

AGENDA ITEM # 11January 27, 1998*Consider approving updates for County policy manual.

John Willingham addressed the court on update for the Williamson County policy manual.

Moved: Commissioner Mehevec

Seconded:

Motion: To adopt personnel policy and include the four lines that are marked out in Chapter III, Section 12: Conflict of Interest and make that part of the personnel policy.

Motion died for lack of second.

Moved: Commissioner Mehevec

Seconded: Commissioner Heiligenstein

Motion: To approve Human Resources Director John Willingham consulting with the ethics commission and put agenda item back on February 17, 1998 (3 weeks) agenda and adopt policy as one document.

Vote: Motion carried 5 - 0

AGENDA ITEM # 12January 27, 1998*Discuss and take appropriate action regarding lease agreement with Cedar Park Chamber of Commerce in new annex.

Commissioner Boatright addressed the court regarding the lease agreement with Cedar Park Chamber of Commerce in the new annex.

Agenda item tabled until February 3, 1998.

AGENDA ITEM # 13January 27, 1998*Consider approving agreement with YMCA for County Park.

Wade Todd addressed the court on the agreement with YMCA for the County Park and has met with the Parks & Wildlife Department to secure their input and make sure that the YMCA met the definition of being a public park.

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To approve agreement with YMCA for County Park.

Vote: Motion carried 5 - 0

< Clerk copy here >

Mr. Wade Todd, President
YMCA of Greater Williamson County
1812 North Mays
P.O. Box 819
Round Rock, Texas 78680

Dear Mr. Todd:

I have reviewed the proposed agreement whereby the YMCA of Greater Williamson County would assume management responsibility for the 50 acre county park leased from this department. The agreement appears to conform to the condition that the property be used as parkland. I would only offer three cautions:

1. The reversion clause in the Transfer of Jurisdiction is to the Texas Department of Transportation, who would ultimately define "parkland".
2. The park should remain available to the general public under some reasonable use guidelines or fees.
3. Any improvements or development that results in habitat, water or soil disturbance, should be in compliance with all federal and state permits and laws.

Thank you for the opportunity to review and comment on this proposed management agreement and good luck.

Sincerely,

Mike Herring, Director
Land Conservation Program

**PARK MANAGEMENT AND OPERATION
AGREEMENT**

This PARK MANAGEMENT AND OPERATION AGREEMENT (this "Agreement") is entered into this 27th day of January, 1998, to be effective as of October 1, 1997, by and between WILLIAMSON COUNTY, a duly formed county governmental jurisdiction within the State of Texas (the "County") 710 Main Street, Georgetown, Texas 78626 and the YMCA OF GREATER WILLIAMSON COUNTY (the "YMCA") 1812 North Mays, Round Rock, Texas 78664.

WHEREAS, the County currently leases a certain 50 acre parcel of land as more particularly described on Exhibit "A" attached hereto and incorporated herein (the "Property") from the Texas Parks and Wildlife Department under the terms of a certain Lease Agreement dated effective February 1, 1994 whereby the County holds the Property as parkland and must cause the Property to continue to be maintained and operated as parkland (the "County Lease");

WHEREAS, while the County is desirous to provide park facilities for its citizens, the County does not operate or fund a County Parks Department to insure that any parkland facilities, including the Property, can be adequately operated and maintained;

WHEREAS, the County and the YMCA have previously entered into an Agreement dated as of October 1, 1996 whereby the YWCA operated the Property as parkland on behalf of the County for a term ending as of September 30, 1997 under the terms and conditions of said Agreement;

WHEREAS, the County and the YMCA now desire to enter into this Agreement whereby the YMCA will operate and manage the Property on behalf of the County.

NOW THEREFORE, in consideration of the above premises as well as the mutual benefits to each of the parties hereto, the County and the YMCA hereby agree to the following:

A. **Term and Use.** The YMCA shall, from the effective date hereof until the termination of the County Lease (unless otherwise sooner terminated under the terms hereof), manage and operate the Property as parkland on behalf of the County. The County Lease provides that the initial lease term shall be fifty (50) years from the date of the County Lease, with the County having the right to renew and extend the County Lease for an additional fifty (50) year term. The YMCA shall have the right hereunder to compel the County to exercise said renewal and extension of the County Lease by written notice delivered to the County at least ninety (90) days prior to termination of the original term.

The YMCA shall operate the Property as a limited access park whereby the park and its facilities may be reserved for use primarily by youth groups and organizations within the County for the furtherance of such groups' and organizations' efforts to promote the education, health and well being of the County's youth. Such use shall include the operation by the YMCA of its summer youth program as well as other programs the YMCA may develop in connection with the utilization of the Property. The Property shall also be made available to other County youth groups, and the YMCA shall make every reasonable effort to accommodate such additional groups.

B. YMCA Duties. The YMCA shall provide the following in connection with the management and operation of the Property: --

1. Develop and revise as necessary a fee schedule for use of the Property and collect said fees on a timely basis. In addition, provide, coordinate and operate a reservations system for the use of the Property.
2. Designate all open use and restricted use areas within the Property. In addition, work with the County and any consultants retained by the County in connection with development of a long-term comprehensive plan for the Property and its continued use as parkland.
3. Establish the park schedule and control access to the park based on such schedule.
4. Negotiate and administer operating contracts related to grounds maintenance, litter control and restroom maintenance on an ongoing basis.
5. Maintain public liability insurance for the Property and the conduct of the YMCA's programs on the Property, naming the County as an additional insured, in the amounts reasonably agreed to by the YMCA and the County from time to time.
6. Maintain adequate records on all matters related to the operation of the Property and provide copies of all such records as may reasonably be required by the County.
7. Provide general operation and maintenance oversight and management necessary to maximize the safe and effective use of the Property for the purposes provided herein.
8. It is anticipated that all costs and expenses reasonably related to the operation and maintenance of the Property shall be paid out of the fees collected in connection with the use of the parkland.

C. County Duties. The County shall provide the following in connection with the management and operation of the Property:

1. Construct and/or renovate various capital improvements related to the Property including:

a) a new entrance to the Property from U.S. Highway 183, including roadways, entry gates and signage;

b) installation of all perimeter fencing, guardrails and interior barriers as may be necessary for the safe use of the Property; and

c) any other construction and/or renovation projects agreed upon between the County and the YMCA in connection with the Property.

2. Provide periodic patrols of the Property by County Sheriff's Officers.

D. Alterations. The YMCA shall have the right, but not the obligation, to construct physical additions and improvements to the Property, such physical additions and improvements to be constructed solely at the YMCA's cost and expense. Prior approval by the County for the construction of such improvements shall not be required. Any physical additions or improvements to the Property made by the YMCA will become the property of the County. However, the YMCA shall have the right, at the YMCA's cost, to remove any physical additions or improvements which are made by the YMCA so long as such can be removed without substantial damage to the Property and the area from which such addition or improvement is removed is reasonably restored to its natural condition.

E. County Default. A default by the County hereunder is the failure to comply with any provision of this Agreement that is not cured within thirty days after written notice is delivered to the County by the YMCA.

F. YMCA Default. A default by the YMCA hereunder is the failure to comply with any provision of this Agreement that is not cured within thirty days after written notice is delivered to the YMCA by the County.

G. Remedies and Termination. In the event either party herein is in default hereunder and has not cured such default within the period provided, the nondefaulting party may either (a) cure said default on behalf of the defaulting party and seek

reimbursement (in the case of any cure made through the payment of money) from the defaulting party, or (b) terminate this Agreement effective 90 days from delivery of notice of such termination to the defaulting party.

H. Impossibility of Performance, Condemnation. In the event it becomes unreasonably onerous for either party to fulfill its obligations hereunder after such party has made all reasonable efforts to overcome such difficulty, then such party may terminate this Agreement effective 90 days from delivery of notice of such termination to the other party. In addition, if the Property cannot be used for the purposes contemplated hereunder because of condemnation or purchase in lieu of condemnation, this Agreement shall terminate.

I. Notices. Any notice required by this Agreement shall be deemed to be delivered (whether or not actually received) when deposited with the United States Postal Service, postage prepaid, certified mail, return receipt requested, addressed to the County or the YMCA at their respective addresses as they appear above or as otherwise revised from time to time in writing delivered to the other party.

J. Entire Agreement. This Agreement, together with the attached exhibits, is the entire agreement of the parties, and there are no oral representations, warranties, agreements, or promises pertaining to this Agreement. This Agreement may be amended only by an instrument in writing signed by the County and the YMCA.

"THE COUNTY"

WILLIAMSON COUNTY

By: John C. Daerfler 1-27-98
 Name: John C. Daerfler
 Title: County Judge

"THE YMCA"

YMCA OF GREATER WILLIAMSON
 COUNTY

By: W. A. Dunn
 Name: Wade Todd
 Title: PRESIDENT/CEO

BRYSON & ASSOCIATES

surveying company

1401 Slaughter Lane West • Austin, Texas 78748 • 512-282-0120

FIELD NOTES

BEING ALL THAT CERTAIN TRACT OR PARCEL OF LAND OUT OF AND A PART OF THE SAMUEL DAMON SURVEY SITUATED IN WILLIAMSON COUNTY, TEXAS, MORE PARTICULARLY DESCRIBED AS BEING OUT OF AND A PART OF THAT CERTAIN TRACT OF LAND, CALLED 305.05 ACRES, CONVEYED FROM N.J. DEDEAR, ET UX, TO THE STATE OF TEXAS FOUND OF RECORD IN VOLUME 311, PAGE 551, WILLIAMSON COUNTY, TEXAS DEED RECORDS, SAID TRACT BEING 50.000 ACRES OF LAND MORE FULLY DESCRIBED BY METES AND BOUNDS AS FOLLOWS,

BEGINNING at an iron pin set on the north line of said 305.05 acre tract for the northwest corner of the herein described tract, from which point a concrete monument found at the northwest corner of said 305.05 acre tract bears S 81°58'09" W, 361.01 feet,

1. THENCE, with said north line, N 81°58'09" E, 1,039.87 feet to an angle point,

2. THENCE, leaving said north line, S 83°03'09" E, 200.29 feet to an iron pin set at the northeast corner of the herein described tract,

THENCE, with the east line of the herein described tract, the following seven (7) courses and distances, numbered 3 through 9,

3. S 03°22'29" W, 617.14 feet to an iron pin set for an angle point,
4. S 05°13'58" E, 292.75 feet to an iron pin set for an angle point,
5. S 26°59'08" E, 310.71 feet to an iron pin set for an angle point,
6. S 04°25'11" E, 368.07 feet to an iron pin set for an angle point,
7. S 21°09'59" W, 729.27 feet to an iron pin set at the beginning of a curve,
8. with a curve to the right whose radius equals 602.96 feet, an arc length of 483.28 feet and whose chord bears S 44°07'42" W, 470.45 feet to an iron pin set at the end of said curve,
9. S 67°05'25" W, 112.28 feet to an iron pin set on the proposed east R.O.W. line of U.S. Highway 183 for the most southerly corner of the herein described tract,

10. THENCE, with said proposed R.O.W. line, N 22°13'15" W, 60.00 feet to an iron pin set for an ell corner,

11. THENCE, leaving said proposed R.O.W. line, N 67°05'25" E, 111.56 feet to an iron pin set at the beginning of a curve,

12. THENCE, with a curve to the left whose radius equals 542.96 feet, an arc length of 192.91 feet and whose chord bears N 56°54'43" E, 191.89 feet to an iron pin set at a corner,

13. THENCE, N 22°13'15" W, with a line 350.00 feet east of and parallel to the existing R.O.W. line, 870.06 feet to an iron pin set for an ell corner,

14. THENCE, S 67°05'25" W, 300.02 feet to an iron pin set on said proposed R.O.W. line for an ell corner,

15. THENCE, with said proposed R.O.W. line N 22°13'15" W, 596.68 feet to a point on the west property line of said 305.05 acre tract,

THENCE, with said west property line of said 305.05 acre tract the following ten (10) courses and distances numbered 16 through 25,

16. N 20°17'01" E, 18.28 feet to an angle point,
17. N 20°22'08" E, 32.03 feet to an angle point,
18. N 00°52'07" W, 36.24 feet to an angle point,
19. N 00°43'44" E, 40.74 feet to an angle point,
20. N 06°59'20" E, 37.83 feet to an angle point,
21. N 17°52'55" E, 35.46 feet to an angle point,
22. N 16°28'22" E, 36.48 feet to an angle point,
23. N 17°15'15" E, 32.56 feet to an angle point,
24. N 19°13'12" W, 34.90 feet to an iron pin set at an angle point,
25. N 21°58'53" W, 223.62 to an iron pin set for an ell corner,

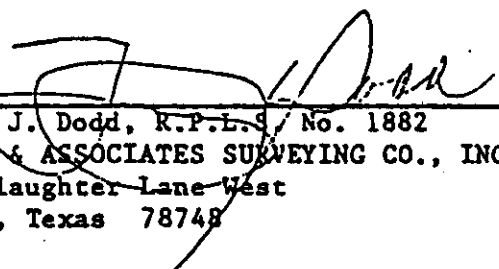
26. THENCE, leaving said property line, N 60°02'08" E, 150.69 feet to an iron pin set for a corner,

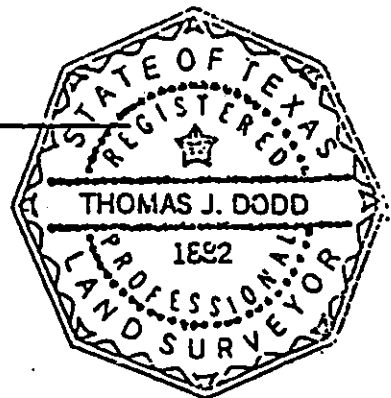
27. THENCE, N 22°13'15" W, with a line 350.00 feet east of and parallel to the existing R.O.W. line, 507.72 feet to the POINT OF BEGINNING containing 50.000 Acres of Land.

I, Thomas J. Dodd, a Registered Professional Land Surveyor do hereby certify that these field notes represents a survey made on the ground this date under my supervision and that all corners are as shown.

Dated this the 26TH day of AUGUST, 1991.

SURVEYED BY:


Thomas J. Dodd, R.P.L.S. No. 1882
BRYSON & ASSOCIATES SURVEYING CO., INC.
3401 Slaughter Lane West
Austin, Texas 78748



CSJ No. 0151-05-055
Job: 50.000 Acre Park Land
Disc: SURV4
HR:sep
8/1/91

AGENDA ITEM # 14

January 27, 1998

*

Discuss and take appropriate action regarding Anderson Mill Tax Office lease space.

Commissioner Boatright addressed the court concerning the Anderson Mill Tax Office lease space.

Moved: Commissioner Boatright

Seconded: Judge Doerfler

Motion: To clarify that upon vacating the Anderson Mill Tax Office lease space that everything that is stationary remains in the office, not including furniture.

Vote: Motion carried 4 - 0 With Commissioner Hays absent from the dais.

Commissioner Boatright withdrew his motion.

Agenda item tabled until February 10, 1998.

AGENDA ITEM # 15

January 27, 1998

*

Discuss and take appropriate action on EMS station for Leander/Liberty Hill area.

EMS Director John Sneed addressed the court concerning the EMS station in the Leander/Liberty Hill area stopping transportation of patients in the near future, but will still participate as "first responders".

No action taken on agenda item which will be placed on February 3, 1998 agenda.

AGENDA ITEM # 16

January 27, 1998

*

Discuss and take appropriate action concerning possible agreement with senior citizens group and Liberty Hill Annex.

Moved: Commissioner Boatright

Seconded: Judge Doerfler

Motion: To draft an agreement with senior citizens group and the Liberty Hill Annex to be presented to commissioners court for approval.

Vote: Motion carried 5 - 0

AGENDA ITEM # 17January 27, 1998*

Consider approving the transfer of the following fixed assets from Tax Office to Sheriff's Department Support Services Division:

- (1) CRT - A108531
- (1) Keyboard - A108530
- (1) Processor - A108528
- (1) Printer - 107768

Consider approving the transfer of the following fixed assets from Justice of the Peace #2 to Constable #2.

- (3) blue cloth chairs - A101795, A101796, A101797

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To approve the transfer of the following fixed assets from Tax Office to Sheriff's Department Support Services Division

- (1) CRT - A108531
- (1) Keyboard - A108530
- (1) Processor - A108528
- (1) Printer - 107768

and approve the transfer of the following fixed assets from Justice of the Peace #2 to Constable #2.

- (3) blue cloth chairs - A101795, A101796, A101797

Vote: Motion carried 5 - 0

< Clerk copy here >

CHANGE OF FIXED ASSET STATUS

DATE 1/14/97

THE FOLLOWING FIXED ASSET IS TO BE: (Circle One)

TRANSFERRED

SOLD

DISPOSED

FIXED ASSET

Quantity	Description	Model	Serial #
1	CRT		A108531
1	Keyboard		A108530
1	Processor		A108528
1	Printer		A107768

FROM (Transferor): Deborah Hunt, Tax OfficeTO (Transferee): Wayne Trayler, Bailiffs

The Transferor requests that this fixed asset be removed from the inventory for his/her office and placed in the inventory for the Transferee's office as of the date shown above.

Deborah M. Hunt
Transferor - Elected Official/Department Head

Howard W. Trayler / Security
Transferee - Elected Official/Department Head

Approved 1-27-98
John C. Daefler

CHANGE OF FIXED ASSET STATUS

DATE January 14, 1998

THE FOLLOWING FIXED ASSET IS TO BE: (Circle One) :

TRANSFERRED

SOLD

DISPOSED

FIXED ASSET

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Serial #</u>
<u>1</u>	<u>Blue cloth chair</u>		<u>A-101795</u>
<u>1</u>	<u>" " "</u>		<u>A-101796</u>
<u>1</u>	<u>" " "</u>		<u>A-101797</u>

FROM (Transferor): J. P. #2 (100-452)TO (Transferee): Constable Pct. #2 (100-532)

The Transferor requests that this fixed asset be removed from the inventory for his/her office and placed in the inventory for the Transferee's office as of the date shown above.

[Signature]
Transferor - Elected Official/Department Head

[Signature]
Transferee - Elected Official/Department Head

approved 1-27-98
John C. Daefler

AGENDA ITEM # 18January 27, 1998*

Consider approving increasing Justice of the Peace #3 change fund from \$100.00 for two drawers to \$200.00 for two drawers. (Total of \$400.00)

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To approve increasing Justice of the Peace #3 change fund from \$100.00 for two drawers to \$200.00 for two drawers for a total of \$400.00.

Vote: Motion carried 5 - 0

AGENDA ITEM # 19January 27, 1998*

Consider approving a line item transfer for the Extension Service:

from:	100-665-5750	Office Furniture & Equipment	\$743.63
to:	100-665-5700	Vehicles	\$743.63

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To approve a line item transfer for the Extension Service:

from:	100-665-5750	Office Furniture & Equipment	\$743.63
to:	100-665-5700	Vehicles	\$743.63

Vote: Motion carried 5 - 0

< Clerk copy here >

ORDER APPROVING A LINE ITEM TRANSFER FOR

100-665

FUND

EXTENSION SERVICE

DEPARTMENT

Judy Adkins

SIGNATURE

WHEREAS, The Williamson County Commissioners Court has carefully studied the public necessity of transferring funds from one line item to another within the above mentioned department's budget; and WHEREAS, The Williamson County Commissioners Court, due to unforeseeable circumstances, did not appropriate sufficient funds in the proper line items when adopting the current county budget; and

WHEREAS, On the 27th day of January, 1998, a motion made by Commissioner Hays and duly seconded by Judge Doerfler the motion carried by a vote of 5 votes for, 0 votes against.

THEREFORE, BE IT ORDERED THAT THE 1997/98 FISCAL YEAR WILLIAMSON COUNTY BUDGET BE AMENDED AND THE FOLLOWING AMOUNT(S) BE TRANSFERRED FROM THE FOLLOWING LINE ITEMS INTO THE NEEDED LINE ITEMS:

FUNDS TO BE REMOVED FROM THE FOLLOWING LINE ITEMS:

LINE ITEM #	DESCRIPTION	AMOUNT
100-665-5750	Office Furniture & Equipment	743.63

FUNDS TO BE INCREASED IN THE FOLLOWING LINE ITEMS:

LINE ITEM #	DESCRIPTION	AMOUNT
100-665-5700	Vehicles	743.63

WHEREUPON, A motion made and seconded, the Williamson County Commissioners Court did authorize the County Judge to sign this Order, the County Clerk was instructed to file a copy of this Order with the existing budget, and to forward a copy of this Order to the County Auditor.

ATTEST:

Elaine Bizzell, County Clerk

John C. Doerfler 1-27-98
John C. Doerfler, County Judge

AGENDA ITEM # 20

January 27, 1998

*

Consider approving a line item transfer for the Justice of the Peace #3:

from:	100-453-4130	Court Appointed Attorneys	\$350.00
to:	100-453-4232	Training	\$350.00

Moved: Commissioner Hays

Seconded: Judge Doerfler


Motion: To approve a line item transfer for the Justice of the Peace #3:

from:	100-453-4130	Court Appointed Attorneys	\$350.00
to:	100-453-4232	Training	\$350.00

Vote: Motion carried 5 - 0

< Clerk copy here >

ORDER APPROVING A LINE ITEM TRANSFER FOR

453	Justice of The Peace, Pct. #3	
FUND	DEPARTMENT	SIGNATURE

WHEREAS, The Williamson County Commissioners Court has carefully studied the public necessity of transferring funds from one line item to another within the above mentioned department's budget; and WHEREAS, The Williamson County Commissioners Court, due to unforeseeable circumstances, did not appropriate sufficient funds in the proper line items when adopting the current county budget; and

WHEREAS, On the 27th day of January, 1998, a motion made by Commissioner Hays and duly seconded by Judge Doerfler the motion carried by a vote of 5 votes for, 0 votes against.

THEREFORE, BE IT ORDERED THAT THE 1997/98 FISCAL YEAR WILLIAMSON COUNTY BUDGET BE AMENDED AND THE FOLLOWING AMOUNT(S) BE TRANSFERRED FROM THE FOLLOWING LINE ITEMS INTO THE NEEDED LINE ITEMS:

FUNDS TO BE REMOVED FROM THE FOLLOWING LINE ITEMS:

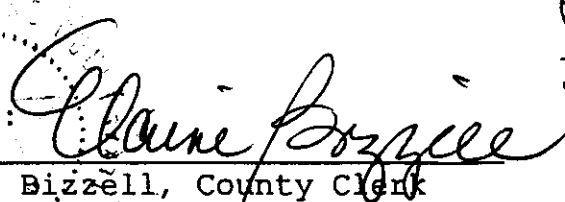
LINE ITEM #	DESCRIPTION	AMOUNT
100-453-4130	Court Appointed Attorneys	\$350.00

FUNDS TO BE INCREASED IN THE FOLLOWING LINE ITEMS:

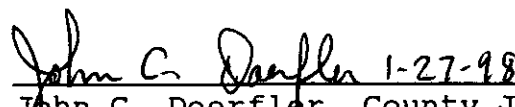
LINE ITEM #	DESCRIPTION	AMOUNT
100-453-4232	Training	\$350.00

WHEREUPON, A motion made and seconded, the Williamson County Commissioners Court did authorize the County Judge to sign this Order, the County Clerk was instructed to file a copy of this Order with the existing budget, and to forward a copy of this Order to the County Auditor.

ATTEST:



Elaine Bizzell, County Clerk



John C. Doerfler, County Judge

AGENDA ITEM # 21

January 27, 1998

*

Consider declaring an emergency and acknowledging additional revenue for EMS Department:

100-342-8000 EMS Fees \$100,073.00

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To declare an emergency and acknowledge additional revenue for EMS Department:

100-342-8000 EMS Fees \$100,073.00

Vote: Motion carried 5 - 0

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AN ORDER DECLARING AN EMERGENCY AND A GRAVE PUBLIC NECESSITY DUE TO UNFORESEEABLE CIRCUMSTANCES AND APPROVING A BUDGET AMENDMENT FOR

100-540 EMS
FUND DEPARTMENT

WHEREAS, THE WILLIAMSON COUNTY COMMISSIONERS COURT HAS CAREFULLY STUDIED THE PUBLIC NECESSITY OF INCREASING THE AUTHORIZED EXPENDITURES DURING THIS FISCAL YEAR; AND

WHEREAS, THE WILLIAMSON COUNTY COMMISSIONERS COURT, DUE TO UNFORESEEABLE CIRCUMSTANCES, DID NOT APPROPRIATE SUFFICIENT FUNDS IN THE CURRENT BUDGET FOR THIS NECESSARY EXPENDITURE; NOW

THEREFORE, BE IT ORDERED BY THE WILLIAMSON COUNTY COMMISSIONERS COURT THAT AN EMERGENCY AND GRAVE PUBLIC NECESSITY DOES EXIST DUE TO UNFORESEEABLE CIRCUMSTANCES.

WHEREAS, ON THE 21 DAY OF JAN., 1998, A MOTION MADE BY Commissioner Hays AND SECONDED BY Judge Doerfler THE MOTION CARRIED BY A VOTE OF 5 FOR, 0 AGAINST.

WHEREAS, THE WILLIAMSON COUNTY COMMISSIONERS COURT HAS DECLARED AN EMERGENCY AND A GRAVE PUBLIC NECESSITY DUE TO UNFORESEEABLE CIRCUMSTANCES IN THE MATTER OF BUDGETING NECESSARY FUNDS FOR THE ABOVE MENTIONED DEPARTMENT; NOW

THEREFORE, BE IT ORDERED THAT THE 1998 FISCAL YEAR WILLIAMSON COUNTY BUDGET BE AMENDED TO APPROPRIATE ADDITIONAL REVENUE AND THE FOLLOWING AMOUNTS BE APPROPRIATED FOR THE FOLLOWING LINE ITEMS:

ACCOUNT #	DESCRIPTION	AMOUNT
100-342-8000	EMS FEES	\$ 100,073.00

WHEREUPON, A MOTION DULY MADE AND SECONDED, THE WILLIAMSON COUNTY COMMISSIONERS COURT DID AUTHORIZE THE COUNTY JUDGE TO SIGN THIS ORDER, THE COUNTY CLERK WAS INSTRUCTED TO FILE A COPY OF THIS ORDER WITH THE EXISTING BUDGET, AND TO FORWARD A COPY OF THIS ORDER TO THE COUNTY AUDITOR.

John C. Doerfler 1-27-98
JOHN C. DOERFLER, COUNTY JUDGE

ATTEST:

Elaine Bizzell
ELAINE BIZZELL, COUNTY CLERK

AGENDA ITEM # 22January 27, 1998*Consider declaring an emergency and acknowledging additional expenditures for EMS Department:

100-540-1100	Salaries	\$87,225.00
100-540-2000	Fringe Benefits	12,848.00

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To declare an emergency and acknowledge additional expenditures for EMS Department:

100-540-1100	Salaries	\$87,225.00
100-540-2000	Fringe Benefits	12,848.00

Vote: Motion carried 5 - 0

< Clerk copy here >

AN ORDER DECLARING AN EMERGENCY AND A GRAVE PUBLIC NECESSITY DUE TO UNFORESEEABLE CIRCUMSTANCES AND APPROVING A BUDGET AMENDMENT FOR

100-540 EMS
FUND DEPARTMENT

WHEREAS, THE WILLIAMSON COUNTY COMMISSIONERS COURT HAS CAREFULLY STUDIED THE PUBLIC NECESSITY OF INCREASING THE AUTHORIZED EXPENDITURES DURING THIS FISCAL YEAR; AND

WHEREAS, THE WILLIAMSON COUNTY COMMISSIONERS COURT, DUE TO UNFORESEEABLE CIRCUMSTANCES, DID NOT APPROPRIATE SUFFICIENT FUNDS IN THE CURRENT BUDGET FOR THIS NECESSARY EXPENDITURE; NOW

THEREFORE, BE IT ORDERED BY THE WILLIAMSON COUNTY COMMISSIONERS COURT THAT AN EMERGENCY AND GRAVE PUBLIC NECESSITY DOES EXIST DUE TO UNFORESEEABLE CIRCUMSTANCES.

WHEREAS, ON THE 27 DAY OF Jan, 1998, A MOTION MADE BY Commissioner Hays AND SECONDED BY Judge Doerfler THE MOTION CARRIED BY A VOTE OF 5 FOR, 0 AGAINST.

WHEREAS, THE WILLIAMSON COUNTY COMMISSIONERS COURT HAS DECLARED AN EMERGENCY AND A GRAVE PUBLIC NECESSITY DUE TO UNFORESEEABLE CIRCUMSTANCES IN THE MATTER OF BUDGETING NECESSARY FUNDS FOR THE ABOVE MENTIONED DEPARTMENT; NOW

THEREFORE, BE IT ORDERED THAT THE 1998 FISCAL YEAR WILLIAMSON COUNTY BUDGET BE AMENDED TO APPROPRIATE ADDITIONAL EXPENDITURES AND THE FOLLOWING AMOUNTS BE APPROPRIATED FOR THE FOLLOWING LINE ITEMS:

ACCOUNT #	DESCRIPTION	\$ AMOUNT
100-540-1100	Salaries	\$ 87,225.00
100-540-2000	FRINGE	\$ 12,848.00

WHEREUPON, A MOTION DULY MADE AND SECONDED, THE WILLIAMSON COUNTY COMMISSIONERS COURT DID AUTHORIZE THE COUNTY JUDGE TO SIGN THIS ORDER, THE COUNTY CLERK WAS INSTRUCTED TO FILE A COPY OF THIS ORDER WITH THE EXISTING BUDGET, AND TO FORWARD A COPY OF THIS ORDER TO THE COUNTY AUDITOR.

John C. Doerfler 1-27-98
JOHN C. DOERFLE, COUNTY JUDGE

ATTEST:
Elaine Bizzell
ELAINE BIZZELL, COUNTY CLERK

AGENDA ITEM # 23

January 27, 1998

*

Discuss and take any appropriate action on EMS salary changes to be effective February 6, 1998.

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To approve EMS salary changes to be effective February 6, 1998.

Vote: Motion carried 5 - 0

< Clerk copy here >



HUMAN RESOURCES DEPARTMENT
Williamson County Courthouse
710 Main St., Second Floor
Georgetown, Texas 78626
Phone: 512/930-3338

January 23, 1998

MEMORANDUM

TO: COUNTY JUDGE AND COMMISSIONERS
FROM: JOHN WILLINGHAM *JW*
SUBJECT: EMS PAY ISSUE

The following information shows the cost of upgrading EMS paramedics by three steps per position and the cost of increasing the relief EMS pay from \$6.50 an hour to \$7.00 an hour, effective February 6, 1998:

5 paramedics from 17/7 to 21/2= $\$2,000.71 \times 5 = \$10,003.55$

15 paramedics from 17/8 to 21/3= $\$2,046.18 \times 15 = \$30,692.70$

4 paramedics from 17/9 to 21/4= $\$2,114.39 \times 4 = \$8,457.56$

14 paramedics from 17/10 to 21/5= $\$2,182.61 \times 14 = \$30,556.54$

4 paramedics from 17/11 to 21/6= $\$2,228.05 \times 4 = \$8,912.20$

1 paramedic from 17/12 to 21/7= $\$2,273.53$

Total cost in salary adjustments= $\$90,896.08$ (over 12 months)

Pro-rated for remainder of fiscal year= $\$90,896 \times .6923 =$
 $\$62,927$

Add increased cost for overtime= $\$62,927 + \$10,000 = \$72,927$

Add cost of increasing relief pay= $\$72,927 + \$14,297 = \$87,225$

Add federal deductions= $.1473 \times \$87.225 = \$12,848$

Grand total= $\$87,225 (540-1100) + \$12,848 (540-2000) = \underline{\$100,073}$

AGENDA ITEM # 24

January 27, 1998

*

Consider approving pay increase for EMS relief personnel.

Moved: Commissioner Hays

Seconded: Judge Doerfler

Motion: To approve pay increase for EMS relief personnel.

Vote: Motion carried 5 - 0

< Clerk copy here >

COMMISSIONERS COURT RECESSED TO EXECUTIVE SESSION AT 12:08 P.M. ON TUESDAY,
JANUARY 27, 1998.

January 7, 1998

MEMORANDUM

TO: JUDGE DOERFLER
FROM: JOHN WILLINGHAM *John*
SUBJECT: PART-TIME/RELIEF PAY FOR EMS

I forgot to mention in my memo dated yesterday that our EMS relief pay is also behind that of other entities. Most are now paying \$7.50 to \$8 an hour for relief. John Sneed has requested that his relief people be raised from \$6.50 to \$7.50 per hour. I think this is a good idea, and it might not actually cost us all that much if the straight time overtime is adopted for regular EMS people—they would want to work those hours themselves, and relief hours would be reduced.

Based on part-time hours for this calendar year, the change would cost about \$17,129 over a year, if there were no reduction in the amount of part-time work needed to run the department.

AGENDA ITEM # 25January 27, 1998*

Discuss pending litigation: Mosaab Najjar vs. Deputy Sheriff Gleason, et al (EXECUTIVE SESSION REQUESTED as per V.T.C.A. Govt. code sec. 551.071 consultation with attorney)

Those present for executive session were Judge Doerfler, Commissioners Heiligenstein, Boatright, Hays and Mehevec along with County Attorney Gene Taylor and First Assistant County Attorney Dale Rye.

The pending litigation of Mosaab Najjar vs. Deputy Sheriff Gleason, et al was discussed but no action was taken in executive session.

AGENDA ITEM # 26January 27, 1998*

Discuss pending litigation: Richard Stewart vs. Williamson County, Texas (EXECUTIVE SESSION REQUESTED as per V.T.C.A. Govt. code sec. 551.071 consultation with attorney)

Those present for executive session were Judge Doerfler, Commissioners Heiligenstein, Boatright, Hays and Mehevec along with County Attorney Gene Taylor and First Assistant County Attorney Dale Rye and County Road & Bridge Director Greg Bergeron.

The pending litigation of Richard Stewart vs. Williamson County, Texas was discussed but no action was taken in executive session.

AGENDA ITEM # 27January 27, 1998*

Discuss potential litigation: Carolyn Barnes vs. Williamson County (EXECUTIVE SESSION REQUESTED as per V.T.C.A. Govt. Code sec. 551.071 consultation with attorney)

Those present for executive session were Judge Doerfler, Commissioners Heiligenstein, Boatright, Hays and Mehevec along with County Attorney Gene Taylor and First Assistant County Attorney Dale Rye.

The pending litigation of Carolyn Barnes vs. Williamson County was discussed but no action was taken in executive session.

COMMISSIONERS COURT RECONVENED FROM EXECUTIVE SESSION AT 12:29 P.M. ON TUESDAY, JANUARY 27, 1998.

AGENDA ITEM # 28January 27, 1998*

Discuss and take any appropriate action on pending litigation: Mosaab Najjar vs. Williamson County Deputy Gleason, et al.

Moved: Commissioner Boatright

Seconded: Commissioner Hays

Motion: To retain Mike Davis of Walsh, Akins & Davis, PC to represent Williamson County in the pending litigation of Mosaab Najjar vs. Williamson County Deputy Gleason, et al.

Vote: Motion carried 5 - 0

AGENDA ITEM # 29January 27, 1998*

Discuss and take any appropriate action on pending litigation: Richard Stewart vs. Williamson County, Texas.

Moved: Commissioner Boatright

Seconded: Commissioner Hays

Motion: To retain Mark Dietz of Dietz & Associates to represent Williamson County in the pending litigation of Richard Stewart vs. Williamson County, Texas.

Vote: Motion carried 5 - 0

AGENDA ITEM # 30January 27, 1998*

Discuss and take any appropriate action on potential litigation: Carolyn Barnes vs. Williamson County.

Moved: Commissioner Hays

Seconded: Commissioner Boatright

Motion: To retain Ann Snell of Bickerstaff, Heath & Smiley LLP in the pending litigation of Carolyn Barnes vs. Williamson County.

Vote: Motion carried 5 - 0

AGENDA ITEM # 31January 27, 1998*

Hear comments from commissioners.

Judge Doerfler commended Commissioner Hays and EMS Director John Sneed on their presentation in College Station concerning the Jarrell tornado.

COMMISSIONERS COURT RECESSED AT 12:33 P.M. ON TUESDAY, JANUARY 27, 1998.

COMMISSIONERS COURT RECONVENED AT 2:10 P.M. ON TUESDAY, JANUARY 27, 1998.

AGENDA ITEM # 32January 27, 1998*

Work Session - Revising subdivision regulations.

County Engineer Joe England presented the court with a copy of the proposed changes of the existing subdivision regulations and highlighted issues presented in a memo by Mr. England to commissioners court.

< Clerk copy here >

JOE M. ENGLAND, P.E.
COUNTY ENGINEER



1900 Georgetown Inner Loop, Suite B
Georgetown, Texas 78626
Telephone (512) 930-3330
Fax (512) 930-3335

Williamson County
Unified Road System

MEMORANDUM

Date: January 27, 1998
From: Joe M. England, P.E. *JME*
To: John Doerfler, County Judge
Mike Heiligenstein, Commissioner Pct. 1
Greg Boatright, Commissioner Pct. 2
David Hays, Commissioner Pct. 3
Jerry Mehevec, Commissioner Pct. 4
Subject: Revised Williamson County Subdivision Regulations

Attached is the revised copy of the existing subdivision regulations. Existing text that is to remain is shown as normal text (normal). Existing text that is to be deleted is shown as strike out text (strike out). Proposed text is shown as italicized text (italicized).

Most changes are minor. The major changes or items to address are as follows:

1. Section 3.1 Platting Procedure Page 7

The court needs to verify that this is the procedure that they want to follow. I do not believe that this procedure is currently being followed.

2. Section 6.4 Road Maintenance Page 17

Each developer will be required to post full fiscal with the county prior to filing a final plat except for those developments that are within utility districts who have agreed not to provide utility hook up until we accept the construction of the streets. Ten per cent of the full fiscal will be required for all subdivisions for two years or 60% occupancy. In return, the county will immediately accept the streets for maintenance.

3. Section 7. Substandard Subdivisions Page 17

This entire sections has been removed due to the moratorium on assessment districts.

4. Section 8. Private Subdivisions Page 19

This is a new section that reflects issues that the court has recently imposed upon subdivisions with private streets.

January 27, 1998
Page Two

5. Section B.2.5

Page 25

This limits local and residential collector streets to a length of 1500 feet. The purpose is to prevent long continuous streets in subdivisions where high rates of speed can be reached.

6. Section B.10.1

Page 31

This changes the design of detention ponds from just the 100 year event to the 2, 10, and 100 year event. The 10 year event is about twice the flow of the 2 year event and the 100 year event is about twice the flow of the 10 year event.

7. Section B.10.11

Page 32

This section eliminates roadside ditches provided that concrete ribbon curbs are used and that the natural drainage patterns in the subdivision are maintained.

8. Section B.11.4

Page 33

This section shifts the responsibility for obtaining a driveway culvert permit from URS to the Health Department for all driveways onto rural county roads whose lot is served by a septic system. The Health Department already has an inspector on site for each of these lots during construction. Modifications will need to be made in their rules and fee structure.

9. Section C.8 Mailboxes

Page 38

This section mandates that all mailboxes be installed in accordance with TxDOT standards. URS is given permission to remove any mailbox that does not meet this standard.

COMMISSIONERS COURT ADJOURNED AT 3:22 P.M. ON TUESDAY, JANUARY 27, 1998.

*** See Volume 89, page 339 for noting in minutes this utility installation request

GREG BERGERON
COUNTY ROAD ADMINISTRATOR



Williamson County
Unified Road System

1900 Georgetown Inner Loop, Suite B
Georgetown, Texas 78626
Telephone (512) 930-3330
Fax (512) 930-3335

VOL 0095 PAGE 091

UTILITY INSTALLATION REQUEST

DATE: 6-16-97

TO: Williamson County Commissioners' Court
c/o County Engineer, County Road Administrator or County Commissioner

Formal notice is hereby given that MANVILLE W.S.C proposes to place
a 4" P.V.C WATER line within the right-of-way of CR 197
County Road as follows: FROM THE INTERSECTION
OF CR 137 OR JAKES HILL RD AND CR 197 ON BRUSHY CREEK
THE RD INCREASMENT GOING WEST ON 197 IS 70'

The location and description of the proposed line and appurtenances is more
fully shown on the drawing attached hereto. The line will be constructed &
maintained on the County right-of-way in accordance with current Williamson
County Specifications as directed by the County Engineer, County Road
Administrator or County Commissioner.

Construction will begin on or after the _____ day of _____, 19____, and
is estimated to be completed in _____ calendar days.

SUBMITTED BY FIRM: MANVILLE W.S.C AUTHORIZED
SIGNATURE: [Signature] TITLE: GENERAL MANAGER FIRM ADDRESS: PO BOX
248 COURLAND TR 78645 PHONE # 512-272-4044
CONTRACTOR (if different from firm): _____
AUTHORIZED SIGNATURE: _____ TITLE: _____
ADDRESS: _____ PHONE # _____

Precinct #: 4

APPROVAL

This application is hereby approved subject to the following understandings and restrictions.

It is expressly understood that the said County Commissioners' Court does not imply hereby
to grant any right, claim, title or easement in or upon this County Road; and it is further
understood that in the future, should Williamson County, for any reason, need to work,
improve, relocate, widen, increase, add to, decrease, or in any manner change the structure
of this road or right-of-way, this line, if affected, will be moved at the direction of the
Williamson County Engineer or County Commissioner. This installation work shall not damage
any part of the roadway and adequate provisions shall be made to cause a minimum of
inconvenience to traffic and adjacent property owners.

APPROVED BY WILLIAMSON COUNTY COMMISSIONERS' COURT

BY: [Signature]
COUNTY ROAD ADMINISTRATOR

DATE: 6/17/97

4" PVC WATER LINE

6" PVC ENCASMENT
15' 70'

← WEST

CR 197
FROM CR 137 TO ROAD CROSSING IS 1850'

EAST →

92

← SOUTH

CR 137
JACKS HILL

→ NORTH

GREG BERGERON
County Road Administrator



**Williamson County
Unified Road System**

VOL 0095 PAGE 093

1900 Georgetown Loop, Ste. B
Georgetown, Texas 78626
Telephone (512) 930-3330
Fax (512) 930-3335

When specifically agreed to in writing and signed by a Williamson County Commissioner, or the County Road Administrator, Williamson County will permit the cutting of a roadbed in lieu of core drilling, provided the contractor or contractors agree to the following installation:

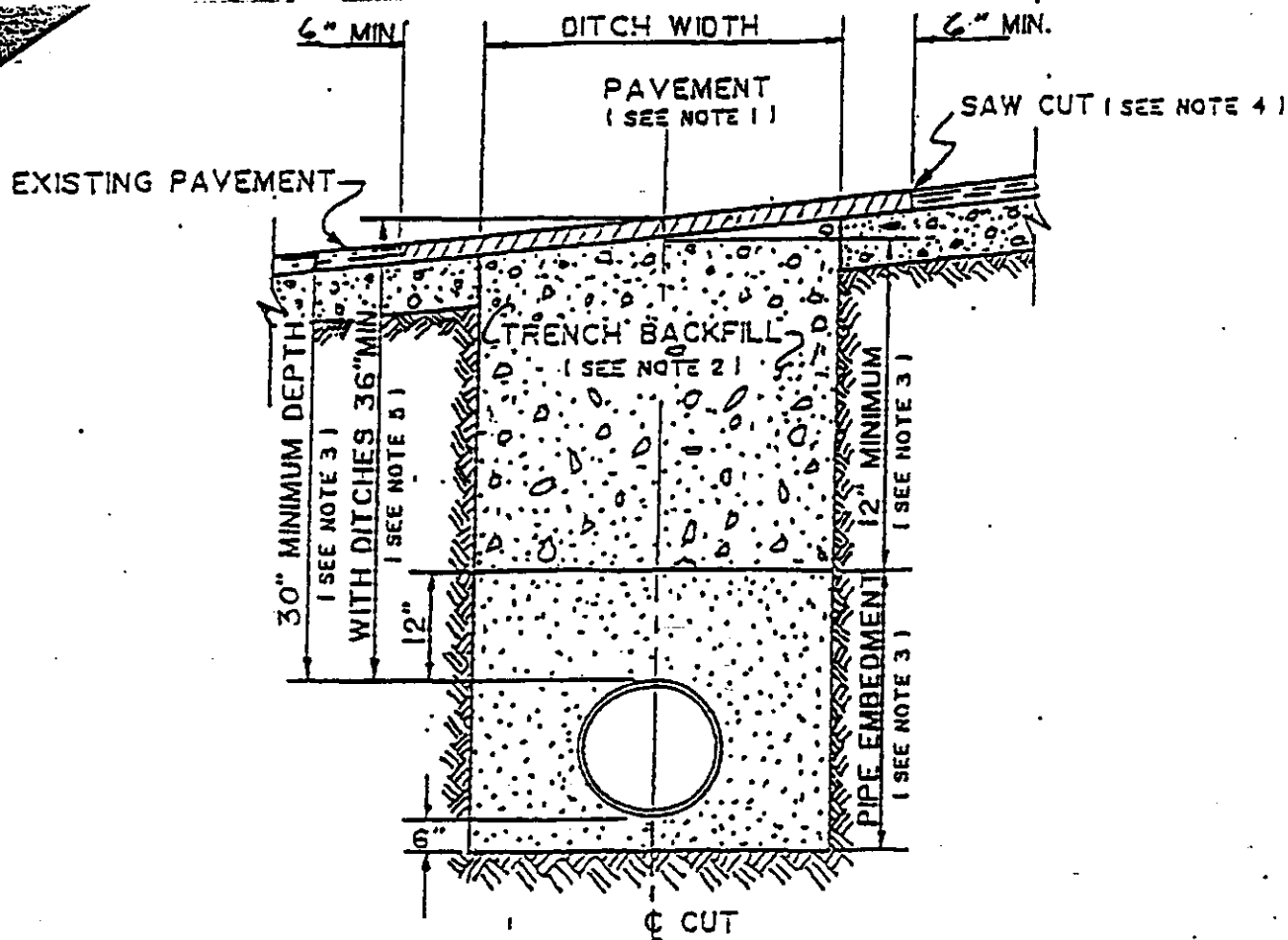
SPECIFICATION FOR CUTTING ROADBED IN LIEU OF CORE DRILLING

1. Compacted base material with concrete cap.
2. The utility shall be placed a minimum of 30" below the flow line.
3. Layer compacted and topped with 3" hot mix asphalt.
4. A performance bond, or other securities agreed upon by the County, must be pledged in the amount of the estimated cost of the road repairs, as agreed to by the contractor and Williamson County, prior to the commencing of a cutting of the roadbed.
5. A road cut permit fee, in the amount of \$120.00 per roadbed cut, must be submitted to the County Road Administrator's office prior to cutting the roadbed.

**SPECIFICATION FOR CUTTING ROADBED IN LIEU OF CORE DRILLING
WITHIN AUSTIN ETJ**

1. Roadbed cuts to be repaired in accordance with City of Austin specifications as outlined in their standard Specifications for Cuts in Public Right of Way Manual.
2. The utility shall be placed a minimum of 30" below the flow line.
3. The installation to be free from defects for a period of one (1) year from completion date. Any maintenance required during this period, caused by the cutting of a road, will be done by the contractor or contractors without cost to the County.
4. A performance bond, or other securities agreed upon by the County, must be pledged in the amount of the estimated cost of the road repairs, as agreed to by the contractor and County, prior to the commencing of a cutting of the roadbed.
5. A roadbed cut permit fee, in the amount of \$120.00 per roadbed cut, must be submitted to the County Road Administrator's office prior to cutting the roadbed.

This agreement must be entered into prior to the commencing of the cutting of a roadbed.



1. Hot mix asphalt 1 1/2" min. thickness. Roll in place to match existing surface. $\pm 1/8"$ tolerance.
2. Trench backfill shall be flexible base, compacted to 95% optimum in 8" layers unless otherwise approved and specified. Flexible base to match existing base thickness or 8 inches, whichever is greater (specifications: TSHD Item 248, Type A, Grade 2).
3. Pipe embedment (pipe envelope) size and materials shall be as specified elsewhere by the utility company and/or its engineers. Pipe depth shall be as specified elsewhere provided minimum depths are met.
4. Saw cut shall be made prior to ditch cut. If pavement is damaged during cut, a new saw cut shall be made beyond the damaged area and new pavement placed.
5. Where roadside ditches (bar ditches) are crossed by the utility pipe, minimum depth to the top of the pipe from centerline road elevation will be 36".

BRID-TABULATION

[illegible]

SPENCER
GODFREY
ARCHITECTS

DOCUMENT 00310

BID FORM

To: Judge John Doerfler
County Judge
Williamson County, Texas

Project: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

Date: APRIL 17, 1997

Submitted by:

(full name)

ANDRES CONSTRUCTION SERVICES

(full address)

816 CONGRESS, SUITE 1100

AUSTIN, TEXAS, 78701

1. OFFER

The undersigned, in compliance with your Invitation To Bid, having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Spencer Godfrey Architects, for the above mentioned project, and being familiar with all of the conditions surrounding the construction of the proposed work propose to furnish all labor, material, equipment and supplies and to construct the project in accordance with the Contract Documents, within the time frame herein stipulated, and for the price set forth below. This price is to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to perform all of the work described in the Specifications and illustrated on the Drawings for a fixed sum (stipulated price) of TWO MILLION SEVEN HUNDRED FIFTY THOUSAND (\$ 2,750,00) including associated profit and overhead.

THE BIDDER UNDERSTANDS THAT TIME IS OF THE ESSENCE TO THE OWNER REGARDING THE COMPLETION OF THE WORK ASSOCIATED WITH THIS CONTRACT. BOTH THE BIDDER'S STIPULATED SUM AND TIME FOR COMPLETION WILL BE CONSIDERED IN DETERMINING THE LOWEST QUALIFIED BIDDER.

Bidder hereby further agrees to commence work on or before the date to be specified in the Owner's Notice to Proceed and to fully complete the work, ready for occupancy within 240 days.

Included herewith, is the required bid security as required by the Instruction to Bidders.

Because the Project is Tax Exempt, NO Federal, State, or Local taxes are included in the Bid Price.

All Cash and Contingency Allowances described in the Contract Documents are included in the Bid Price.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for **forty-five (45)** from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within seven days of receipt.

Commence work within ten days after written Notice to Proceed.

Bidder hereby agrees that the attached bid security will become the property of the Owner, and the Owner may cash the Bond, if the Contract for Construction is not executed by the bidding contractor within seven days from receipt.

3. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum # 1 Dated 3/28/97.

Addendum # 2 Dated 4/14/97.

Addendum # 3 Dated 4/15/97.

Addendum # Dated

4. APPENDICES

The following appendices are included with this bid form and have been properly completed by the bidder:

- a. Section 00410 - Bid Security Form
- b. Section 00420 - Unit Prices

The bidder fully understands, and agrees, that, if he is the apparent lowest qualified bidder, he will submit, within forty-eight hours of the bid time the following documents:

- a. Section 00430 - Subcontractor Listing
- b. Section 00440 - Substitution Listing
- c. Section 00450 - Equipment Suppliers Listing
- d. Section 00740 - Cost Breakdown

5. BID FORM SIGNATURE(S)

The Corporate Seal of

ANDRES CONSTRUCTION SERVICES

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation) was hereunto affixed in the presence of:

Robert H. Andres

(Authorized signing officer Title)

(Seal)

PRESIDENT

(Authorized signing officer Title)



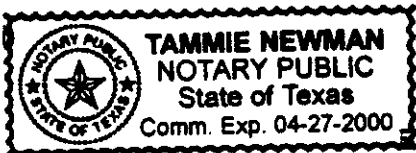
Subscribed and Sworn before me this 17th day of April, 1997.

Notary Public:

Tammie Newman

My Commission Expires: 4-27-2000

(Seal)



END OF DOCUMENT

COPY

THE AMERICAN INSTITUTE OF ARCHITECTS

AIA DOCUMENT A310

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we
816 Congress, Suite 1100
Austin, Texas 78701

ANDRES CONSTRUCTION SERVICES

(Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called Principal, and
HARTFORD PLAZA; HARTFORD, CT 06115

HARTFORD FIRE INSURANCE COMPANY

(Here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of
as Surety, hereinafter called the Surety, are held firmly bound unto
Williamson County, 350 Discovery Blvd., Cedar Park, Texas

CONNECTICUT

(Here insert full name and address or legal title of Owner)

as Obligee, hereinafter called Obligee, in the sum of

FIVE PERCENT OF MAXIMUM AMOUNT BID

Dollars (\$ ***5%MAB***)

for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for
Williamson County Annex

(Here insert full name and address and description of project)

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this 17 th day of April 1997



ANDRES CONSTRUCTION SERVICES

(Principal)

(Seal)

PRESIDENT
(Title)

HARTFORD FIRE INSURANCE COMPANY

(Surety)

(Seal)

(Title) William D. Birdsong, ATTORNEY-IN-FACT

SUPPLEMENTS TO BID FORMS

To: Judge John Doerfler
County Judge
Williamson County

Project: Williamson County Annex
305 Discovery Boulevard
Cedar Park, Texas

Date: 4/17/97

Submitted by:

(full name)
ANARES CONSTRUCTION SERVICES
(full address)
816 CONGRESS, SUITE 1100
AUSTIN, TX, 78701

In accordance with Document 00100 - Instructions to Bidders and Document 00310 - Bid Form,
I/we include the Supplements to Bid Form Appendices listed below. The information provided shall
be considered an integral part of the Bid Form.

These Appendices are as follows:


1. BID FORM
2. BID BOND
3. UNIT PRICES
4. QUALIFICATIONS
5. _____
6. _____

SUPPLEMENTS TO BID FORM SIGNATURE(S)

The Corporate Seal of

ANDRES CONSTRUCTION SERVICES
(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

(Seal)


(Authorized signing officer Title)

END OF SECTION

SECTION 00420

UNIT PRICES

1. The following is a list of Unit Prices referenced in the Bid Form, and stipulated in Section 01151 Unit Prices:

A. The base pier drilling depth is shown on the drawings. All piers shall be drilled to the diameter indicated on the drawings. To establish proper price for pier drilling the following unit prices shall prevail and be used as a measure for credits or charges against the Contract Sum specified in the Contractors Bid.

1. 24" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 10.00 per lineal foot.

For depths less than the base drilling depth level, SUBTRACT
\$ 3.00 per lineal foot.

2. 30" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 12.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 4.00
per lineal foot.

3. 36" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 14.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 5.00
per lineal foot.

4. 42" PIERS


For each additional foot beyond the base drilling depth level, ADD
\$ 16.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 6.00
per lineal foot.

- B. In the event ground water is encountered requiring the casing of piers, ADD
\$ 12.00 per lineal foot of 24" diameter steel pier casing, ADD
\$ 14.00 per lineal foot of 30" diameter steel pier casing.
\$ 16.00 per lineal foot of 36" diameter steel pier casing, ADD
\$ 18.00 per lineal foot of 42" diameter steel pier casing.

2. The above prices shall include all labor, materials, equipment, overhead and profit necessary to cover complete and finished work. Any work by unit price shall be in addition to (or subtracted from) the base quoted Contract Sum.
3. Documentation of unit price expenses or credits shall be accurate and supported by independent jobsite records. Unit price data shall be submitted for the Architect's review at the completion of the pier drilling/placement operation.

(Bidder)


(signature) ANDRES CONSTRUCTION SERVICES

Date: 4/17/97

END OF SECTION

WILLIAMSON COUNTY ANNEX QUALIFICATIONS
ANDRES CONSTRUCTION SERVICES

GENERAL

1. We have included no rain days in the construction schedule and we reserve the right to review each rain day on an individual basis.

DIVISION 1

1. We have included the costs of standard building permit fees, but we exclude the cost of impact fees, utility fees, Aid to Construction Fees, meters, and Owner related "use" fees.

2. We have included no funds for printing and plans and assume said drawings will be supplied by the Owner/Architect at no charge to the Contractor.

DIVISION 2

1.

DIVISION 3

1.

DIVISION 4

1.

DIVISION 5

1.

DIVISION 6

1.

DIVISION 7

1.

DIVISION 8

1.

DIVISION 9

1.

DIVISION 10

1.

DIVISION 11

1.

DIVISION 12

1.

DIVISION 13

1.

DIVISION 14

1.

DIVISION 15

1. We have included gas piping from the meter to the boilers. We have excluded the meter and bringing the gas service to the building, assuming that the gas company would provide this work.

DIVISION 16

1.

DIVISION 17

1.

DOCUMENT 00310

BID FORM

To: Judge John Doerfler
County Judge
Williamson County, Texas

Project: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

Date: 4/17/97

Submitted by:

(full name)

BRATH, INC.

(full address)

600 IH 35 SOUTH

ROUND ROCK, TX 78681

1 OFFER

The undersigned, in compliance with your Invitation To Bid, having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Spencer Godfrey Architects, for the above mentioned project, and being familiar with all of the conditions surrounding the construction of the proposed work propose to furnish all labor, material, equipment and supplies and to construct the project in accordance with the Contract Documents, within the time frame herein stipulated, and for the price set forth below. This price is to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to perform all of the work described in the Specifications and illustrated on the Drawings for a fixed sum (stipulated price) of Two Million Six Hundred Thirty
(\$ 2,638,000) including associated profit and overhead. Eight Thousand -

THE BIDDER UNDERSTANDS THAT TIME IS OF THE ESSENCE TO THE OWNER REGARDING THE COMPLETION OF THE WORK ASSOCIATED WITH THIS CONTRACT. BOTH THE BIDDER'S STIPULATED SUM AND TIME FOR COMPLETION WILL BE CONSIDERED IN DETERMINING THE LOWEST QUALIFIED BIDDER.

Bidder hereby further agrees to commence work on or before the date to be specified in the Owner's Notice to Proceed and to fully complete the work, ready for occupancy within 330 days.

Included herewith, is the required bid security as required by the Instruction to Bidders.

Because the Project is Tax Exempt, NO Federal, State, or Local taxes are included in the Bid Price.

All Cash and Contingency Allowances described in the Contract Documents are included in the Bid Price.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for **forty-five (45)** from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within seven days of receipt.

Commence work within ten days after written Notice to Proceed.

Bidder hereby agrees that the attached bid security will become the property of the Owner, and the Owner may cash the Bond, if the Contract for Construction is not executed by the bidding contractor within seven days from receipt.

3. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum # 1 Dated 3/28/97

Addendum # 2 Dated 4/14/97

Addendum # 3 Dated 4/15/97

Addendum # Dated

4. APPENDICES

The following appendices are included with this bid form and have been properly completed by the bidder:

- a. Section 00410 - Bid Security Form
- b. Section 00420 - Unit Prices

The bidder fully understands, and agrees, that, if he is the apparent lowest qualified bidder, he will submit, within forty-eight hours of the bid time the following documents:

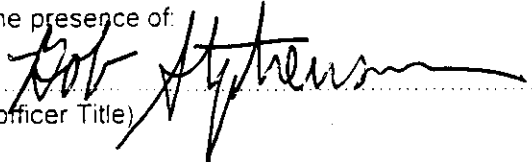
- a. Section 00430 - Subcontractor Listing
- b. Section 00440 - Substitution Listing
- c. Section 00450 - Equipment Suppliers Listing
- d. Section 00740 - Cost Breakdown

5. BID FORM SIGNATURE(S)

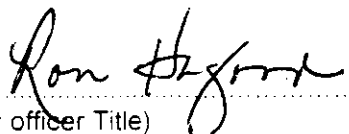
The Corporate Seal of

BRATH, INC.

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation) was
hereunto affixed in the presence of:

 VICE PRESIDENT
(Authorized signing officer Title)

(Seal)

 Pres.
(Authorized signing officer Title)

Subscribed and Sworn before me this 17th day of April 1997.

Notary Public: 

My Commission Expires: 6-9-00

(Seal)

END OF DOCUMENT

DOCUMENT 00400

SUPPLEMENTS TO BID FORMS

To: Judge John Doerfler
County Judge
Williamson County

Project: Williamson County Annex
305 Discovery Boulevard
Cedar Park, Texas

Date: 4/17/97

Submitted by:

(full name)

BRATT, INC.

(full address)

600 IH 35 SOUTH

ROUND ROCK, TX 78681

In accordance with Document 00100 - Instructions to Bidders and Document 00310 - Bid Form,
I/we include the Supplements to Bid Form Appendices listed below. The information provided shall
be considered an integral part of the Bid Form.

These Appendices are as follows:

1. 00410 BID SECURITY FORM
2. 00420 UNIT PRICES
3. _____
4. _____
5. _____
6. _____

SUPPLEMENTS TO BID FORM SIGNATURE(S)

The Corporate Seal of

BRATH, INC.

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

(Seal)



VICE PRESIDENT

(Authorized signing officer Title)

END OF SECTION

SECTION 00420

UNIT PRICES

1. The following is a list of Unit Prices referenced in the Bid Form, and stipulated in Section 01151 Unit Prices:

- A. The base pier drilling depth is shown on the drawings. All piers shall be drilled to the diameter indicated on the drawings. To establish proper price for pier drilling the following unit prices shall prevail and be used as a measure for credits or charges against the Contract Sum specified in the Contractors Bid.

1. 24" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 23.50 per lineal foot.

For depths less than the base drilling depth level, SUB-TRACT
\$ 7.50 per lineal foot.

2. 30" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 34.50 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 12.50
per lineal foot.

3. 36" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 38.40 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 16.00
per lineal foot.

4. 42" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 51.30 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 22.50
per lineal foot.

- B. In the event ground water is encountered requiring the casing of piers, ADD

\$ 40.00 per lineal foot of 24" diameter steel pier casing, ADD

\$ 45.00 per lineal foot of 30" diameter steel pier casing.

\$ 50.00 per lineal foot of 36" diameter steel pier casing, ADD

\$ 55.00 per lineal foot of 42" diameter steel pier casing.

2. The above prices shall include all labor, materials, equipment, overhead and profit necessary to cover complete and finished work. Any work by unit price shall be in addition to (or subtracted from) the base quoted Contract Sum.
3. Documentation of unit price expenses or credits shall be accurate and supported by independent jobsite records. Unit price data shall be submitted for the Architect's review at the completion of the pier drilling/placement operation.

(Bidder)

BRATH, INC.

(signature)

Date:

4/17/97

END OF SECTION



AIA Document A310

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we Brath Inc., 600 IH 35 South
(Here insert full name and address or legal title of Contractor)
Round Rock TX 78681

as Principal, hereinafter called the Principal, and Continental Casualty Company
(Here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of Illinois
as Surety, hereinafter called the Surety, are held and firmly bound unto Williamson County
(Here insert full name and address or legal title of Owner)

as Obligee, hereinafter called the Obligee, in the sum of Five Percent (5%) of Maximum
Amount of Bid

Dollars (\$ 5% of Bid),
for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for Williamson County Precinct 2 Annex
(Here insert full name, address and description of project)
Cedar Park

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this 17th

day of April 19 97

Nancy Knauth
(Witness)

Brath Inc
(Principal)
VILE PRESIDENT
(Title)

Bob Stephen
(Witness)

Continental Casualty Company
(Surety)
Steve Schutze
(Title) Attorney-in-Fact

113

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That CONTINENTAL CASUALTY COMPANY, an Illinois corporation, NATIONAL FIRE INSURANCE COMPANY OF HARTFORD, a Connecticut corporation, AMERICAN CASUALTY COMPANY OF READING, PENNSYLVANIA, a Pennsylvania corporation (herein collectively called "the CNA Surety Companies"), are duly organized and existing corporations having their principal offices in the City of Chicago, and State of Illinois, and that they do by virtue of the signature and seals herein affixed hereby make, constitute and appoint C. A. Schutze, Jr. Steve Schutze, Janis Winkler, Mary A. Pierce, Individually

of Austin, Texas
their true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on their behalf bonds, undertakings and other obligatory instruments of similar nature
- In Unlimited Amounts -

and to bind them thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of their corporations and all the acts of said Attorney, pursuant to the authority hereby given are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Laws and Resolutions, printed on the reverse hereof, duly adopted, as indicated, by the Boards of Directors of the corporations.

In Witness Whereof, the CNA Surety Companies have caused these presents to be signed by their Group Vice President and their corporate seals to be hereto affixed on this 17th day of March, 1997.



CONTINENTAL CASUALTY COMPANY
NATIONAL FIRE INSURANCE COMPANY OF HARTFORD
AMERICAN CASUALTY COMPANY OF READING, PENNSYLVANIA

M.C. Vonnahme Group Vice President

State of Illinois, County of Cook, ss:

On this 17th day of March, 1997, before me personally came M. C. Vonnahme, to me known, who, being by me duly sworn, did depose and say: that he resides in the Village of Darien, State of Illinois; that he is a Group Vice President of CONTINENTAL CASUALTY COMPANY, NATIONAL FIRE INSURANCE COMPANY OF HARTFORD, and AMERICAN CASUALTY COMPANY OF READING, PENNSYLVANIA described in and which executed the above instrument; that he knows the seals of said corporations; that the seals affixed to the said instrument are such corporate seals; that they were so affixed pursuant to authority given by the Boards of Directors of said corporations and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporations.



My Commission Expires March 6, 2000

Mary Jo Abel Notary Public

CERTIFICATE

I, Robert E. Ayo, Assistant Secretary of CONTINENTAL CASUALTY COMPANY, NATIONAL FIRE INSURANCE COMPANY OF HARTFORD, and AMERICAN CASUALTY COMPANY OF READING, PENNSYLVANIA do hereby certify that the Power of Attorney herein above set forth is still in force, and further certify that the By-Law and Resolution of the Board of Directors of each corporation printed on the reverse hereof are still in force. In testimony whereof I have hereunto subscribed my name and affixed the seals of the said corporations this 17th day of April, 1997.



CONTINENTAL CASUALTY COMPANY
NATIONAL FIRE INSURANCE COMPANY OF HARTFORD
AMERICAN CASUALTY COMPANY OF READING, PENNSYLVANIA

Robert E. Ayo Assistant Secretary

DOCUMENT 00310

BID FORM

To: Judge John Doerfler
County Judge
Williamson County, Texas

Project: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

Date: April 17, 1997

Submitted by:
(full name)

Browning Construction Co.

(full address)

903 Basse Road

San Antonio, Texas 78212

1. OFFER

The undersigned, in compliance with your Invitation To Bid, having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Spencer Godfrey Architects, for the above mentioned project, and being familiar with all of the conditions surrounding the construction of the proposed work propose to furnish all labor, material, equipment and supplies and to construct the project in accordance with the Contract Documents, within the time frame herein stipulated, and for the price set forth below. This price is to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to perform all of the work described in the Specifications and illustrated on the Drawings for a fixed sum (stipulated price) of Two Million, six hundred and
(\$ 2,645,000) including associated profit and overhead. *forty five thousand.*

THE BIDDER UNDERSTANDS THAT TIME IS OF THE ESSENCE TO THE OWNER REGARDING THE COMPLETION OF THE WORK ASSOCIATED WITH THIS CONTRACT. BOTH THE BIDDER'S STIPULATED SUM AND TIME FOR COMPLETION WILL BE CONSIDERED IN DETERMINING THE LOWEST QUALIFIED BIDDER.

Bidder hereby further agrees to commence work on or before the date to be specified in the Owner's Notice to Proceed and to fully complete the work, ready for occupancy within 310 calendar days.

Included herewith, is the required bid security as required by the Instruction to Bidders.

Because the Project is Tax Exempt, NO Federal, State, or Local taxes are included in the Bid Price.

All Cash and Contingency Allowances described in the Contract Documents are included in the Bid Price.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for forty-five (45) from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within seven days of receipt.

Commence work within ten days after written Notice to Proceed.

Bidder hereby agrees that the attached bid security will become the property of the Owner, and the Owner may cash the Bond, if the Contract for Construction is not executed by the bidding contractor within seven days from receipt.

3. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum # 1 Dated March 28, 1997

Addendum # 2 Dated April 14, 1997

Addendum # 3 Dated April 15, 1997

Addendum # Dated

4. APPENDICES

The following appendices are included with this bid form and have been properly completed by the bidder:

- a. Section 00410 - Bid Security Form
- b. Section 00420 - Unit Prices

The bidder fully understands, and agrees, that, if he is the apparent lowest qualified bidder, he will submit, within forty-eight hours of the bid time the following documents:

- a. Section 00430 - Subcontractor Listing
- b. Section 00440 - Substitution Listing
- c. Section 00450 - Equipment Suppliers Listing
- d. Section 00740 - Cost Breakdown

6. BID FORM SIGNATURE(S)

The Corporate Seal of

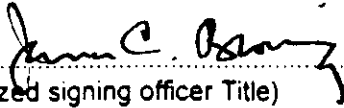
Browning Construction Co.

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation) was
hereunto affixed in the presence of:

James C. Browning, President

(Authorized signing officer Title)

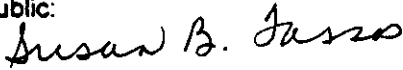
(Seal)



(Authorized signing officer Title)

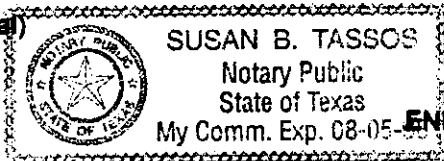
Subscribed and Sworn before me this 17th day of April, 1997.

Notary Public:



My Commission Expires: 08/05/98

(Seal)



END OF DOCUMENT

SECTION 00420

UNIT PRICES

1. The following is a list of Unit Prices referenced in the Bid Form, and stipulated in Section 01151 Unit Prices:

A. The base pier drilling depth is shown on the drawings. All piers shall be drilled to the diameter indicated on the drawings. To establish proper price for pier drilling the following unit prices shall prevail and be used as a measure for credits or charges against the Contract Sum specified in the Contractors Bid.

1. 24" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 25.00 per lineal foot.

For depths less than the base drilling depth level, SUB-TRACT
\$ 0 per lineal foot.

2. 30" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 33.50 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 0
per lineal foot.

3. 36" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 42.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 0
per lineal foot.

4. 42" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 55.50 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 0
per lineal foot.

- B. In the event ground water is encountered requiring the casing of piers, ADD
\$ 11.00 per lineal foot of 24" diameter steel pier casing, ADD
\$ 13.25 per lineal foot of 30" diameter steel pier casing.
\$ 15.50 per lineal foot of 36" diameter steel pier casing, ADD
\$ 17.75 per lineal foot of 42" diameter steel pier casing.



FEDERAL INSURANCE COMPANY

BID BOND

Bond No. 80822729M

Amount \$ GAB (5%)

Know All Men By These Presents,

That we, Browning Construction Co.
903 Basse Road
San Antonio, TX 78212

(hereinafter called the Principal),
as Principal, and the FEDERAL INSURANCE COMPANY, Warren, New Jersey, a corporation duly organized under
the laws of the State of Indiana, (hereinafter called the Surety), as Surety, are held and firmly bound unto
Williamson Co.

(hereinafter called the Obligee),

in the sum of Five Percent Greatest Amount Bid Dollars
(\$ 5%), for the payment of which we, the said Principal and the said Surety, bind ourselves,
our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals and dated this 17th day of April
A. D. nineteen hundred and ninety-seven

WHEREAS, the Principal has submitted a bid, dated April 17, 1997,
for construction of new 2 story Co. Annex Bldg. (Williamson Co. Precinct 2 Annex)

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Obligee shall accept the bid
of the Principal and the Principal shall enter into a contract with the Obligee in accordance with such bid and
give bond with good and sufficient surety for the faithful performance of such contract, or in the event of the failure
of the Principal to enter into such contract and give such bond, if the Principal shall pay to the Obligee the dif-
ference, not to exceed the penalty hereof, between the amount specified in said bid and the amount for which
the Obligee may legally contract with another party to perform the work covered by said bid, if the latter amount
be in excess of the former, then this obligation shall be null and void, otherwise to remain in full force and effect.

Browning Construction Co.

Principal

By:

John C. Browning

FEDERAL INSURANCE COMPANY

By:

Deborah L. Jung

Deborah L. Jung
Attorney-in-fact

119

POWER OF ATTORNEY
FEDERAL INSURANCE COMPANY
 ATTN: SURETY DEPARTMENT
 15 Mountain View Road, Warren, NJ 07059
 Telephone: (908) 903-2000
 Fax No.: (908) 903-3656

Know all Men by these Presents, That **FEDERAL INSURANCE COMPANY**, an Indiana Corporation, has constituted and appointed, and does hereby constitute and appoint Austin W. Moore, Michael N. Venson, Deborah L. Jung and Joe M. Westheimer, Jr. of San Antonio, Texas-----

each its true and lawful Attorney-in-Fact to execute under such designation in its name and to affix its corporate seal to and deliver for and on its behalf as surety thereon or otherwise, bonds of any of the following classes, to-wit:

1. Bonds and Undertakings (other than Bail Bonds) filed in any suit, matter or proceeding in any Court, or filed with any Sheriff or Magistrate, for the doing or not doing of anything specified in such Bond or Undertaking.
2. Surety bonds to the United States of America or any agency thereof, including those required or permitted under the laws or regulations relating to Customs or Internal Revenue; License and Permit Bonds or other indemnity bonds under the laws, ordinances or regulations of any State, City, Town, Village, Board or other body or organization, public or private; bonds to Transportation Companies, Lost Instrument Bonds; Lease Bonds, Workers' Compensation Bonds, Miscellaneous Surety Bonds and bonds on behalf of Notaries Public, Sheriffs, Deputy Sheriffs and similar public officials.
3. Bonds on behalf of contractors in connection with bids, proposals or contracts.

In Witness Whereof, the said **FEDERAL INSURANCE COMPANY** has, pursuant to its By-Laws, caused these presents to be signed by its Vice President and Assistant Secretary and its corporate seal to be hereto affixed this 1st

day of November 19 96

Corporate Seal



Kenneth C. Wendel

Assistant Secretary

FEDERAL INSURANCE COMPANY
BY

Gerardo G. Mauriz
Gerardo G. Mauriz
Vice President

STATE OF NEW JERSEY } ss.
County of Somerset

On this 1st day of November 19 96, before me personally came Kenneth C. Wendel to me known and by me known to be Assistant Secretary of **FEDERAL INSURANCE COMPANY**, the corporation described in and which executed the foregoing Power of Attorney, and the said Kenneth C. Wendel being by me duly sworn, did depose and say that he is Assistant Secretary of **FEDERAL INSURANCE COMPANY** and knows the corporate seal thereof; that the seal affixed to the foregoing Power of Attorney is such corporate seal and was thereto affixed by authority of the By-Laws of said Company, and that he signed said Power of Attorney as Assistant Secretary of said Company by like authority; and that he is acquainted with Gerardo G. Mauriz and knows him to be the Vice President of said Company, and that the signature of said Gerardo G. Mauriz subscribed to said Power of Attorney is in the genuine handwriting of said Gerardo G. Mauriz and was thereto subscribed by authority of said By-Laws and in deponent's presence.

Notarial Seal



Acknowledged and Sworn to before me
on the date above written.

Theresa B. Cichowski
Notary Public

IN THE EVENT YOU WISH TO NOTIFY US OF A CLAIM, VERIFY THE AUTHENTICITY OF THIS BOND OR NOTIFY US OF ANY OTHER MATTER, PLEASE WRITE TO US AT THE ADDRESS LISTED ABOVE.

Form 15-10-0134 (Rev.9-94) GENERAL

TERESA B. CICHOWSKI
Notary Public, State of New Jersey
No. 0014101
Commission Expires July 27, 2001

DOCUMENT 00310

BID FORM

To: Judge John Doerfler
County Judge
Williamson County, Texas

Project: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

Date: APRIL 17, 1997

Submitted by: CHASCO CONTRACTING
(full name)

(full address) P O BOX 1057

ROUND ROCK, TEXAS 78680

1. OFFER

The undersigned, in compliance with your Invitation To Bid, having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Spencer Godfrey Architects, for the above mentioned project, and being familiar with all of the conditions surrounding the construction of the proposed work propose to furnish all labor, material, equipment and supplies and to construct the project in accordance with the Contract Documents, within the time frame herein stipulated, and for the price set forth below. This price is to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to perform all of the work described in the Specifications and illustrated on the Drawings for a fixed sum (stipulated price) of Two Million Five Hundred Ninety Six (\$2,596,000.00) including associated profit and overhead. Thousand and no/100

THE BIDDER UNDERSTANDS THAT TIME IS OF THE ESSENCE TO THE OWNER REGARDING THE COMPLETION OF THE WORK ASSOCIATED WITH THIS CONTRACT. BOTH THE BIDDER'S STIPULATED SUM AND TIME FOR COMPLETION WILL BE CONSIDERED IN DETERMINING THE LOWEST QUALIFIED BIDDER.

Bidder hereby further agrees to commence work on or before the date to be specified in the Owner's Notice to Proceed and to fully complete the work, ready for occupancy within 270 days.

Included herewith, is the required bid security as required by the Instruction to Bidders.

Section 00310-1

Because the Project is Tax Exempt, NO Federal, State, or Local taxes are included in the Bid Price.

All Cash and Contingency Allowances described in the Contract Documents are included in the Bid Price.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for forty-five (45) from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within seven days of receipt.

Commence work within ten days after written Notice to Proceed.

Bidder hereby agrees that the attached bid security will become the property of the Owner, and the Owner may cash the Bond, if the Contract for Construction is not executed by the bidding contractor within seven days from receipt.

3. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum # 1 Dated 3/28/97

Addendum # 2 Dated 4/14/97

Addendum # 3 Dated 4/15/97

Addendum # Dated

4. APPENDICES

The following appendices are included with this bid form and have been properly completed by the bidder:

a. Section 00410 - Bid Security Form

b. Section 00420 - Unit Prices

The bidder fully understands, and agrees, that, if he is the apparent lowest qualified bidder, he will submit, within forty-eight hours of the bid time the following documents:

a. Section 00430 - Subcontractor Listing

b. Section 00440 - Substitution Listing

c. Section 00450 - Equipment Suppliers Listing

d. Section 00740 - Cost Breakdown

RECORDERS MEMORANDUM

All or parts of the text on this page was not clearly legible for satisfactory recordation.

5. BID FORM SIGNATURE(S)

The Corporate Seal of

CHASCO CONTRACTING

(Bidder, please print the full name of your Proprietorship, Partnership, or Corporation) was hereunto affixed in the presence of:

(Authorized signing officer Title) CHAZ GLACE, C.E.O.

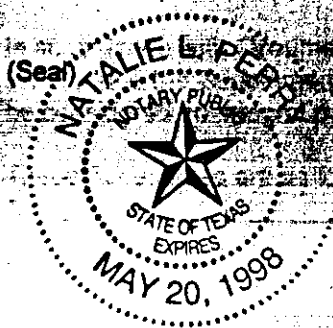
(Seal)

(Authorized signing officer Title)

Subscribed and Sworn before me this 17TH day of APRIL 1997.

Notary Public: *Natalie L. Perry*
NATALIE L. PERRY

My Commission Expires: 5-20-98



END OF DOCUMENT

Search 00310-3

DOCUMENT 00400

SUPPLEMENTS TO BID FORMS

To: Judge John Doerfler
County Judge
Williamson County

Project: Williamson County Annex
305 Discovery Boulevard
Cedar Park, Texas

Date: APRIL 17, 1997

Submitted by:

(full name)

CHASCO CONTRACTING

(full address)

P O BOX 1057

ROUND ROCK, TX. 78680

In accordance with Document 00100 - Instructions to Bidders and Document 00310 - Bid Form, we include the Supplements to Bid Form Appendices listed below. The information provided shall be considered an integral part of the Bid Form.

These Appendices are as follows:

1. SECTION 00410 - BID SECURITY FORM
2. SECTION 00420 - UNIT PRICES
3. _____
4. _____
5. _____
6. _____

Section 00400-1

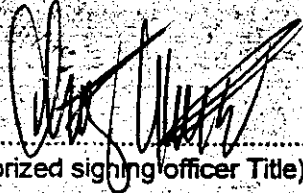
SUPPLEMENTS TO BID FORM SIGNATURE(S)

The Corporate Seal of

CHASCO CONTRACTING, INC.

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

(Seal)



(Authorized signing officer Title) CHAZ GLACE, C.E.O.

END OF SECTION

RECORDERS MEMORANDUM

All or parts of the text on this page was not clearly legible for satisfactory recordation.

Section 00400-2

SECTION 00410

BID SECURITY FORM

1. Bidder shall utilize A.I.A. Document A310 or approved substitute for the submission of required bid bonds. No other forms will be allowed.
2. Bid Security shall be in an amount equal to five (5) percent of the bid amount.
3. Failure to comply with these instructions will result in the rejection of the bid submitted.
4. A copy of A.I.A. Document A310 may be purchased from the office of the Architect.

END OF SECTION

Section 00410-1

**Bid Bond
SURETY DEPARTMENT**



THE HARTFORD

VOL 0095 PAGE 127

KNOW ALL MEN BY THESE PRESENTS,

That we, **CHASCO CONTRACTING**

hereinafter called the Principal, and the **HARTFORD FIRE INSURANCE COMPANY**, as Principal,
existing under the laws of the State of **CONNECTICUT**, whose principal office is in **HARTFORD**, a corporation created and
as Surety, hereinafter called the Surety, are held and firmly bound unto
WILLIAMSON COUNTY

as Obligor, hereinafter called the Obligor,

in the sum of **5% OF THE TOTAL AMOUNT BID**

Dollars (\$-----5%-----),

for the payment of which sum, well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas, the Principal has submitted a bid for
**WILLIAMSON COUNTY ANNEX
305 DISCOVERY BOULEVARD
CEDAR PARK, TX.**

NOW, THEREFORE, if the Obligor shall accept the bid of the Principal and the Principal shall enter into a contract with the Obligor in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or contract documents with good and sufficient surety for the faithful performance of such contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such contract and give such bond or bonds, if the Principal shall pay to the Obligor the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligor may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this 17TH day of APRIL A.D. 19 97

Witness
(If Individual)

Attest
(If Corporation)

Natalie J Perry

CHASCO CONTRACTING (SEAL)

By *Chaz Glace* (SEAL)
CHAZ GLACE, C.E.O. (Title)

(SEAL)

(SEAL)

HARTFORD FIRE INSURANCE COMPANY

Attest

Julie Boos

By *David P. Ferguson* (SEAL)
DAVID P. FERGUSON (Title)
ATTORNEY-IN-FACT

HARTFORD FIRE INSURANCE COMPANY, INC.

Hartford, Connecticut

POWER OF ATTORNEY

Know all men by these Presents, That the HARTFORD FIRE INSURANCE COMPANY, a corporation duly organized under the laws of the State of Connecticut, and having its principal office in the City of Hartford, County of Hartford, State of Connecticut, does hereby make, constitute and appoint

**ROBERT JAMES NITSCHKE, DAVID P. FERGUSON, VIOLET FROSCH
and NINA SMITH of GIDDINGS, TEXAS**

its true and lawful Attorney(s)-in-Fact, with full power and authority to each of said Attorney(s)-in-Fact, in their separate capacity if more than one is named above, to sign, execute and acknowledge any and all bonds and undertakings and other writings obligatory in the nature thereof on behalf of the Company in its business of guaranteeing the fidelity of persons holding places of public or private trust; guaranteeing the performance of contracts other than insurance policies; guaranteeing the performance of insurance contracts where surety bonds are accepted by states and municipalities, and executing or guaranteeing bonds and undertakings required or permitted in all actions or proceedings or by law allowed, and to bind the HARTFORD FIRE INSURANCE COMPANY thereby as fully and to the same extent as if such bonds and undertakings and other writings obligatory in the nature thereof were signed by an Executive Officer of the HARTFORD FIRE INSURANCE COMPANY and sealed and attested by one other of such Officers, and hereby ratifies and confirms all that its said Attorney(s)-in-Fact may do in pursuance hereof.

This power of attorney is granted by and under authority of the following provisions:

(1) By-Laws adopted by the Stockholders of the HARTFORD FIRE INSURANCE COMPANY at a meeting duly called and held on the 9th day of March, 1971.

ARTICLE IV

SECTION 8. The President or any Vice-President, acting with any Secretary or Assistant Secretary, shall have power and authority to appoint, for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, one or more Resident Vice Presidents, Resident Assistant Secretaries and Attorneys-in-Fact and at any time to remove any such Resident Vice-President, Resident Assistant Secretary, or Attorney-in-Fact, and revoke the power and authority given to him.

SECTION 11. Attorneys-in-Fact shall have power and authority, subject to the terms and limitations of the power of attorney issued to them, to execute and deliver on behalf of the Company and to attach the seal of the Company thereto any and all bonds and undertakings, and other writings obligatory in the nature thereof, and any such instrument executed by any such Attorney-in-Fact shall be as binding upon the Company as if signed by an Executive Officer and sealed and attested by one other of such Officers.

This power of attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Directors of the HARTFORD FIRE INSURANCE COMPANY at a meeting duly called and held on the 12th day of February, 1993.

Resolved, that the signatures of such Officers and the seal of the Company may be affixed to any such power of attorney, or to any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

In Witness Whereof, the HARTFORD FIRE INSURANCE COMPANY has caused these presents to be signed by its Vice-President, and its corporate seal to be hereto affixed, duly attested by its Secretary, this 1st day of May, 1995.

Attest:

HARTFORD FIRE INSURANCE COMPANY

Richard R. Hermanson
Richard R. Hermanson
Secretary



Paul L. Marabella
Paul L. Marabella
Vice-President

STATE OF CONNECTICUT
COUNTY OF HARTFORD

On this 1st day of May, A.D. 1995, before me personally came Paul L. Marabella, to me known, who being by me duly sworn, did depose and say: that he resides in the County of Hartford, State of Connecticut; that he is the Vice-President of the HARTFORD FIRE INSURANCE COMPANY, the corporation described in and which executed the above instrument; that he knows the seal of the said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed by order of the Board of Directors of said corporation and that he signed his name thereto by like order.

STATE OF CONNECTICUT
COUNTY OF HARTFORD



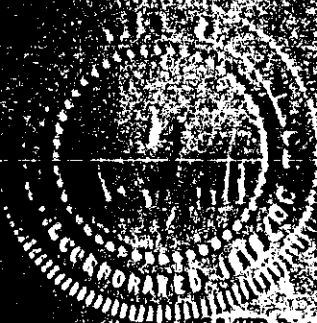
Jean H. Wozniak
Jean H. Wozniak
Notary Public
My Commission Expires June 30, 1998

CERTIFICATE

I, the undersigned, Secretary of the HARTFORD FIRE INSURANCE COMPANY, a Connecticut Corporation, DO HEREBY CERTIFY that the foregoing and attached POWER OF ATTORNEY remains in full force and has not been revoked, and furthermore, that the Resolutions of the Board of Directors, set forth in the Power of Attorney, are now in force.

Signed and sealed at the City of Hartford

Dated the 17TH day of APRIL



Robert J. Nitschke
Robert J. Nitschke
Secretary

RECORDERS MEMORANDUM

All or parts of the text on this page was not clearly legible for satisfactory recordation.

SECTION 00420

UNIT PRICES

1. The following is a list of Unit Prices referenced in the Bid Form, and stipulated in Section 01151 Unit Prices:

- A. The base pier drilling depth is shown on the drawings. All piers shall be drilled to the diameter indicated on the drawings. To establish proper price for pier drilling the following unit prices shall prevail and be used as a measure for credits or charges against the Contract Sum specified in the Contractors Bid.

1. 24" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 30.00 per lineal foot.

For depths less than the base drilling depth level, SUBTRACT
\$ 9.00 per lineal foot.

2. 30" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 42.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 12.00
per lineal foot.

3. 36" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 51.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 17.00
per lineal foot.

4. 42" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ 68.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ 22.00
per lineal foot.

- B. In the event ground water is encountered requiring the casing of piers, ADD
- | | |
|-----------------|--|
| \$ <u>12.00</u> | per lineal foot of 24" diameter steel pier casing, ADD |
| \$ <u>14.00</u> | per lineal foot of 30" diameter steel pier casing, ADD |
| \$ <u>15.00</u> | per lineal foot of 36" diameter steel pier casing, ADD |
| \$ <u>20.00</u> | per lineal foot of 42" diameter steel pier casing, ADD |

Section 00420-

2017-2018 CONTRACTING

2. The above prices shall include all labor, materials, equipment, overhead and profit necessary to cover complete and finished work. Any work by unit price shall be in addition to (or subtracted from) the base quoted Contract Sum.

3. Documentation of unit price expenses or credits shall be accurate and supported by independent jobsite records. Unit price data shall be submitted for the Architect's review at the completion of the pier drilling/placement operation.

(Bidder)  MASCO CONTRACTING

(signature) CHAZ GLACE, C.E.O.

Date: APRIL 17, 1997

END OF SECTION

RECORDERS MEMORANDUM
All or parts of the text on this page was not
clearly legible for satisfactory recordation.

Section 00420-2

BID FORM

To: Judge John Doerfler
County Judge
Williamson County, Texas

Project: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

Date: 17 April, 1997

Submitted by:
John King, Inc., Commercial Builders
Post Office Box 9677
Austin, Texas 78766-9677

1. OFFER

The undersigned, in compliance with your Invitation To Bid, having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the contract Documents prepared by Spencer Godfrey Architects, for the above mentioned project, and being familiar with all of the conditions surrounding the construction of the proposed work propose to furnish all labor, material, equipment and supplies and to construct the project in accordance with the Contract Documents, within the time frame herein stipulated, and for the price set forth below. This price is to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to perform all of the work described in the Specifications and illustrated on the Drawings for a fixed sum (stipulated price) of Two million five hundred ninety Three Thousand dollars (\$ 2,593,000.00) including associated profit and overhead.

THE BIDDER UNDERSTANDS THAT TIME IS OF THE ESSENCE TO THE OWNER REGARDING THE COMPLETION OF THE WORK ASSOCIATED WITH THIS CONTRACT. BOTH THE BIDDER'S STIPULATED SUM AND TIME FOR COMPLETION WILL BE CONSIDERED IN DETERMINING THE LOWEST QUALIFIED BIDDER.

Bidder hereby further agrees to commence work on or before the date to be specified in the Owner's Notice to Proceed and to fully complete the work, ready for occupancy within 270 days.

Included herewith, is the required bid security as required by the Instruction to Bidders.

Because the Project is Tax Exempt, NO Federal, State or Local taxes are included in the Bid Price.

All Cash and Contingency Allowances described in the Contract Documents are included in the Bid Price.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for forty-five (45) days from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within seven days of receipt.

Commence work within ten days after written Notice to Proceed.

Bidder hereby agrees that the attached bid security will become the property of the Owner, and the Owner may cash the Bond, if the Contract for Construction is not executed by the bidding contractor within seven days from receipt.

3. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum # One Dated 28 March, 97

Addendum # Two Dated 14 April, 97

Addendum # Three Dated 15 April, 97

4. APPENDICES

The following appendices are included with this bid form and have been properly completed by the bidder:

a. Section 00410 - Bid Security Form

b. Section 00420 - Unit Prices

The bidder fully understands, and agrees, that, if he is the apparent lowest qualified bidder, he will submit, within forty-eight hours of the bid time, the following documents:

a. Section 00430 - Subcontractor Listing

b. Section 00440 - Substitution Listing

c. Section 00450 - Equipment Suppliers Listing

d. Section 00740 - Cost Breakdown

Section 00310-2

5. BID FORM SIGNATURE(S)

The Corporate Seal of

JOHN KING, INC.

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation) was
hereunto affixed in the presence of:

David C. Watson, Vice President

Kelli King
Kelli King, Vice President

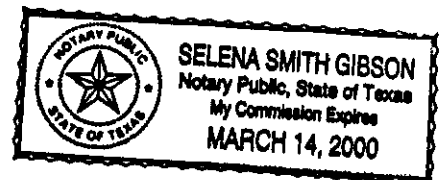
Subscribed and Sworn before me this 17th day of April, 1997.

Notary Public:

My Commission Expires:

Selena Smith G. M.

END OF DOCUMENT



SECTION 00420

UNIT PRICES

1. The following is a list of Unit Prices referenced in the Bid Form, and stipulated in Section 01151 Unit Prices:

A. The base pier drilling depth is shown on the drawings. All piers shall be drilled to the diameter indicated on the drawings. To establish proper price for pier drilling the following unit prices shall prevail and be used as a measure for credits or charges against the Contract Sum specified in the Contractor's Bid.

1. 24" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$27.00 per lineal foot.

For depths less than the base drilling depth level, SUBTRACT
\$9.50 per lineal foot.

2. 30" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$42.00 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$13.50
per lineal foot.

3. 36" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$56.40 per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$17.00
per lineal foot.

4. 42" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$70.80 per lineal foot.

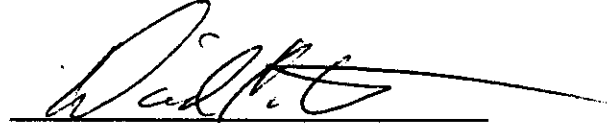
For depths less than the thirteen foot level, SUBTRACT \$20.50
per lineal foot.

B. In the event ground water is encountered requiring the casing of piers, ADD
\$26.16 per lineal foot of 24" diameter steel pier casing, ADD
\$35.64 per lineal foot of 30" diameter steel pier casing.
\$45.12 per lineal foot of 36" diameter steel pier casing, ADD
\$54.60 per lineal foot of 42" diameter steel pier casing.

Section 00420-1

2. The above prices shall include all labor, materials, equipment, overhead and profit necessary to cover complete and finished work. Any work by unit price shall be in addition to (or subtracted from) the base quoted Contract Sum.
3. Documents of unit price expenses or credits shall be accurate and supported by independent jobsite records. Unit price data shall be submitted for the Architect's review at the completion of the pier drilling / placement operation.

JOHN KING, INC.



David C. Watson, Vice President

17 April, 1997

END OF SECTION

Section 00420-2

DOCUMENT 00400

SUPPLEMENTS TO BID FORMS

To: Judge John Doerfler
County Judge
Williamson County, Texas

Project: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

Date: 17 April, 1997

Submitted by:
John King, Inc., Commercial Builders
Post Office Box 9677
Austin, Texas 78766-9677

In accordance with Document 00100 - Instructions to Bidders and Document 00310 - Bid Form, I/We include the Supplements to Bid Form Appendices listed below. The information provided shall be considered an integral part of the bid form.

The Appendices are as follows:

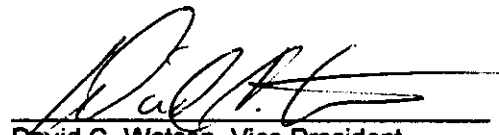
1. Bid Security Form (Section 00410)
2. Unit Prices (Section 00420)
3. _____
4. _____
5. _____
6. _____

Section 00400-1

SUPPLEMENTS TO BID FORM SIGNATURE(S)

The Corporate Seal of

JOHN KING, INC.



David C. Watson, Vice President

17 April, 1997

END OF SECTION

Section 00400-2



Bid Bond

Bond Number

Know All Men By These Presents:

That John King, Inc.
..... of ... Austin, TX
....., as Principal, and United States Fidelity and Guaranty
Company, a Maryland corporation, as Surety, are held and firmly bound unto Judge John Doerfler, County...
Judge, Williamson County, TX
as Oblige, in the full and just sum of 5% of bid by Principal
..... Dollars,
lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs,
executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

Whereas the said Principal is herewith submitting its proposal for the construction of the new
building for the Williamson County, Precinct Two Annex, 305 Discovery BLVD,
Cedar Park, TX.

The Condition Of This Obligation is such that if the aforesaid Principal shall be awarded the contract the said
Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the
performance of the terms and conditions of the contract, then this obligation to be void; otherwise the Principal and Surety will
pay unto the Oblige the difference in money between the amount of the bid of the said Principal and the amount for which the
Oblige legally contracts with another party to perform the work if the latter amount be in excess of the former, but in no event
shall liability hereunder exceed the penal sum hereof.

Signed, sealed and delivered ... 4/17/97
(Date)

.....
Kelli King, Secy.....

..... John King, Inc. (Seal)
..... (Seal)
UNITED STATES FIDELITY AND GUARANTY COMPANY

..... John W. Wagner
John W. Wagner Attorney-in-fact

United States Fidelity and Guaranty Company

Power of Attorney

No. 107860



VOL 0095 PAGE 139

Know all men by these presents: That **United States Fidelity and Guaranty Company**, a corporation organized and existing under the laws of the State of Maryland and having its principal office at the City of Baltimore, in the State of Maryland, does hereby constitute and appoint **William H. Pitts, Jr., Norman P. Rolling, John W. Wagner, James O. Schnell and Rose Marie Boriskie**

of the City of **Austin** , State of **Texas** its true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety to, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof on behalf of the Company in its business of guaranteeing the fidelity of persons; guaranteeing the performance of contracts; and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

In Witness Whereof, the said **United States Fidelity and Guaranty Company**, has caused this instrument to be sealed with its corporate seal, duly attested by the signatures of its Vice President and Assistant Secretary, this **21st** day of **January** , A.D. 19 **97**.



United States Fidelity and Guaranty Company.

(Signed) By *Gary A. Wilson* Vice President

(Signed) By *Thomas E. Huibregtse* Assistant Secretary

State of Maryland)

SS:

Baltimore City)

On this **21st** day of **January** , A.D. 19 **97** , before me personally came **Gary A. Wilson**, Vice President of **United States Fidelity and Guaranty Company**, and **Thomas E. Huibregtse**, Assistant Secretary of said Company, with both of whom I am personally acquainted, who being by me severally duly sworn, said, that they, the said **Gary A. Wilson** and **Thomas E. Huibregtse** were respectively the Vice President and the Assistant Secretary of the said **United States Fidelity and Guaranty Company**, the corporation described in and which executed the foregoing Power of Attorney; that they each knew the seal of said corporation; that the seal affixed to said Power of Attorney was such corporate seal, that it was so affixed by order of the Board of Directors of said corporation, and that they signed their names thereto by like order as Vice President and Assistant Secretary, respectively, of the Company.

My Commission expires the **1st** day of **August** A.D. 19 **98**.



(Signed) By *Edmund L. Rudright* Notary Public

This Power of Attorney is granted under and by authority of the following Resolutions adopted by the Board of Directors of the **United States Fidelity and Guaranty Company** on September 24, 1992:

Resolved, that in connection with the fidelity and surety insurance business of the Company, all bonds, undertakings, contracts and other instruments relating to said business may be signed, executed, and acknowledged by persons or entities appointed as Attorney(s)-in-Fact pursuant to a Power of Attorney issued in accordance with these resolutions. Said Power(s) of Attorney for and on behalf of the Company may and shall be executed in the name and on behalf of the Company, either by the Chairman, or the President, or an Executive Vice President, or a Senior Vice President, or a Vice President or an Assistant Vice President, jointly with the Secretary or an Assistant Secretary, under their respective designations. The signature of such officers may be engraved, printed or lithographed. The signature of each of the foregoing officers and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Attorney(s)-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and subject to any limitations set forth therein, any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is validly attached.

Resolved, That Attorney(s)-in-Fact shall have the power and authority, and, in any case, subject to the terms and limitations of the Power of Attorney issued to them, to execute and deliver on behalf of the Company and to attach the seal of the Company to any and all bonds and undertakings, and other writings obligatory in the nature thereof, and any such instrument executed by such Attorney(s)-in Fact shall be as binding upon the Company as if signed by an Executive Officer and sealed and attested to by the Secretary of the Company.

I, **Thomas E. Huibregtse**, an Assistant Secretary of the **United States Fidelity and Guaranty Company**, do hereby certify that the foregoing are true excerpts from the Resolutions of the said Company as adopted by its Board of Directors on September 24, 1992 and that these Resolutions are in full force and effect.

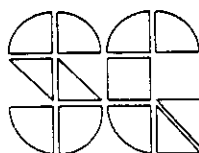
I, the undersigned Assistant Secretary of the **United States Fidelity and Guaranty Company**, do hereby certify that the foregoing Power of Attorney is in full force and effect and has not been revoked.

In Testimony Whereof, I have hereunto set my hand and the seal of the **United States Fidelity and Guaranty Company**,

on this *17th* day of *April* , 19 *97* *Thomas E. Huibregtse*
Assistant Secretary



139



ADDENDA

ADDENDUM NO.: 01

DATE: April 2, 1997

PROJECT: Williamson County Precinct 2 Annex

LOCATION: Cedar Park, Texas

NOTICE TO BIDDERS:

- A. This Addendum shall be considered part of the Contract Documents dated **March 26, 1997** for the above mentioned project as though it has been issued at the same time and incorporated integrally data differ Addendum shall govern and take precedence.
- B. Bidders are hereby notified that they shall make necessary adjustments in their estimates on account of this Addendum. It will be construed that each bidder's proposal submitted with full knowledge of all modifications and supplemental data specified therein. Please attach to the back of the Project Manual.

ARCHITECTURAL:

PROJECT MANUAL SPECIFICATIONS:

ITEM 1: N/A

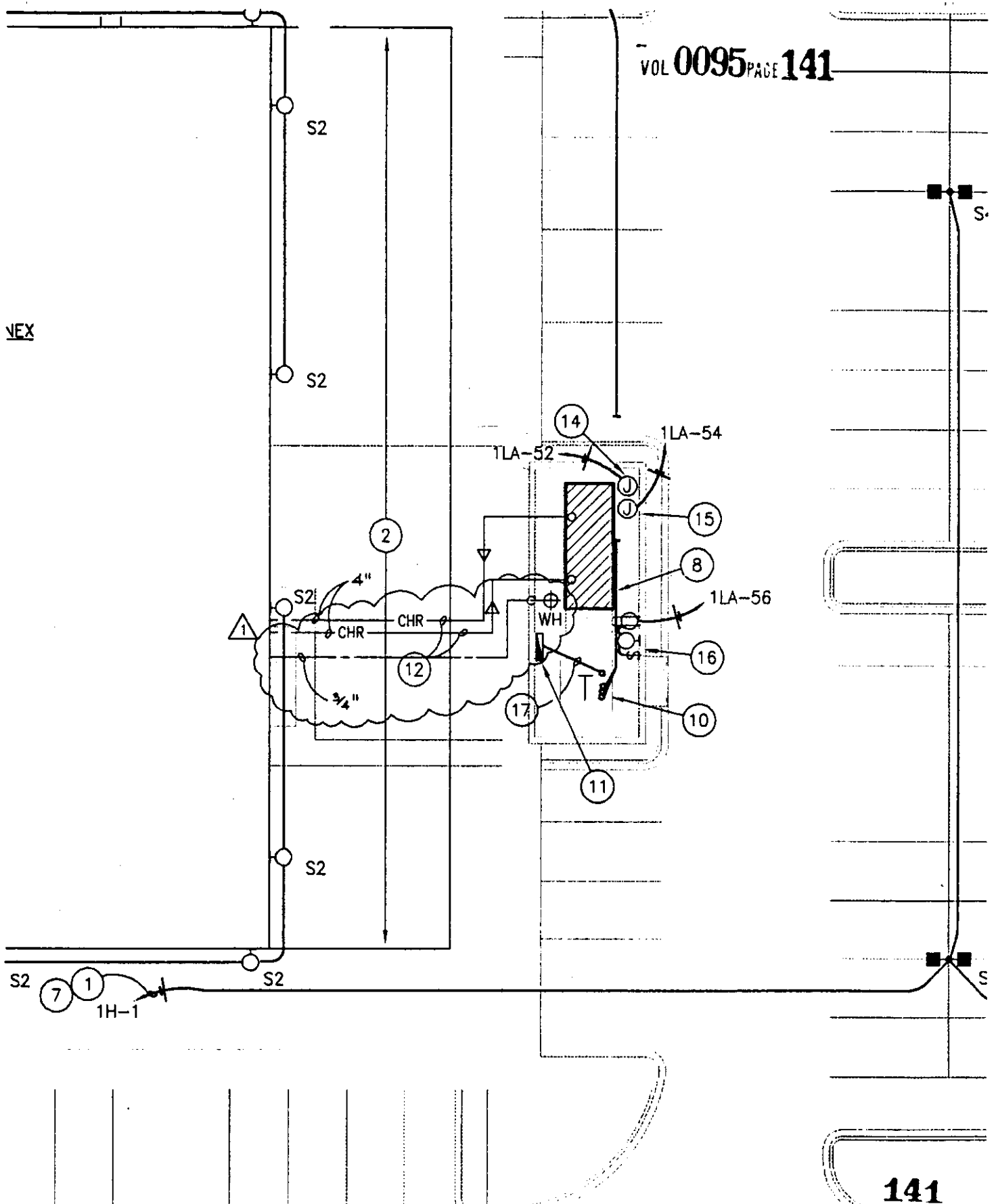
PROJECT DRAWINGS:

ITEM 1: Add hose bib to chiller pad. Refer Supplemental Drawing SD-1.

ITEM 2: Revise Constable Suite on 2nd floor. Refer Supplemental Drawings SD-2 through SD-9.

AD FORM

VEX



141

Johnson Consulting Engineers, Inc.1779 Wells Branch Parkway, Suite 101
Austin, Texas 78728

(512) 990-9550 FAX 990-9552

PROJECT: WILLIAMSON COUNTY ANNEX





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DRAWN BY: RNL CHECKED BY: DLJ PROJ. NO. 96166

SCALE: 1"=20'-0" DATE: 03/27/97 FILE NAME:

SHEET NO.

SD-1

AHU-16	AHU-17	AHU-18	AHU-19	AHU-20
1240	2210	1400 	2700	1700
0.85	0.85	0.75	0.85	0.85
1 1/2	1 1/2	1 1/2 	3	1 1/2
480/3/60	480/3/60	480/3/60	480/3/60	480/3/60
6.0	6.0	6.0 	11.0	6.0
26,400	47,500	30,800	39,100	39,400
24,600	46,500	25,500	39,100	36,000
75/63	77/63	75/63	78/63	76/63
44/54	44/54	44/54	44/54	44/54
450	510	510 	420	400
5.3	9.5	6.2	7.8	7.9
0.5	0.9	0.6	0.5	0.7
40,200	71,600	35,600	87,500	55,100
65	65	65	65	65
180/160	180/160	180/160	180/160	180/160
4.0	7.2	3.6	8.7	5.5
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TRANE	TRANE	TRANE	TRANE	TRANE
CLCH /3	CLCH /6	CLCH /3	CLCH /8	CLCH /6
VDT E/O/S/U	VDT E/O/S/U	VDT E/O/S/U	VDT E/O/S/U	VDT E/O/S/U

142

Johnson Consulting Engineers, Inc.1779 Wells Branch Parkway, Suite 101
Austin, Texas 78728

(512) 990-9550

FAX 990-9552

PROJECT: WILLIAMSON COUNTY ANNEX

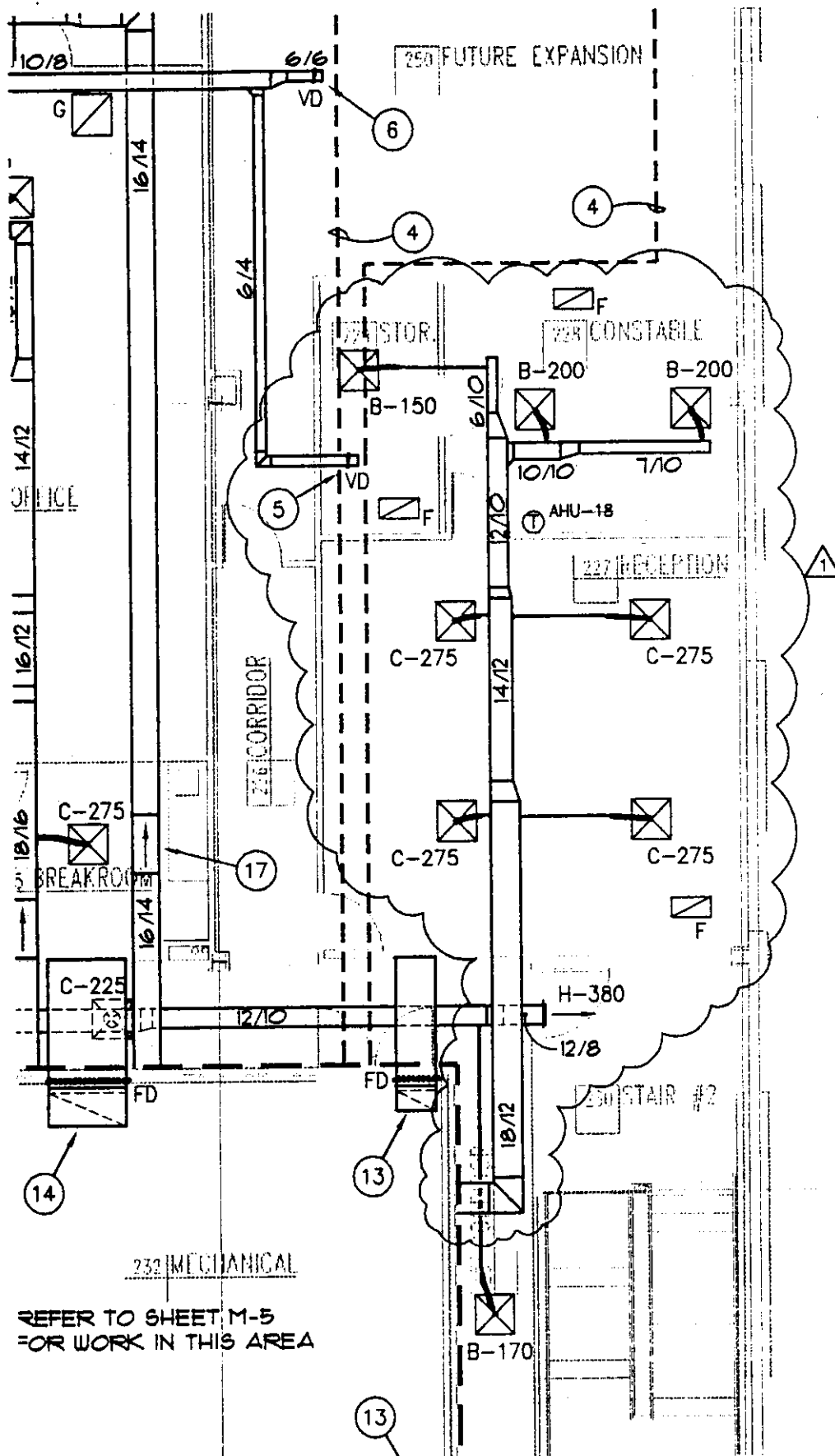
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DRAWN BY: RNL CHECKED BY: DLJ PROJ. NO. 96166

SCALE: NO SCALE DATE: 03/27/97 FILE NAME:

SHEET NO.

SD-2



143

Johnson Consulting Engineers, Inc.

1779 Wells Branch Parkway, Suite 101
Austin, Texas 78728

(512) 990-9550 FAX 990-9552

PROJECT: WILLIAMSON COUNTY ANNEX

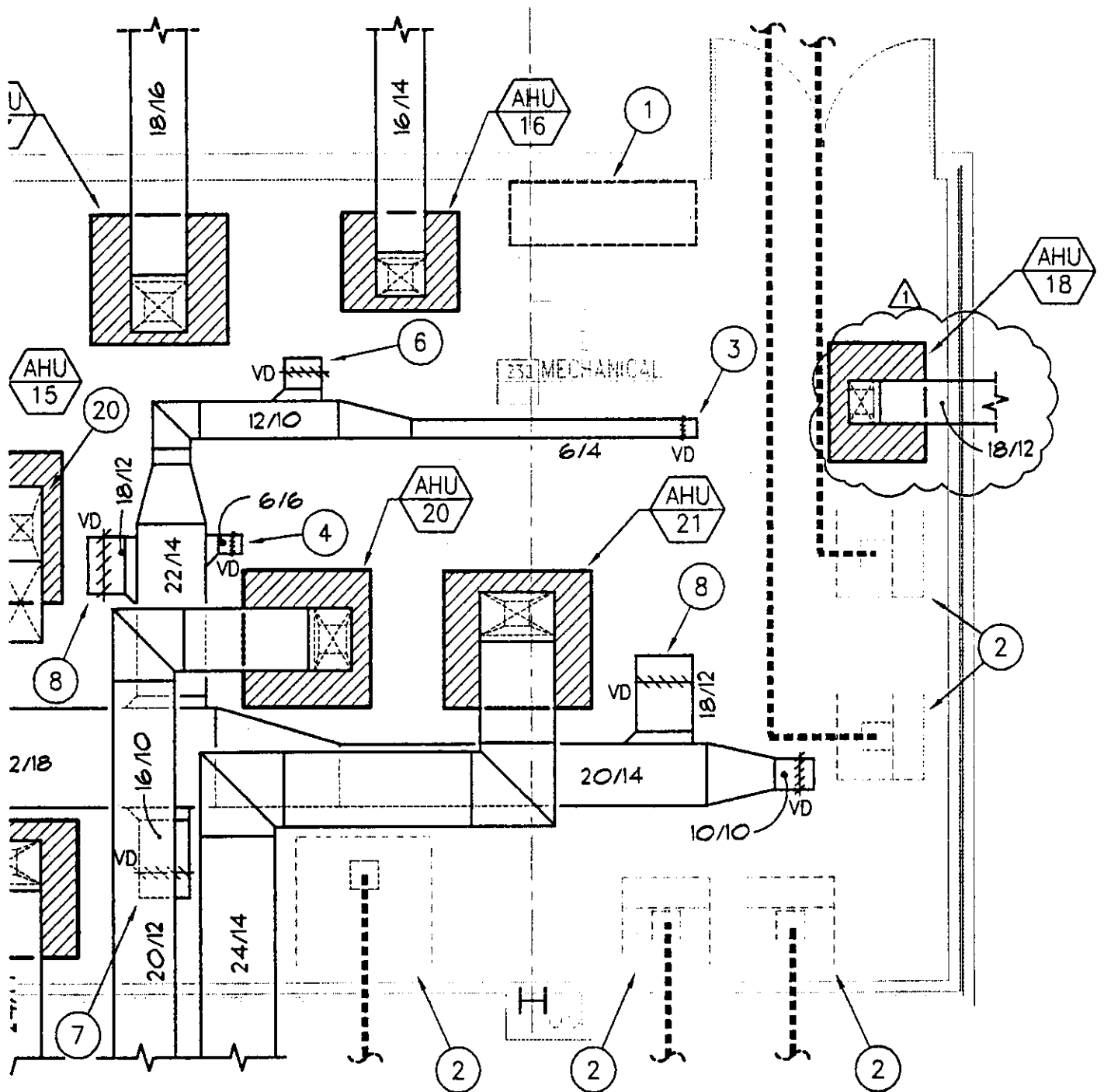
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DRAWN BY: RNL CHECKED BY: DLJ PROJ. NO. 96166

SCALE: 1/8"=1'-0" DATE: 03/27/97 FILE NAME:

SHEET NO.

SD-3



144

Johnson Consulting Engineers, Inc.

1779 Wells Branch Parkway, Suite 101
Austin, Texas 78728

(512) 990-9550 FAX 990-9552

PROJECT: WILLIAMSON COUNTY ANNEX

DRAWING TITLE: MECHANICAL ROOM PLAN - HVAC

DRAWN BY: RNL CHECKED BY: DLJ PROJ. NO. 96166

SCALE: 1/4"=1'-0" DATE: 03/27/97 FILE NAME:

SHEET NO.

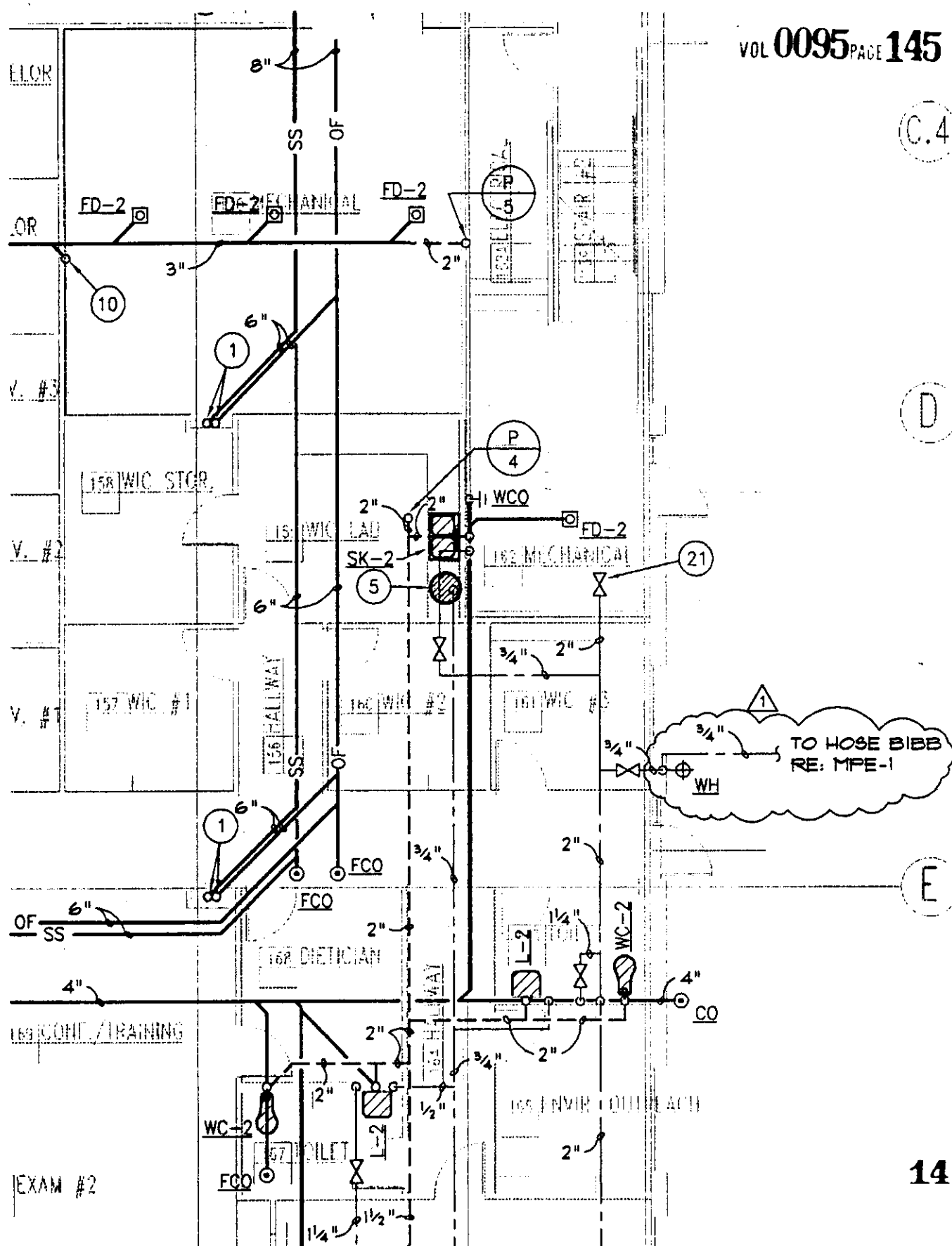
SD-4

C.4

D

E

145

**Johnson Consulting Engineers, Inc.**1779 Wells Branch Parkway, Suite 101
Austin, Texas 78728

(512) 990-9550 FAX 990-9552

PROJECT: WILLIAMSON COUNTY ANNEX

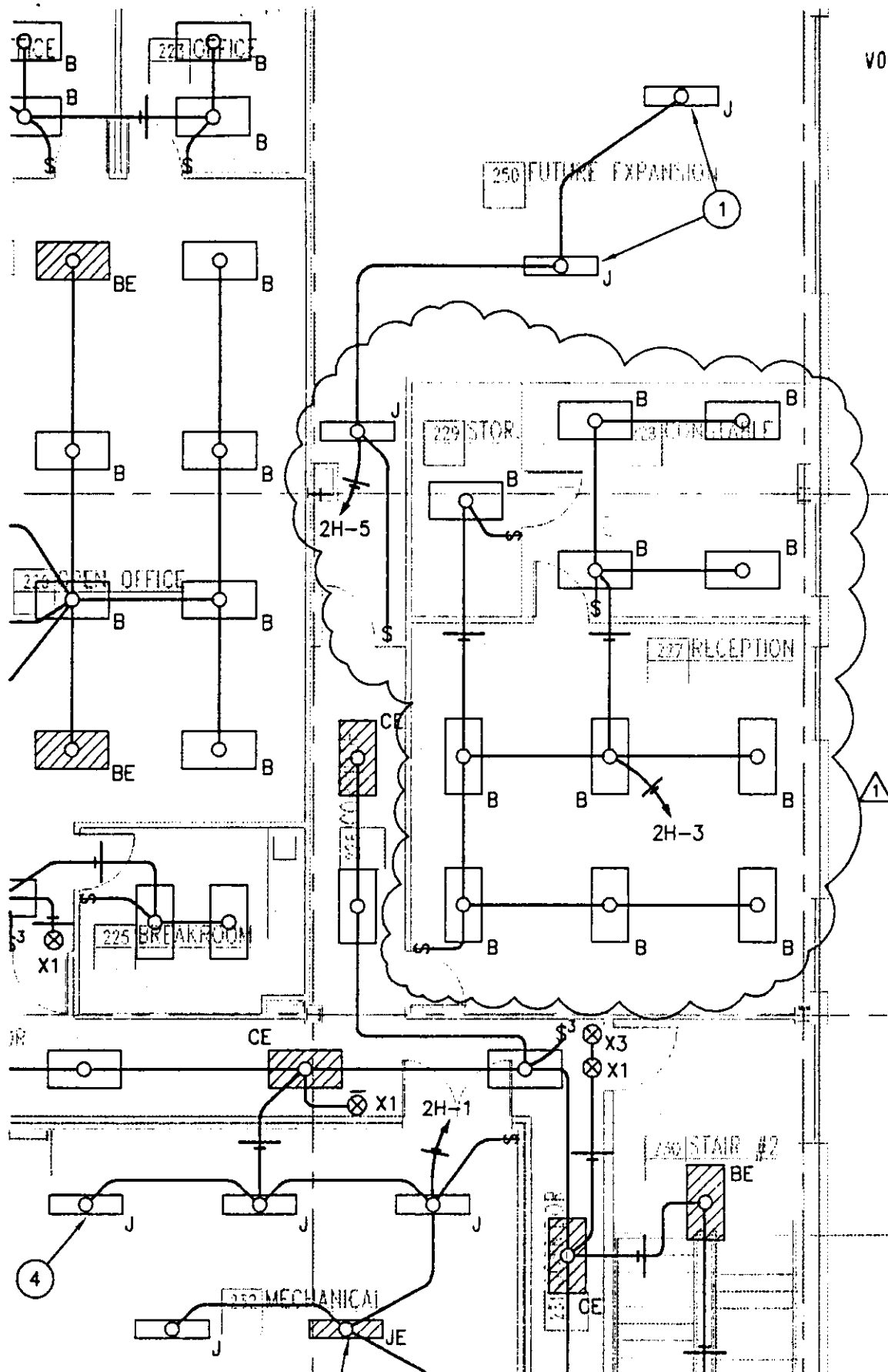
DRAWING TITLE: FIRST FLOOR PLAN - PLUMBING

DRAWN BY: RNL CHECKED BY: DLJ PROJ. NO. 96166

SCALE: 1/8" = 1'-0" DATE: 03/27/97 FILE NAME:

SHEET NO.

SD-5



147

Johnson Consulting Engineers, Inc.1779 Wells Branch Parkway, Suite 101
Austin, Texas 78728

(512) 990-9550 FAX 990-9552

PROJECT: WILLIAMSON COUNTY ANNEX

DRAWING TITLE: SECOND FLOOR PLAN - LIGHTING

DRAWN BY: RNL CHECKED BY: DLJ PROJ. NO. 96166

SCALE: 1/8"=1'-0" DATE: 03/27/97 FILE NAME:

SHEET NO.

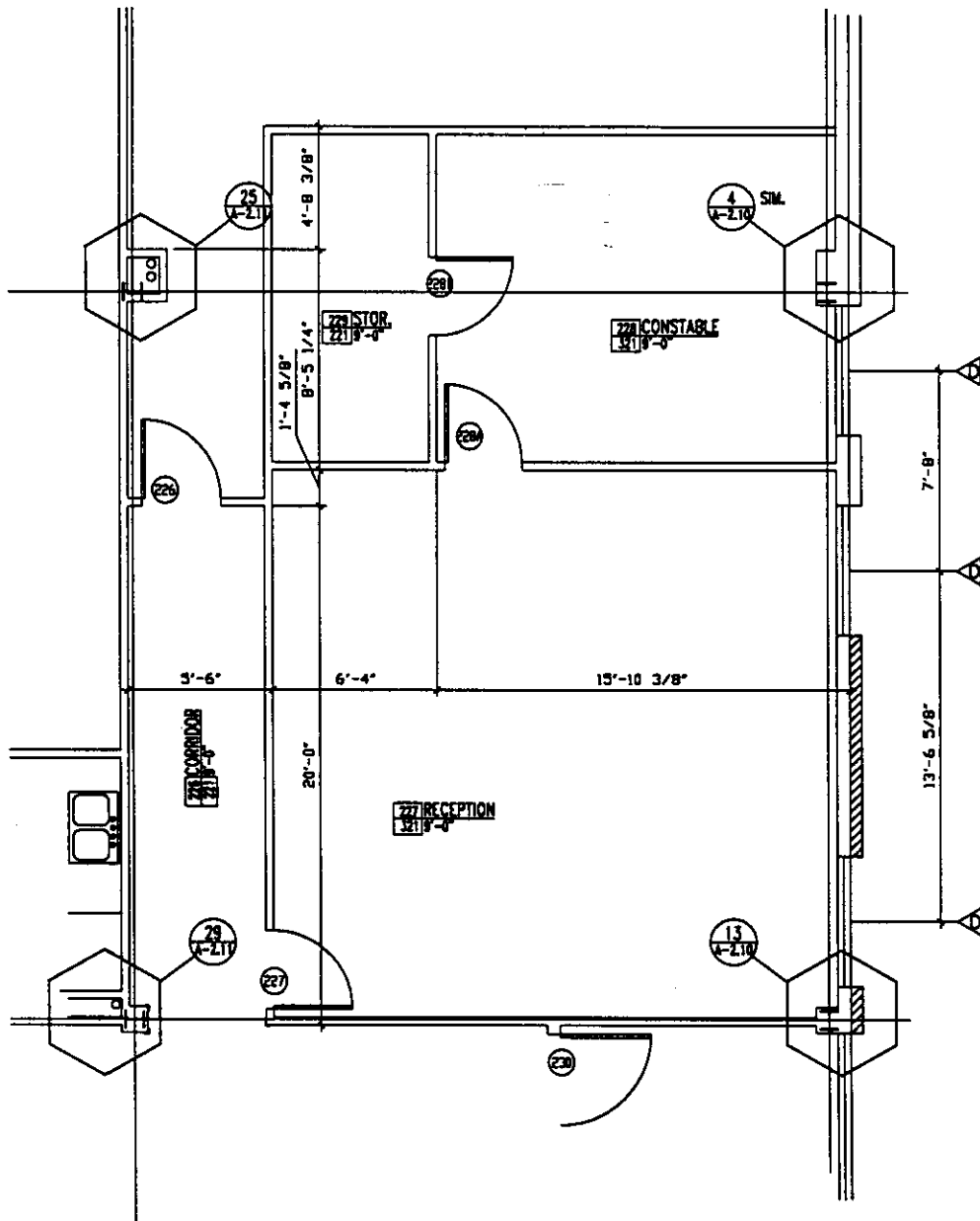
SD-7

SPENCER GODFREY ARCHITECTS

REVISION SKETCH/CLARIFICATION

DATE: 3/28/97 NO. SD-8

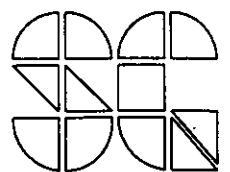
PROJECT: WILLIAMSON COUNTY ANNEX PROJECT NO. 96030



148

FLOOR PLAN

SCALE: $1/8'' = 1'-0''$

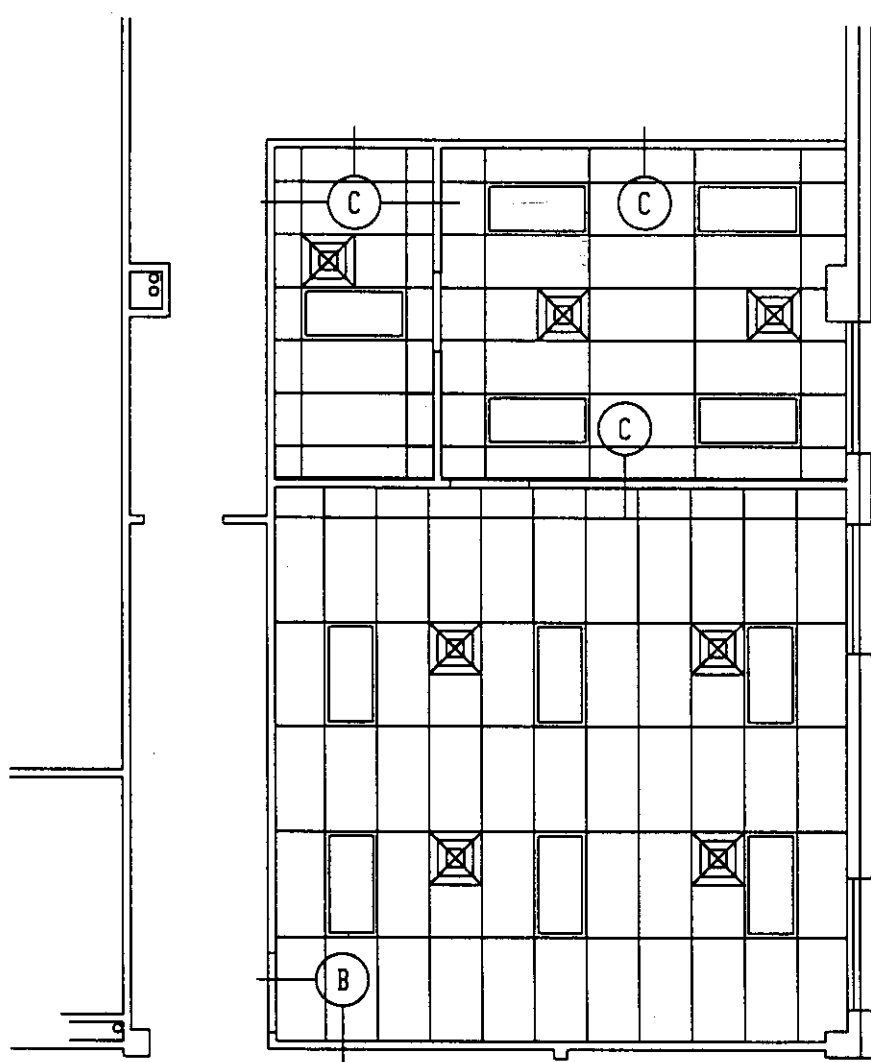


VOL 0095 PAGE 148

REVISION SKETCH/CLARIFICATION

DATE: 3/28/97 NO. SD-9

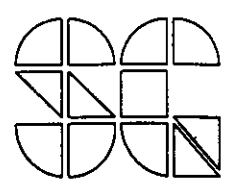
PROJECT: WILLIAMSON COUNTY ANNEX PROJECT NO. 96030



149

REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0"





1106 SOUTH MAYS, SUITE 120 • ROUND ROCK, TEXAS 78664 • (512) 388-0677 • FAX (512) 388-0752

ADDENDA**ADDENDUM NO.: 02****DATE:** April 14, 1997**PROJECT:** Williamson County Precinct 2 Annex**LOCATION:** Cedar Park, Texas**NOTICE TO BIDDERS:**

- A. This Addendum shall be considered part of the Contract Documents dated **March 26, 1997** for the above mentioned project as though it has been issued at the same time and incorporated integrally data differ Addendum shall govern and take precedence.
- B. Bidders are hereby notified that they shall make necessary adjustments in their estimates on account of this Addendum. It will be construed that each bidder's proposal submitted with full knowledge of all modifications and supplemental data specified therein. Please attach to the back of the Project Manual.

ARCHITECTURAL:**PROJECT MANUAL SPECIFICATIONS:**

- ITEM 1:** Section 00100 - Instructions to Bidders, 7.04, A, 2
Delete "Section 00460 - List of Alternates" then add "Section 00420 - Unit Prices".
- ITEM 2:** Section 08712 - Door Hardware, 3.03 Schedule, HW A
Delete reference to door 138A, add door 138B.
- ITEM 3:** Section 10420 - Plaques, 2.02, A
Revise to read "Building Plaque: 18" x 10" cast aluminum....." (Refer attached drawing)
- ITEM 4:** Section 10441 - Plastic Signs, 3.03 Schedule
Add "CC. DO NOT BLOCK DOOR OPENING" (x4)
Add "DD. IN CASE OF FIRE, DO NOT USE ELEVATOR, USE STAIRS" (2)
- ITEM 5:** Section 10520 - Fire Extinguishers, Cabinets, and Accessories, 3.03 Schedule
Change to read "Provide 15 total units."
- ITEM 6:** Section 15782 - Outside Air Units, 3.04
Change the cooling design conditions entering air temperature to 105/77.
- ITEM 7:** General
The following manufacturers are approved for bidding prior to final compliance with the specifications and submittal process.
Outside Air Units: Engineered Commercial Systems, Inc.
Fire Alarm System: Gamewell

PROJECT DRAWINGS:

- ITEM 1: Sheet 0.2 and 0.3
1-hour fire separation key designates 2-hour wall (as referenced on Sheet 0.1). 1-hour wall is correct. Refer attached SD-13 and SD-14.
- ITEM 2: Sheet C-2.2
Add Note: "Provide 1-1/2" domestic water meter and 2" irrigation meter. Meters shall be installed to City of Austin Standards."
- ITEM 3: Sheet A-1.1
Revise curb radius on 2 block parking islands. Refer attached SD-10.
- ITEM 4: Sheet A-1.1
Add approximately 235 lf of 6' privacy fence adjacent to gas line easement. Add high-pressure gas line easement warning. Refer attached SD-11.
- ITEM 5: Sheet A-1.1
Revise northeast entry drive to align with parking lot across the sheet. Refer attached SD-12.
- ITEM 6: Sheet A-3.1
Revise keyed notes 9 and 10 to read: "9. 12" dark bronze AL. letters with concealed fasteners." and "10. 9" dark bronze AL. numbers with concealed fasteners."
- ITEM 7: Sheet S-3
Revise plan note. Delete reference to ".....22 GA composite metal deck" and add ".....20 GA composite metal deck."
- ITEM 8: Sheet P-3
Revise per attached sketch P-3.1.

AD FORM

WILLIAMSON COUNTY PRECINCT 2 ANNEX

Dedicated to the Citizens of Williamson County on May 5, 1998

COUNTY JUDGE

John Doerfler

COMMISSIONERS:

Mike Heiligenstein Greg Boatright

David Hays Jerry Mehevic

Spencer Godfrey Architects, Round Rock, Texas

XYZ Constructors, Anytown, Texas

18"

INSTALL PER MANUFACTURERS INSTRUCTIONS AT
LOCATION AS SELECTED BY THE ARCHITECT.

Note: Projected Single
Line-Beveled Edge
Pebbled Background
Texture

PLAQUE DETAIL

SCALE: 1/2" = 1'

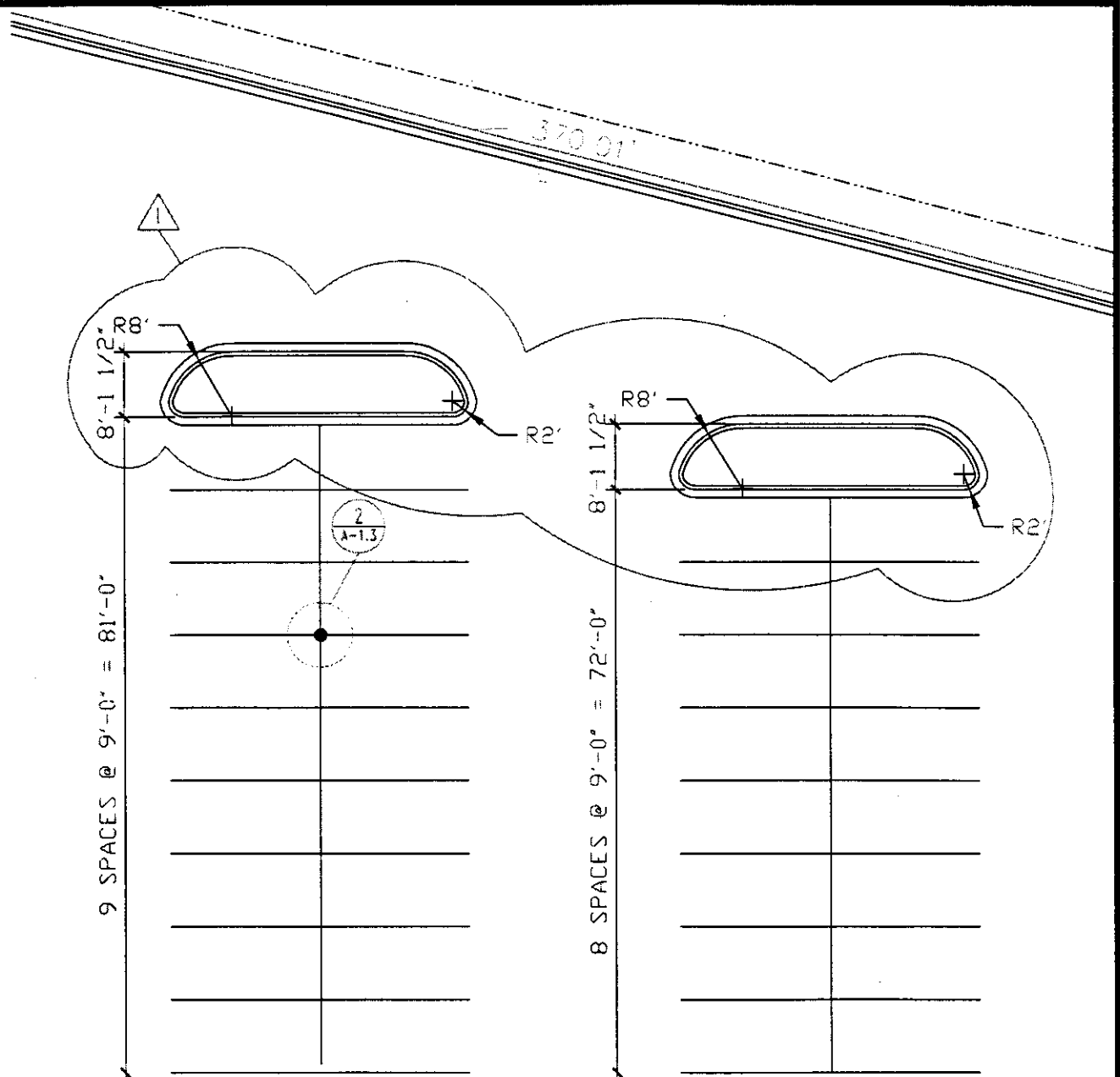
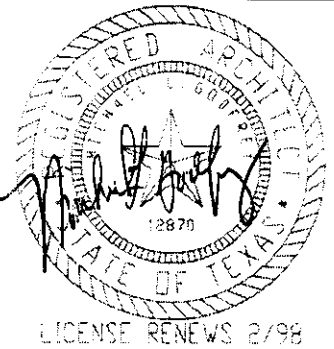
SPENCER GODFREY ARCHITECTS

REVISION SKETCH/CLARIFICATION

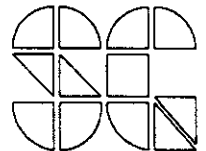
DATE: 4/2/97 NO. SD-10

PROJECT: WILLIAMSON COUNTY ANNEX

PROJECT NO. 96030

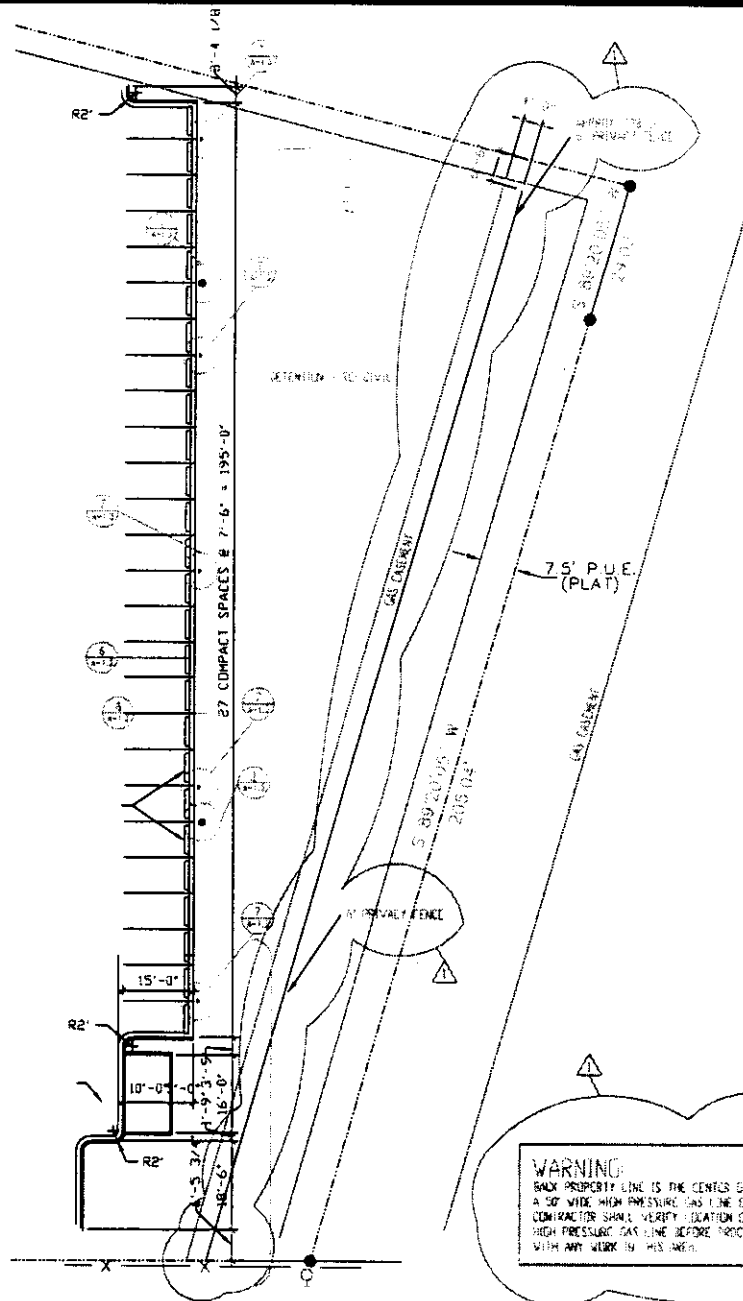
**ISLAND REVISIONS**

SCALE: 1" = 20'-0"

153

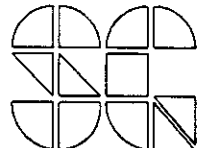
REVISION SKETCH/CLARIFICATION

PROJECT: WILLIAMSON COUNTY ANNEX



SCALE: 1" = 40'-0"

154



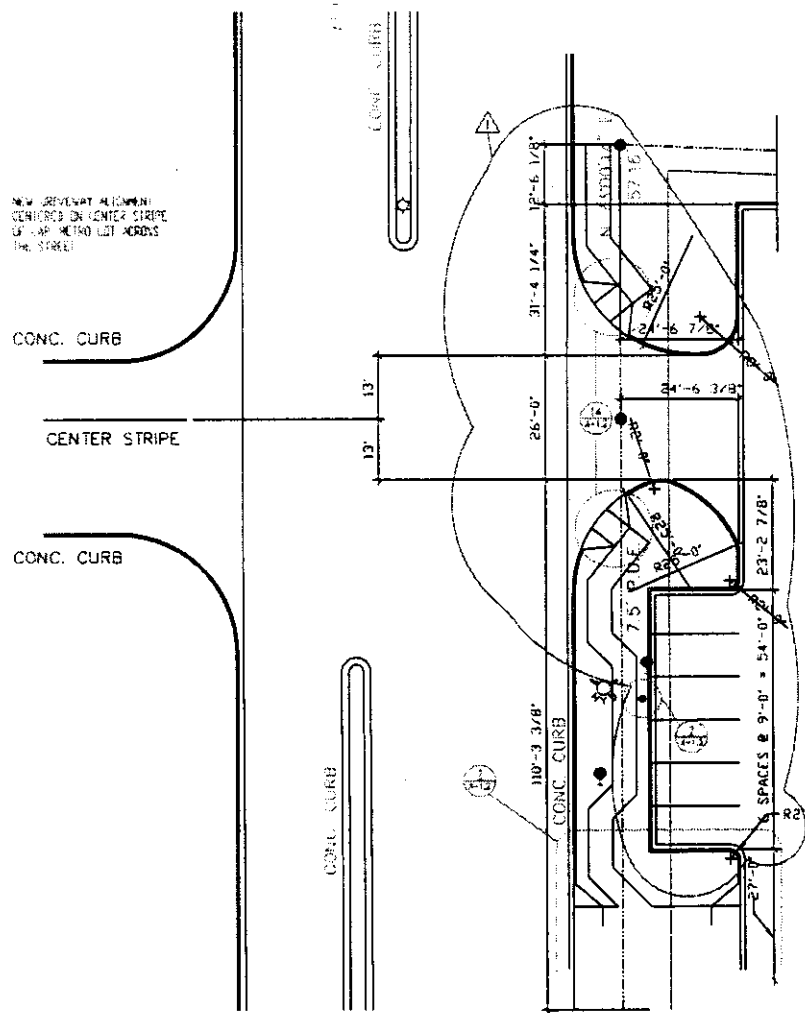
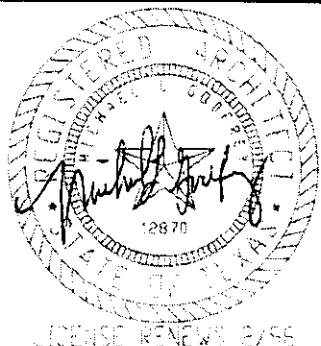
SPENCER GODFREY ARCHITECTS

REVISION SKETCH/CLARIFICATION

DATE: 4/9/97 NO. SD-12

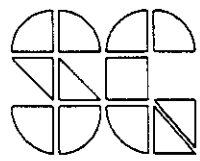
PROJECT: WILLIAMSON COUNTY ANNEX

PROJECT NO. 96030



REVISED ENTRY DRIVE

SCALE: 1" = 40'-0"



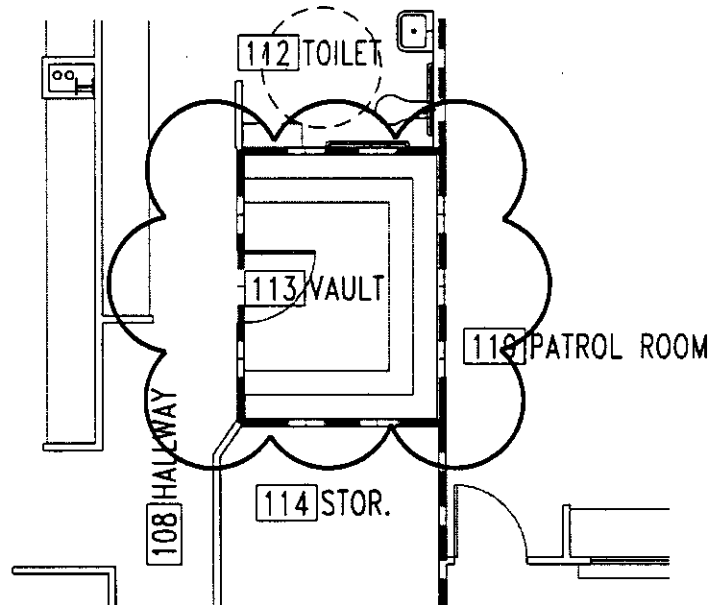
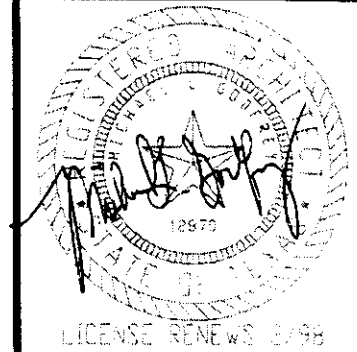
SPENCER GODFREY ARCHITECTS

REVISION SKETCH/CLARIFICATION

DATE: 4/11/97 NO. SD-13

PROJECT: WILLIAMSON COUNTY ANNEX

PROJECT NO. 96030

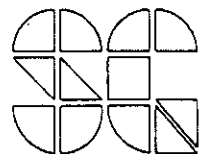


NOTE: CLOUDED AREA INDICATES 2 HOUR SEPARATION.
ALL OTHER AREAS TO BE 1 HOUR SEPARATION UNLESS INDICATED.

FIRE RATING @ FIRST FLOOR

SCALE: 1/8" = 1'-0"

156



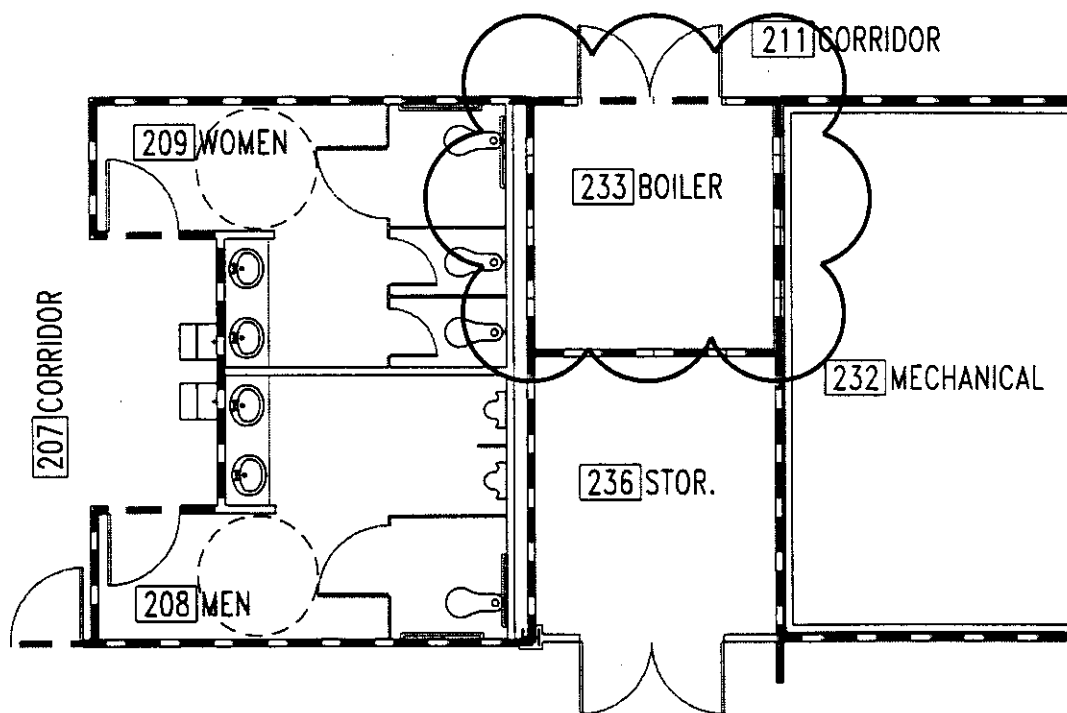
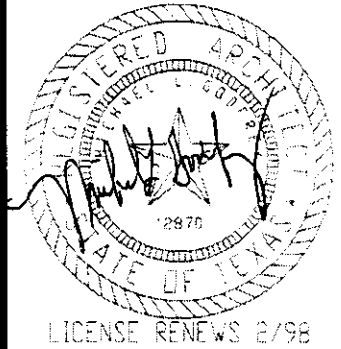
SPENCER GODFREY ARCHITECTS

REVISION SKETCH/CLARIFICATION

DATE: 4/11/97 NO. SD-14

PROJECT: WILLIAMSON COUNTY ANNEX

PROJECT NO. 96030

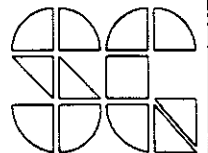


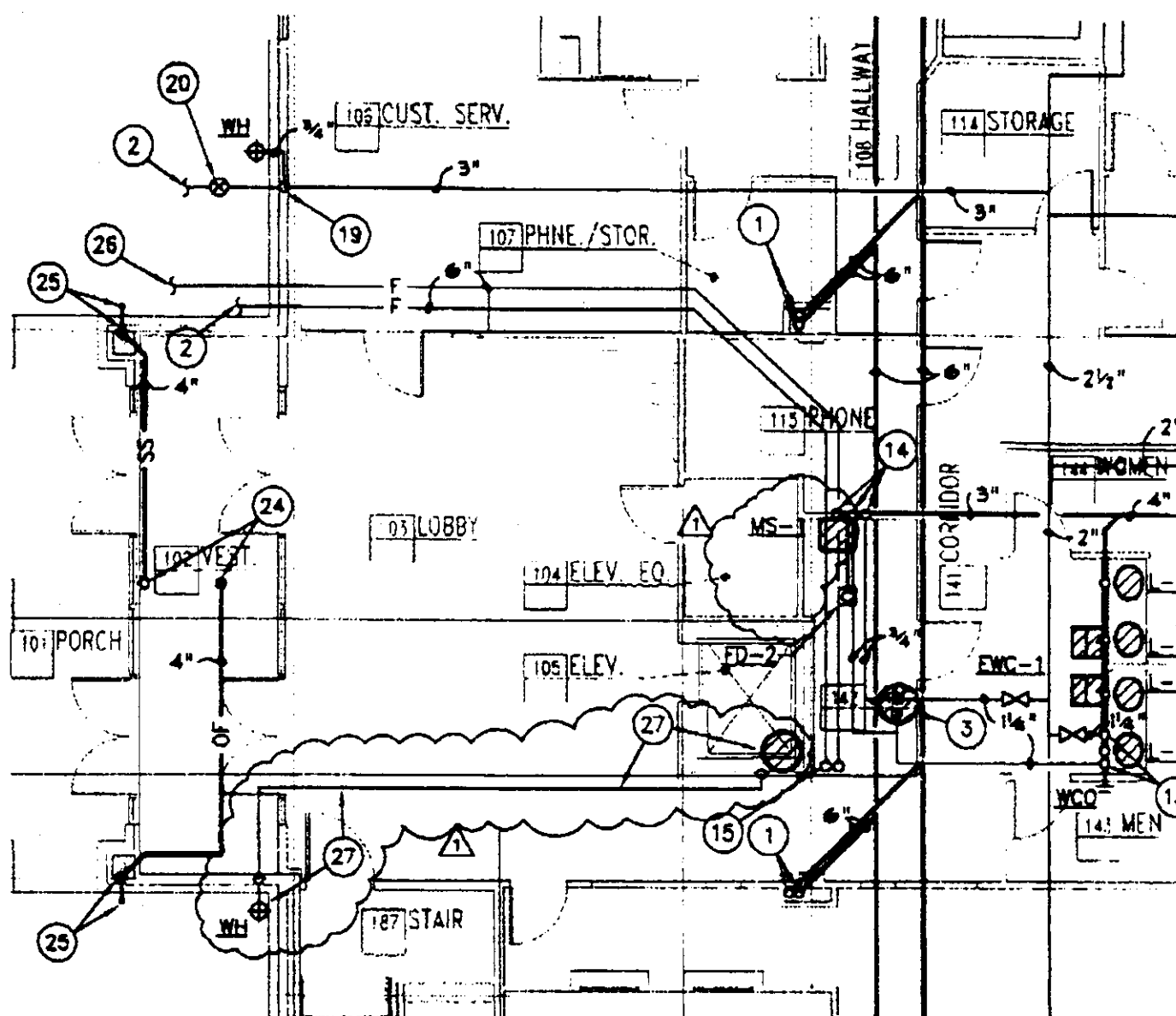
NOTE: CLOUDED AREA INDICATES 2 HOUR SEPARATION.
ALL OTHER AREAS TO BE 1 HOUR SEPARATION UNLESS INDICATED.

FIRE RATING @ SECOND FLOOR

SCALE: 1/8" = 1'-0"

157





(25) 4" STORM DRAIN OVERFLOW DOWN IN COLUMN. STUB OUT AT 6" AFF THRU JOSAM 25010 DOWN SPOUT NOZZLE.

(26) TO FIRE DEPARTMENT CONNECTION. RE: MPE-1

(27) LITTLE GIANT 5-MSP-18 WITH RS-5-18 AUTOMATIC SUMP PUMP IN SUMP AT ELEVATOR PIT. 120V-1Ø-1/6 HP. CONNECT 3/4" COPPER DISCHARGE LINE AND ROUTE TO WALL HYDRANT AS SHOWN. CAP WALL HYDRANT OUTLET AND LABEL WALL HYDRANT "ELEVATOR SUMP PUMP".

(28) 2" VENT UP.

(29) SLEEVE GAS PIPING ABOVE CEILING. VENT TO BOILER ROOM AND AT EXTERIOR WALL

158

Johnson Consulting Engineers, Inc.

1779 Wells Branch Parkway, Suite 101
Austin, Texas 78728

(512) 990-9550 FAX 990-9552

PROJECT: WILLIAMSON COUNTY ANNEX

DRAWING TITLE: FIRST FLOOR PLAN - PLUMBING

DRAWN BY: KB CHECKED BY: DLJ PROJ. NO. 96166

SCALE: 1/8"=1'-0" DATE: 04/10/97 FILE NAME:

SHEET NO.

P-3.1



1106 SOUTH MAYS, SUITE 120 • ROUND ROCK, TEXAS 78664 • (512) 388-0677 • FAX (512) 388-0752

ADDENDA

ADDENDUM NO.: 03

DATE: April 15, 1997

PROJECT: Williamson County Precinct 2 Annex

LOCATION: Cedar Park, Texas

NOTICE TO BIDDERS:

- A. This Addendum shall be considered part of the Contract Documents dated **March 26, 1997** for the above mentioned project as though it has been issued at the same time and incorporated integrally data differ Addendum shall govern and take precedence.
- B. Bidders are hereby notified that they shall make necessary adjustments in their estimates on account of this Addendum. It will be construed that each bidder's proposal submitted with full knowledge of all modifications and supplemental data specified therein. Please attach to the back of the Project Manual.

ARCHITECTURAL:

PROJECT MANUAL SPECIFICATIONS:

- ITEM 1: Section 00800A – Supplementary Conditions, 2.09, E – Delete paragraph.
Performance Bond and Labor and Material Payment Bonds will be required by the Owner of the General Contractor.

PROJECT DRAWINGS:

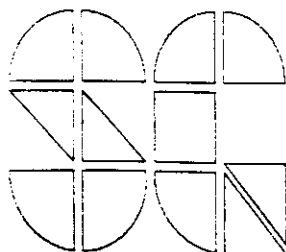
- ITEM 1: Sheet C-2.2.
Add the following: "Provide two 2" double check valve backflow preventers with box. One for domestic water and one for irrigation. Watts series 007-2 or equal.
- ITEM 2: Sheet C-2.2
Change sewer line from SDR35 to PVC-DWW SCH40. Add 1 clean-out on building sewer line adjacent to Discovery Boulevard.

WILLIAMSON COUNTY PRECINCT 2 ANNEX

CEDAR PARK, TEXAS

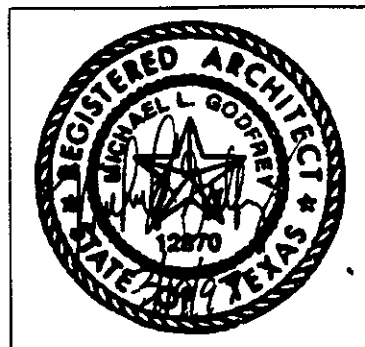
MARCH 26, 1997

PROJECT MANUAL SPECIFICATIONS



**SPENCER GODFREY
ARCHITECTS**

1106 SOUTH MAYS, SUITE 120
ROUND ROCK, TEXAS 78664
512/388-0677



SET NO. 7

PROJECT MANUAL

FOR

**WILLIAMSON COUNTY
PRECINCT 2 ANNEX**

SPENCER GODFREY ARCHITECTS
1106 SOUTH MAYS, SUITE 120
ROUND ROCK, TEXAS 78664

MARCH 26, 1997



A handwritten signature of Michael L. Godfrey in cursive script.

MICHAEL L. GODFREY
TEXAS REGISTRATION NUMBER 12870

RENEWS FEBRUARY 1998

TABLE OF CONTENTS

INDEX OF DIVISION 0

00010	GENERAL INSTRUCTIONS
00020	INVITATION TO BID
00100	INSTRUCTIONS TO BIDDERS
00200	INFORMATION AVAILABLE TO BIDDER
00221	OWNER'S/ARCHITECT'S DISCLAIMER
00300	BID TENDER FORMS
00310	BID FORM
00400	SUPPLEMENTS TO BID FORMS
00410	BID SECURITY FORM
00420	UNIT PRICES
00430	SUBCONTRACTOR LISTING
00440	SUBSTITUTION LISTING
00450	EQUIPMENT SUPPLIERS LISTING
00470	COST BREAKDOWN
00500C	AGREEMENT FORMS
00600	BONDS AND CERTIFICATES
00610	PERFORMANCE BOND
00620	LABOR AND MATERIALS PAYMENT BOND
00650	CERTIFICATES OF INSURANCE
00660	CERTIFICATE OF COMPLIANCE WITH APPLICABLE LAWS & REGULATIONS
00700A	GENERAL CONDITIONS - AIA
00800A	SUPPLEMENTARY CONDITIONS
00850	DRAWINGS INDEX
00851	INDEX OF DRAWINGS
00900	ADDENDA AND MODIFICATIONS

INDEX OF DIVISION 1

01010	SUMMARY OF WORK
01011	SUMMARY OF PROJECT
01020	ALLOWANCES
01021	CASH ALLOWANCES
01022	INSPECTION TESTING ALLOWANCES
01023	CONTINGENCY/PROJECT BETTERMENT ALLOWANCE

01040	COORDINATION
01045	CUTTING AND PATCHING
01050	FIELD ENGINEERING
01060	REGULATORY REQUIREMENTS
01061(S)	BUILDING CODES
01070	ABBREVIATIONS AND SYMBOLS
01080	IDENTIFICATION SYSTEMS
01090	REFERENCE STANDARDS
01150	MEASUREMENT AND PAYMENT
01151	UNIT PRICES
01152	APPLICATION FOR PAYMENT
01153	CHANGE ORDER PROCEDURES
01300	SUBMITTALS
01310	CONSTRUCTION SCHEDULES
01320	PROGRESS REPORTS
01340	SHOP DRAWINGS, PROJECT DATA, AND SAMPLES
01350	MOCK-UPS
01370	SCHEDULE OF VALUES
01380	CONSTRUCTION PHOTOGRAPHS
01400	QUALITY CONTROL
01405	MANUFACTURER CERTIFICATION
01410	TESTING LABORATORY SERVICES
01500	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
01568	EROSION CONTROL
01580	PROJECT IDENTIFICATION AND SIGNS
01590	FIELD OFFICES AND SHEDS
01600	MATERIAL AND EQUIPMENT
01610	TRANSPORTATION AND HANDLING
01620	STORAGE AND PROTECTION
01630	SUBSTITUTIONS AND PROJECT OPTIONS
01650	STARTING OF SYSTEMS
01660	TESTING, ADJUSTING, AND BALANCING OF SYSTEMS
01700	CONTRACT CLOSEOUT
01710	CLEANING
01720	RECORD DOCUMENTS
01730	OPERATIONAL AND MAINTENANCE DATA
01740	WARRANTIES AND BONDS
01750	SPARE PARTS AND MAINTENANCE MATERIALS

INDEX OF DIVISION 2

02010	SUBSURFACE INVESTIGATION
02011	GEOTECHNICAL INVESTIGATION
02100	SITE PREPARATION
02110	CLEARING
02200	EARTHWORK
02210	SITE GRADING
02213	ROUGH GRADING
02220	STRUCTURAL EXCAVATION AND BACKFILLING
02225	TRENCHING FOR UTILITIES
02230	BASE FOR ASPHALT PAVING
02231	BASE FOR CONCRETE PAVING
02250	COMPACTION CONTROL AND TESTING
02260	FINISH GRADING
02270	SLOPE PROTECTION AND EROSION CONTROL
02281	SOIL TREATMENT/TERMITE CONTROL
02372	DRILLED, CAST-IN-PLACE CONCRETE PIERS
02440	SITE IMPROVEMENTS
02441	UNDERGROUND SPRINKLER SYSTEMS
02444	CHAIN LINK FENCES AND GATES
02452	SITE SIGNAGE
02480	LANDSCAPE PLANTING
02484	SOIL PREPARATION AND SOIL MIXES
02485	SEEDING AND GRASS
02486	SODDING
02490	TREES PLANTS AND GROUND COVERS
02500	PAVING AND SURFACING
02513	ASPHALTIC CONCRETE PAVING
02515	PORTLAND CEMENT CONCRETE PAVING
02528	CONCRETE CURBS
02577	PAVEMENT MARKING
02585	CONCRETE WALKS - BROOM FINISH
02665	DOMESTIC WATER SYSTEM
02720	STORM SEWER SYSTEMS
02730	SEWAGE COLLECTION SYSTEM

INDEX OF DIVISION 3

03100	CONCRETE FORMWORK
03200	CONCRETE REINFORCEMENT
03250	CONCRETE ACCESSORIES
03300	CAST-IN-PLACE CONCRETE
03345	CONCRETE FLOOR FINISHING

INDEX OF DIVISION 4

04050	MASONRY PROCEDURES
04100	MORTAR
04103	MORTAR COLORING MATERIALS
04150	MASONRY ACCESSORIES
04160	JOINT REINFORCEMENT
04170	ANCHORS AND TIE SYSTEMS
04180	MASONRY CONTROL JOINTS
04200	UNIT MASONRY
04220	CONCRETE UNIT MASONRY

INDEX OF DIVISION 5

05050	METAL FASTENERS
05120	STRUCTURAL STEEL
05210	STEEL JOISTS
05311	STEEL ROOF DECK
05314	COMPOSITE STEEL FLOOR DECK
05400	COLD FORMED METAL FRAMING
05410	COLD FORMED METAL STUD SYSTEM
05510	STEEL STAIRS
05515	LADDERS
05520	HANDRAILS AND RAILINGS

INDEX OF DIVISION 6

06050	FASTENERS AND SUPPORTS
06100	ROUGH CARPENTRY
06114	WOOD BLOCKING AND CURBING
06200	FINISH CARPENTRY
06220	MILLWORK
06240	PLASTIC LAMINATE
06300	WOOD TREATMENT
06310	PRESSURE TREATED LUMBER
06400	ARCHITECTURAL WOODWORK
06410	CABINET WORK

INDEX OF DIVISION 7

07100	WATERPROOFING
07150	DAMPPROOFING
07160(B)	BITUMINOUS DAMPPROOFING
07200	INSULATION
07212	RIGID BOARD INSULATION
07213	BATT AND BLANKET INSULATION
07220(B)	ROOF AND DECK INSULATION
07240	EXTERIOR INSULATION AND FINISH SYSTEM
07270	FIRESTOPPING
07532	ELASTOMERIC ROOFING- MECHANICALLY ATTACHED
07600	FLASHING AND SHEET METAL
07620	SHEETMETAL FLASHING AND TRIM
07830	ROOF HATCHES
07850	PREFABRICATED CURBS
07900	SEALANTS

INDEX OF DIVISION 8

08100	METAL DOORS AND FRAMES
08111	STANDARD STEEL DOORS AND FRAMES
08200	WOOD AND PLASTIC DOORS
08215	PREFINISHED WOOD DOORS
08331	OVERHEAD COILING DOORS
08400	ENTRANCES AND STOREFRONTS
08410	ALUMINUM ENTRANCES AND STOREFRONTS
08420	ENTRANCE DOORS
08700	HARDWARE
08712	DOOR HARDWARE
08730	WEATHER-STRIPPING AND SEALS
08740	THRESHOLDS
08800	GLAZING
08912	GLAZED ALUMINUM CURTAIN WALLS

INDEX OF DIVISION 9

09100	METAL SUPPORT SYSTEMS
09110	NON-LOAD BEARING WALL FRAMING SYSTEMS
09130	ACOUSTICAL SUSPENSION SYSTEMS

09250	GYPSUM WALLBOARD
09260	GYPSUM WALLBOARD SYSTEMS
09280	GYPSUM WALLBOARD ACCESSORIES
09300	TILE
09311	CERAMIC TILE - FLOORS
09312	CERAMIC TILE WALL FINISH
09500	ACOUSTICAL TREATMENT
09510	SUSPENDED ACOUSTICAL CEILINGS
09650	RESILIENT FLOORING
09655	RESILIENT STAIR TREADS AND LANDINGS
09660	RESILIENT TILE FLOORING
09680	CARPETING
09683	CARPET - DIRECT GLUE
09900	PAINTING
09910	EXTERIOR PAINTING
09920	INTERIOR PAINTING
09930	TRANSPARENT FINISHES
09950	WALL COVERING
09952	VINYL WALL COVERING
09970	PREFINISHED PANELS
09990	ADHESIVES

INDEX OF DIVISION 10

10162	METAL TOILET PARTITIONS AND URINAL SCREENS
10260	WALL AND CORNER GUARDS
10350	FLAGPOLES
10400	IDENTIFYING SERVICES
10410	DIRECTORIES AND BULLETIN BOARDS
10420	PLAQUES
10441	PLASTIC ROOM IDENTIFICATION SIGNS
10520	FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES
10800	TOILET AND BATH ACCESSORIES

INDEX OF DIVISION 11

11130(B)	AUDIO-VISUAL EQUIPMENT
11450(A)	RESIDENTIAL EQUIPMENT

VOL 0095 PAGE 168

INDEX OF DIVISION 12

12512 HORIZONTAL LOUVER BLINDS

INDEX OF DIVISION 13

NOT USED

INDEX OF DIVISION 14

14202 ELEVATORS
14212 HYDRAULIC ELEVATORS - PASSENGER

INDEX OF DIVISION 15

15010 BASIC MECHANICAL REQUIREMENTS

15121 EXPANSION COMPENSATION
15140 SUPPORTS AND ANCHORS
15170 MOTORS
15190 MECHANICAL IDENTIFICATION

15242 VIBRATION ISOLATION
15260 PIPING INSULATION
15280 EQUIPMENT INSULATION
15290 DUCTWORK INSULATION

15310 FIRE PROTECTION PIPING
15330 WET PIPE SPRINKLER SYSTEMS

15410 PLUMBING PIPING
15440 PLUMBING FIXTURES
15450 PLUMBING EQUIPMENT

15510 HYDRONIC PIPING
15515 HYDRONIC SPECIALTIES
15540 HVAC PUMPS
15561 FIRE TUBE BOILERS
15682 AIR COOLER WATER CHILLERS

15782 OUTSIDE AIR UNITS

15855 AIR HANDLING UNITS
15870 POWER VENTILATORS
15890 DUCTWORK

15910	DUCTWORK ACCESSORIES
15936	AIR OUTLETS AND INLETS
15980	INSTRUMENTATION
15990	TESTING, ADJUSTING AND BALANCING
15994	MECHANICAL SYSTEMS DEMONSTRATION

INDEX OF DIVISION 16

16010	BASIC MECHANICAL REQUIREMENTS
16111	CONDUIT
16123	BUILDING WIRE AND CABLE
16130	BOXES
16141	WIRING DEVICES
16170	GROUNDING AND BONDING
16180	EQUIPMENT WIRING SYSTEMS
16190	SUPPORTING DEVICES
16195	ELECTRICAL IDENTIFICATION
16420	SERVICE ENTRANCE
16425	SWITCHBOARDS
16440	DISCONNECT SWITCHES
16450	SECONDARY GROUNDING
16460	DRY TYPE TRANSFORMERS
16470	PANELBOARDS
16480	MOTOR CONTROLS
16485	CONTRACTORS
16510	INTERIOR LUMINARIES
16530	EXTERIOR LIGHTING
16721	FIRE ALARM AND SMOKE DETECTION SYSTEMS
16741	TELEPHONE CONDUIT SYSTEM
16770	PUBLIC ADDRESS SYSTEM

END OF SECTION

DOCUMENT 00010

GENERAL INSTRUCTIONS

PROJECT: Williamson County Annex
350 Discovery Boulevard
Cedar park, Texas

ARCHITECT PROJECT NUMBER: 96030

BID DATE AND TIME: April 17, 1997. 2:00 PM CST

GENERAL CONTRACTOR: Open Bid for any interested and qualified General Contractors who attend the Pre-bid Conference on March 27 , 1997.

ARCHITECT: Spencer Godfrey Architects
1106 South Mays, Suite 100
Round Rock, Texas 78664
Telephone: (512) 388-0677

THE DRAWINGS AND SPECIFICATIONS CONTAINED AS A PART OF THIS BID SOLICITATION REPRESENT FINAL CONTRACT DOCUMENTS PREPARED BY THE ARCHITECT AND HIS CONSULTANTS.

ANY DISCREPANCIES, OMISSIONS, OR CONFLICTS CONTAINED IN THE CONTRACT DOCUMENTS ARE UNINTENTIONAL. FORWARD ANY CLARIFICATION REQUESTS EITHER TO THE ARCHITECT OR APPROPRIATE CONSULTANT FOR RESOLUTION.

THE PROJECT: The scope of the work and character of the project is described by the contract documents consisting of the plans and specifications prepared by the Architect and his consulting engineers and dated on the project documents.

REQUEST FOR SUBCONTRACTOR PRICING:

Interested subcontractors are requested to prepare their individual bids based upon the information reflected on or within the contract documents. Bids should be prepared "per plans and specifications". Bids should be forwarded to the General Contractors.

CONTRACT DOCUMENTS are available for viewing at **AGC, ABC, and Dodge/McGraw Hill plan rooms**. Plans and specifications are also available for viewing at the office of the Architect by appointment only. Subcontractors who wish to purchase individual sets from the Architect may do so at a cost of **ONE HUNDRED FIFTY DOLLARS (\$150.00)** per set (NON-REFUNDABLE). No partial sets will be released by the Architect.

END OF DOCUMENT

DOCUMENT 00020

INVITATION TO BID

PROJECT: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

ARCHITECT PROJECT NUMBER: 96030

BID DATE AND TIME: April 17, 1997 at 2:00 PM CST

BID OPENING LOCATION: Commissioners Court Room
Williamson County Courthouse
Georgetown, Texas

ARCHITECT: Spencer Godfrey Architects
1106 South Mays, Suite 100
Round Rock, Texas 78664
Telephone: (512) 388-0677

ADDRESS BIDS TO: Judge John Doerfler, County Judge

THIS BID INVITATION IS ADDRESSED TO: All interested and qualified General Contractor Bidders who attend the Pre-bid Conference on March 27, 1997.

THE PROJECT: The scope of the work and character of the project is described by the contract documents consisting of the plans and specifications prepared by the Architect and his consulting engineers and dated on the project documents.

A SEALED BID from general contractors for the referenced project will be received at, or prior to, the date and time indicated, and at the location specified above. Bids will be opened and read aloud. Due to space limitations, it is requested that only invited bidding general contractors attend and not bidding sub-contractors.

BIDS shall be submitted in accordance with instructions contained in the "Instructions To Bidders" Document 00100. The Bid Security specified must accompany the bid.

CONTRACT DOCUMENTS may be obtained from the office of the Architect, at the address indicated, upon deposit of a check or money order in the amount of **ONE HUNDRED FIFTY DOLLARS (\$150.00)** per set of plans and specifications. This monetary deposit will be refunded upon return of the contract documents PROVIDED all documents are returned as complete sets, are unaltered, are in good condition with no permanent markings, and return is made not later than 5 days from the bid date.

No exceptions will be made to the above stipulated conditions for plan deposit refund. Any shipping or postage expense shall be borne by the Bidder.

CONTRACT DOCUMENTS can only be obtained by General Contract Bidders. Copies of drawing and specifications have been placed in **AGC, ABC, and Dodge/McGraw-Hill plan rooms.**

BIDS shall be valid for a period of not less than **FORTY-FIVE (45) DAYS** from the date of the bid opening.

THE OWNER reserves the right to reject any or all bids, to waive any formalities of the bidding, and to require evidence of qualifications of prime bidders and listed subcontractor bidders, to include financial statements.

END OF DOCUMENT

DOCUMENT 00100

INSTRUCTIONS TO BIDDERS

VOL 0095
PAGE 173

PART 1 SUMMARY

1.01 DOCUMENT INCLUDES

- A. Invitation
 - 1. Bid Submission
 - 2. Intent
 - 3. Work Identified in the Contract Documents
 - 4. Contract Time
- B. Bid Documents and Contract Documents
 - 1. Definitions
 - 2. Contract Documents Identification
 - 3. Availability
 - 4. Examination
 - 5. Queries/Addenda
 - 6. Product/System Substitutions
- C. Site Assessment
 - 1. Site Examination
- D. Qualifications
 - 1. Pre-qualification
 - 2. Subcontractors/Suppliers/Others
- E. Bid Submission
 - 1. Bid Depository
 - 2. Bid Ineligibility
 - 3. Submission Procedures
- F. Bid Enclosures/Requirements
 - 1. Security Deposit
 - 2. Insurance
 - 3. Bid Form Requirements
 - 4. Bid Form Signature
 - 5. Additional Bid Information
- G. Offer Acceptance/Rejection
 - 1. Duration of offer
 - 2. Acceptance of Offer

1.02 RELATED DOCUMENTS

- A. Document 00020 - Invitation to Bid.
- B. Document 00200 - Information Available to Bidders

- C. Document 00221 - Owner's/Architect's Disclaimer
- D. Document 00300 - Bid Tender Forms.
- E. Document 00310 - Bid Form (Stipulated Price).
- F. Document 00400 - Supplements to Bid Form.
- G. Document 00410 - Bid Security Form.
- H. Document 00420 - Unit Prices.
- I. Document 00430 - Subcontractor Listing
- J. Document 00440 - Substitution Listing
- K. Document 00800 - Supplementary Conditions

PART 2 INVITATION

2.01 BID SUBMISSION

- A. Bids signed and under seal, executed, and dated, for the **Williamson County Annex** will be received by the Owner at the **Commissioners Court Room, Williamson County Courthouse, Georgetown, Texas** on or before **2:00 PM CST** (local time) on the **17th day of April, 1997**.
- B. Offers submitted after the above time will be rejected.
- C. Apparent low bidder shall submit documents 00430 - Subcontractor Listing; 00440 - Substitution Listing; 00490 - Cost Breakdown within 40 hours after bid opening.
- D. Bids will be opened publicly immediately after the stipulated time for receipt of Bids.

2.02 INTENT

- A. The intent of this Bid request is to obtain an offer to perform work to complete the **Williamson County Annex** located at **350 Discovery Boulevard, Cedar Park, Texas** for a **Lump Sum Price**, in accordance with the Contract Documents.

2.03 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

- A. Work of this proposed Contract comprises general construction including Civil, Structural, Mechanical, and Electrical Work.

2.04 CONTRACT TIME

- A. Identify Contract Time in the Bid Form. The completion date in the Agreement shall be the Contract Time added to the Commencement Date. The Commencement Date shall be the date indicated on the written Owner's Notice to Proceed.

- B. The Owner requires that the Work of this contract be completed as quickly as possible. Consideration will be given to time of completion when reviewing the submitted Bids.

PART 3 BID DOCUMENTS AND CONTRACT DOCUMENTS

3.01 DEFINITIONS

- A. Bid Documents: Contract Documents supplemented with Invitation to Bid, Instructions to Bidders, Information Available to Bidders, Bid Form and Appendix A, Supplements to Bid Forms and Appendices, Bid Securities, identified herein.
- B. Contract Documents: Defined in AIA A201 Article 1 including issued Addenda.
- C. Bid, Offer, or Bidding: Act of submitting an offer under seal.
- D. Bid Price: Monetary sum identified by the Bidder in the Bid Form.

3.02 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as Project Number: **96030**, as prepared by the Architect and identified in the Index of Drawings (Section 00851).

3.03 AVAILABILITY

- A. Bid Documents may be obtained at the office of the **Architect** located at **1106 South Mays, Suite 120, Round Rock, Texas 78664, 512/388-0677**
- B. A maximum of **five (5)** sets of Bid Documents may be obtained by **General Contract Bidders** upon receipt of a refundable deposit, by cash, or certified check, in the amount of **ONE HUNDRED FIFTY DOLLARS (\$150.00)** for each set.
- C. Deposit will be refunded if Bid Documents are returned complete, undamaged, unmarked and reusable, within **five (5)** days of Bid submission. Failure to comply will result in forfeiture of deposit. No exceptions will be made to or for any Bidder.
- D. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

3.04 EXAMINATION

- A. Bid Documents may be viewed at the office of the Architect, by appointment only as well as local area plan rooms (Associated Builders and Contractors, Associated General Contractors, F.W. McGraw Hill Dodge Information Systems).
- B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents appear to be incomplete.
- C. Immediately notify the Architect upon finding discrepancies, conflicting information, or omissions in the Bid Documents.

3.05 QUERIES/ADDENDA

- A. Direct questions to the Architect, telephone: (512) 388-0677. Refer 3.05-C.

- B. Addenda may be issued during the Bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Price.
- C. Verbal answers or clarifications are not binding on any party.
- D. Clarifications requested by Bidders must be in writing not less than **three (3)** days before date set for receipt of Bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to General Contract Bidders, and Previously identified plan viewing rooms.

3.06 PRODUCT/SYSTEM SUBSTITUTIONS

- A. Where the Bid Documents stipulate a particular Product, substitutions will be considered by the Architect up to three (3) days before receipt of Bids.
- B. The submission shall provide sufficient information to determine acceptability of such products.
- C. When a request to substitute a Product is made, the Architect may approve the substitution and will issue an Addendum to all General Contract Bidders and area plan rooms, as well as the sub-contractor and/or supplier initiating the substitution request.
- D. In submission of substitutions to products specified, Bidders shall include in their Bid, any changes required in the Work and changes to Contract Time and Contract Sum to accommodate such substitutions. A later claim by the Bidder for an addition to the Contract Time or Contract Sum because of changes in Work necessitated by use of substitutions shall not be considered.

PART 4 SITE ASSESSMENT

4.01 SITE EXAMINATION

- A. Examine the project site before submitting a Bid.

PART 5 QUALIFICATIONS

5.01 EVIDENCE OF QUALIFICATIONS

- A. ALL GENERAL CONTRACT BIDDERS will determine the qualifications of prospective subcontractors.

5.02 SUBCONTRACTORS/SUPPLIERS/OTHERS

- A. The Owner reserves the right to reject a proposed Subcontractor for reasonable cause.
- B. Refer to AIA Article 5 of General Conditions.

PART 6 BID SUBMISSION**6.01 SUBMISSION PRODECURE**

- A. Bidders shall be solely responsible for the delivery of their Bids in the manner and time prescribed.
- B. Submit **TWO COPIES** of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelop, clearly identified with **GENERAL CONTRACTOR'S** name, project name, and Owner's name on the outside.
- C. Improperly completed information, or irregularities in security deposit/bid bond, shall be cause to declare the Bid invalid.

PART 7 BID ENCLOSURES/RQUIREMENTS**7.01 SECURITY DEPOSIT**

- A. Bids shall be accompanied by a security deposit as follows:
 - 1. Bid Bond in the amount of a sum no less than 5 percent of the Bid Price on AIA A310 Bid Bond Form.
- B. Endorse the Bid Bond in the name of the Owner as obligee signed and sealed by the Contractor as principal and the Surety or Bonding Company letterhead.

7.02 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Appendices.

7.03 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the Bidder, as follows:
 - 1. Sole Proprietorship: Signature of sole proprietor in the presence of a Notary Public who will also sign. Insert the words "Sole Proprietor" under the signature. Affix Notary Public seal.
 - 2. Partnership: Signature of all partners in the presence of a Notary Public who will also sign. Insert the word "Partner" under each signature. Affix Notary Public seal.
 - 3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts under each signature. Affix the corporate seal.

7.04 ADDITIONAL BID INFORMATION

- A. The Prime Bidder will be required to complete, as part of the bid form the following Appendices and submit them with the complete d bid form:
 - 1. Document 00410 - Bid Security Form (AIA Document A310).
 - 2. Document 00460 - List of Alternates

PART 8 OFFER ACCEPTANCE/REJECTION

8.01 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be revocable for a period of **forty-five (45)** days after the Bid closing date.

8.02 ACCEPTANCE OF OFFER

- A. The Owner reserves the right to accept or reject any or all offers.
- B. After acceptance by the Owner, the Architect on behalf of the Owner, will issue to the successful Bidder, a written Bid Acceptance.

END OF DOCUMENT

DOCUMENT 00200

INFORMATION AVAILABLE TO BIDDERS

1. SUBSURFACE INVESTIGATION REPORT

- A. A copy of a geotechnical report with respect to the building site is included in this manual and titled as follows:

GEOTECHNICAL INVESTIGATION FOR

**PROPOSED WILLIAMSON COUNTY ANNEX
CEDAR PARK, TEXAS**

**REPORT
for**

WILLIAMSON COUNTY

by

**KOHUTEK ENGINEERING AND TESTING, INC.
GEOTECHNICAL, CONSTRUCTION MATERIALS, AND ENVIRONMENTAL**

Date: December 6, 1997

- B. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of the Architect and his designated Structural Engineer.
- C. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in the Contract Documents.
- D. This report, by its nature, cannot reveal all conditions that exist on the site. Subsurface conditions found to vary substantially from this report should be reported immediately to the Architect. Resultant changes in the design and construction of foundations may be made, with resulting credits or expenditures to the Contract Price accruing to the Owner.
- 2. TOPOGRAPHIC SURVEY**
- A. A copy of a topographic survey with respect to the project site is available for viewing at the office of the Architect.
- B. This survey identifies grade elevations prepared primarily for the use of the Architect and Engineer in establishing new grades and identifying natural water shed.

END OF DOCUMENT

179

Section 00200-1

SECTION 00221

OWNER'S/ARCHITECT'S DISCLAIMER

1. INFORMATION CONTAINED IN THE CONTRACT DOCUMENTS

- A. The Owner and Architect assume no responsibility for any inferences or assumptions made by the bidding contractors, which are not based upon written or drawn documents prepared as a part of this contract.
- B. Conclusions drawn by the bidder are his own. Any questions which arise after careful review of the documents by the bidder requiring clarification should be answered in writing prior to the bid date by the Architect.
- C. Neither the Owner nor the Architect assume responsibility for conclusions drawn by the bidding contractors, or their respective sub-contractors, relative to the data and information contained and represented by the Geotechnical report and soil boring data. The contractor is encouraged to conduct his own soil investigation as required to satisfy himself as to conditions which might affect his bid, or the course of his work.

END OF SECTION

SECTION 00300
BID TENDER FORMS

PART 1 SUMMARY

1.01 REQUIREMENTS

- A. The General Contract Bidder must submit his bid on the form identified herein.
- B. No alterations to the bid form are allowed.
- C. All blanks or spaces requiring information from the bidder must be completed fully.
- D. Any identified Appendices to the Bid Form, stipulated in the Instructions To Bidders shall be completed as required and included as part of the Bid Tender Form.

1.02 RELATED DOCUMENTS

- A. Document 00020 - Invitation to Bid
- B. Document 00100 - Instructions to Bidders
- C. Document 00200 - Information Available to Bidders
- D. Document 00310 - Bid Tender Forms (Stipulated Price)
- E. Document 00400 - Supplements to Bid/Tender Forms

END OF DOCUMENT

DOCUMENT 00310

VOL 0095 PAGE 182

BID FORM

To: Judge John Doerfler
County Judge
Williamson County, Texas

Project: Williamson County Annex
350 Discovery Boulevard
Cedar Park, Texas

Date: _____

Submitted by:
(full name)

(full address)

1. OFFER

The undersigned, in compliance with your Invitation To Bid, having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Spencer Godfrey Architects, for the above mentioned project, and being familiar with all of the conditions surrounding the construction of the proposed work propose to furnish all labor, material, equipment and supplies and to construct the project in accordance with the Contract Documents, within the time frame herein stipulated, and for the price set forth below. This price is to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

Bidder hereby agrees to perform all of the work described in the Specifications and illustrated on the Drawings for a fixed sum (stipulated price) of _____
(\$ _____) including associated profit and overhead.

THE BIDDER UNDERSTANDS THAT TIME IS OF THE ESSENCE TO THE OWNER REGARDING THE COMPLETION OF THE WORK ASSOCIATED WITH THIS CONTRACT. BOTH THE BIDDER'S STIPULATED SUM AND TIME FOR COMPLETION WILL BE CONSIDERED IN DETERMINING THE LOWEST QUALIFIED BIDDER.

Bidder hereby further agrees to commence work on or before the date to be specified in the Owner's Notice to Proceed and to fully complete the work, ready for occupancy within _____ days.

Included herewith, is the required bid security as required by the Instruction to Bidders.

Because the Project is Tax Exempt, NO Federal, State, or Local taxes are included in the Bid Price.

All Cash and Contingency Allowances described in the Contract Documents are included in the Bid Price.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for **forty-five (45)** from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within seven days of receipt.

Commence work within ten days after written Notice to Proceed.

Bidder hereby agrees that the attached bid security will become the property of the Owner, and the Owner may cash the Bond, if the Contract for Construction is not executed by the bidding contractor within seven days from receipt.

3. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum # Dated

Addendum # Dated

Addendum # Dated

Addendum # Dated

4. APPENDICES

The following appendices are included with this bid form and have been properly completed by the bidder:

- a. Section 00410 - Bid Security Form
- b. Section 00420 - Unit Prices

The bidder fully understands, and agrees, that, if he is the apparent lowest qualified bidder, he will submit, within forty-eight hours of the bid time the following documents:

- a. Section 00430 - Subcontractor Listing
- b. Section 00440 - Substitution Listing
- c. Section 00450 - Equipment Suppliers Listing
- d. Section 00740 - Cost Breakdown

5. BID FORM SIGNATURE(S)

The Corporate Seal of

.....
(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation) was
hereunto affixed in the presence of:

.....
(Authorized signing officer Title)

(Seal)

.....
(Authorized signing officer Title)

Subscribed and Sworn before me this _____ day of _____, 1997.

Notary Public:

My Commission Expires:

(Seal)

END OF DOCUMENT

DOCUMENT 00400

SUPPLEMENTS TO BID FORMS

VOL 0095 PAGE 185

To: Judge John Doerfler
County Judge
Williamson County

Project: Williamson County Annex
305 Discovery Boulevard
Cedar Park, Texas

Date: _____

Submitted by:
(full name)

.....
(full address)

.....
In accordance with Document 00100 - Instructions to Bidders and Document 00310 - Bid Form,
I/we include the Supplements to Bid Form Appendices listed below. The information provided shall
be considered an integral part of the Bid Form.

These Appendices are as follows:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

SUPPLEMENTS TO BID FORM SIGNATURE(S)

The Corporate Seal of

.....
(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

(Seal)

.....
(Authorized signing officer Title)

END OF SECTION

SECTION 00410

BID SECURITY FORM

1. Bidder shall utilize A.I.A. Document A310 or approved substitute for the submission of required bid bonds. No other forms will be allowed.
2. Bid Security shall be in an amount equal to five (5) percent of the bid amount.
3. Failure to comply with these instructions will result in the rejection of the bid submitted.
4. A copy of A.I.A. Document A310 may be purchased from the office of the Architect.

END OF SECTION

SECTION 00420

UNIT PRICES

1. The following is a list of Unit Prices referenced in the Bid Form, and stipulated in Section 01151 Unit Prices:

A. The base pier drilling depth is shown on the drawings. All piers shall be drilled to the diameter indicated on the drawings. To establish proper price for pier drilling the following unit prices shall prevail and be used as a measure for credits or charges against the Contract Sum specified in the Contractors Bid.

1. 24" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ _____ per lineal foot.

For depths less than the base drilling depth level, SUB-TRACT
\$ _____ per lineal foot.

2. 30" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ _____ per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ _____
per lineal foot.

3. 36" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ _____ per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ _____
per lineal foot.

4. 42" PIERS

For each additional foot beyond the base drilling depth level, ADD
\$ _____ per lineal foot.

For depths less than the thirteen foot level, SUBTRACT \$ _____
per lineal foot.

- B. In the event ground water is encountered requiring the casing of piers, ADD
\$ _____ per lineal foot of 24" diameter steel pier casing, ADD
\$ _____ per lineal foot of 30" diameter steel pier casing.
\$ _____ per lineal foot of 36" diameter steel pier casing, ADD
\$ _____ per lineal foot of 42" diameter steel pier casing.

2. The above prices shall include all labor, materials, equipment, overhead and profit necessary to cover complete and finished work. Any work by unit price shall be in addition to (or subtracted from) the base quoted Contract Sum.
3. Documentation of unit price expenses or credits shall be accurate and supported by independent jobsite records. Unit price data shall be submitted for the Architect's review at the completion of the pier drilling/placement operation.

(Bidder)

(signature)

Date: _____

END OF SECTION

VOL 0095 PAGE 189

SECTION 00430

SUBCONTRACTOR LISTING

VOL 0095 PAGE 190

1. In response to the Owner's and Architect's request for Sub contractor listing, I hereby submit the following as my proposed subcontractors for work on this project:

PROJECT NAME: **Williamson County Annex, Cedar Park, Texas**

- A. SITE PAVING AND BASE: _____
- B. STRUCTURAL CONCRETE: _____
- C. MASON: _____
- D. ROUGH CARPENTRY: _____
- E. FINISH CARPENTRY: _____
- F. CABINETRY: _____
- G. GLAZIER: _____
- H. STRUCTURAL STEEL ERECTOR: _____
- I. GYPSUM BOARD SYSTEMS INSTALLER: _____
- J. EXTERIOR FINISH SYSTEM INSTALLER: _____
- K. ACOUSTICAL CEILING INSTALLER: _____
- L. PAINTER: _____
- M. CERAMIC TILE SETTER: _____
- N. WALL COVERING INSTALLER: _____
- O. ROOFING SUPPLIER: _____
- P. ROOFING INSTALLER: _____
- Q. ELECTRICIAN: _____
- R. PLUMBER: _____
- S. HVAC: _____

RESPECTFULLY SUBMITTED:

(Bidder)

(signature)

Date: _____

END OF SECTION

SECTION 00440

SUBSTITUTION LISTING

Page _____ of _____

The following is a list of proposed substitutes to specified products, manufacturers, suppliers, or materials. All supporting data for each substitution is appropriately attached as required by instructions included in Section 01630 of the Specification Manual.

SUBSTITUTION LISTING, BY SPECIFICATION NUMBER:

[illegible]

(Bidder)

(signature)

(Date)

(Use extra pages as required - number consecutively)

END OF SECTION

Section 00440-1

SECTION 00450

EQUIPMENT SUPPLIERS LISTING

The following is a list of proposed equipment suppliers.

SUPPLIERS:

Light Fixtures: _____

Electrical Devices: _____

HVAC Units: _____

Plumbing Fixtures: _____

Hardware: _____

Wood Doors: _____

Metal Doors: _____

Storefront Systems: _____

Curtain Wall Systems: _____

Toilet and Bath Accessories: _____

Toilet Partitions: _____

VCT Flooring: _____

Carpet: _____

Ceramic Tile: _____

Masonry: _____

Roofing: _____

(Bidder)

(Signature)

(Date)

END OF SECTION

Section 00450-1

SECTION 00470
COST BREAKDOWN

1. The General Contractor shall provide the following information related to distribution of project costs:

GENERAL CONDITIONS AND DIVISION 01	\$ _____
DIVISION II - SITEWORK	\$ _____
DIVISION III - CONCRETE	\$ _____
DIVISION IV - MASONRY	\$ _____
DIVISION V - METALS	\$ _____
DIVISION VI - WOOD AND PLASTICS	\$ _____
DIVISION VII - THERMAL AND MOISTURE PROTECTION	\$ _____
DIVISION VIII - WINDOWS AND DOORS	\$ _____
DIVISION IX - FINISHES	\$ _____
DIVISION X - SPECIALTIES	\$ _____
DIVISION XI - EQUIPMENT	\$ _____
DIVISION XV - MECHANICAL	\$ _____
DIVISION XVI - ELECTRICAL	\$ _____
GENERAL CONTRACTOR OVERHEAD AND PROFIT	\$ _____
TOTAL (GUARANTEED MAXIMUM PRICE)	\$ _____

RESPECTFULLY SUBMITTED:

(Bidder)

(Signature)

Date: _____

END OF SECTION

DOCUMENT 00500C

AGREEMENT FORMS

1 AGREEMENT

The Form of Agreement will be the AIA Document A111 "Standard Form of Agreement Between Owner and Contractor (Stipulated Sum), most current edition.

END OF SECTION

SECTION 00600

BONDS AND CERTIFICATES

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Contractor shall submit all required bonds and certificates, as required by the contract documents, in the format and utilizing the forms specified.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions of the Contract
- B. Section 00650 - Certificates of Insurance
- C. Section 00660 - Certificate of Compliance With Applicable Laws and Regulations

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 00610

LABOR AND MATERIALS PAYMENT BOND

A. Performance Bond will be provided on Bonding Company Form.

END OF SECTION

SECTION 00620

LABOR AND MATERIALS PAYMENT BOND

STATE OF TEXAS

COUNTY OF _____

Know All Men By These Presents: That _____ of the City of _____, County of _____ and State of _____, as principal, and _____ a solvent corporation authorized under the laws of the State of Texas to act as surety on bonds for principals, are held and firmly bound unto _____ (Owner), and all Subcontractors, workers, laborers, mechanics and suppliers as their interests may appear, all of whom shall have the right to sue upon this bond in the penal sum of _____ U.S. Dollars (\$ _____ U.S.), for the payment whereof, well and truly to be made the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, by these presents:

The Conditions of this Bond is such that, whereas, the Principal has entered into a certain written contract with the Owner, dated the _____ day of _____, 19____, to which Agreement is hereby referred to and make a part hereof as fully and to the same extent as if copied at length herein.

Now, therefore, the condition of this obligation is such, that if the said Principal shall well and truly pay all subcontractors, workers, laborers, mechanic, and suppliers, all moneys to them owing by said Principals for Subcontracts, work, labor, equipment, supplies and materials done and furnished for the construction of the improvement of said Agreement, then this obligation shall be and become null and void: otherwise to remain in full force and effect.

Provided, however, that this bond is executed pursuant to the provisions of Article 5160 of the Revised Civil Statutes of Texas as amended and all liabilities on the bond shall be determined in accordance with the provisions of said Article to the same extent as if it were copied at length herein.

Surety, for value received, stipulates and agrees that no extension of time, shall in anywise affect its obligation on this bond, and it does hereby waive notice of any such extension of time.

In witness whereof, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 19____.

Principal

Surety

By _____

By _____

Title _____

Title _____

Address _____

Address _____

The name and address of the Resident Agent of Surety is:

Note: A copy of the Surety Agent's "Power of Attorney" must be attached hereto.

END OF SECTION

801

SECTION 00650

CERTIFICATES OF INSURANCE

PART 1 GENERAL

1.01 DESCRIPTION

- A. As Specified in the General Conditions of the Contract and otherwise required by the specifications and contract requirements, the Contractor shall submit evidentiary proof of project related insurance.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions of Insurance is the A.I.A document G705, or similar document listing each category as shown on document G705. A copy of this form may be purchased from the office of the Architect.

END OF SECTION

SECTION 00660

**CERTIFICATE OF COMPLIANCE WITH APPLICABLE LAWS AND
REGULATIONS**

VOL 0095
PAGE 201

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Contractor shall submit, along with his final Request for Payment, three completed copies of the Certificate of Compliance With Applicable Laws and Regulations, with original signatures, fully notarized.
- B. The form for this certificate is found on the following page of this Section.

1.02 RELATED SECTIONS

- A. Section 01300 - Submittals

1.03 CERTIFICATE OF COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS

The undersigned, a duly appointed officer of _____,

attests to and certifies that to the best of his knowledge the Project known as _____

_____ has been constructed in proper

accordance with applicable building codes, zoning ordinances, laws and regulations applicable for

_____, _____
(City) (State)

SIGNED: _____, TITLE: _____

DATE: _____

SWORN BEFORE ME THIS _____ DAY OF _____, 1997.

Notary Public: _____

My commission expires: _____

(Notary Seal)

END OF SECTION

DOCUMENT 00700 (A)
GENERAL CONDITIONS - AIA

1 GENERAL CONDITIONS

AIA Document A201 General Conditions of the Contract for Construction (1987 Edition), is the General Conditions between the Owner and Contractor. A copy of this document is available from the Architect and is identified by pages numbered A201 - 1987 1 -A201 -1987 24.

2 SUPPLEMENTARY CONDITIONS

Refer to Document 00800 for amendments to these General Conditions.

DOCUMENT 00800(A)**SUPPLEMENTARY CONDITIONS****PART 1 SUPPLEMENTS****1.01 DESCRIPTION**

- A. These Supplementary Conditions amend or supplement the General Conditions of the Contract for Construction (AIA A201 - 1987 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions which are defined in the General Conditions of the Contract for Construction (AIA A201 - 1987 Edition) have the meanings assigned to them in the General Conditions.

PART 2 MODIFICATIONS**2.01 ARTICLE 1 - GENERAL PROVISIONS**

- A. Add the following:

1.1.8 DOCUMENT RELATIONSHIP

The Agreement and each of the Contract Documents are complimentary, and they shall be interpreted so that what is called for in one shall be as binding as if called for by all. Should the Contractor observe any conflicts within the Contract Documents, he shall bring them to the attention of the Architect immediately so that decision and revision, if deemed necessary, can be formulated. In the event of duplications or conflicts of Contract Documents after the contract has been executed, the most expensive method of work, materials, and equipment shall be accruing to the Owner in the event the least expensive method, materials, and equipment for use is directed by the Architect. A duplication of work is not intended by the Contract Documents and any duplication specified shall not become the basis for extra cost to the Owner.

- B. Delete 1.2.3 in its entirety and substitute the following:

1.2.3 The Drawings and Specifications are to be considered as cooperative and all work necessary for the execution of the work if shown on the Drawings and not described in the Specifications, or described in the Specifications and not shown on the Drawings, or any work which is obviously necessary to complete the work within the limits established by the Drawings and Specifications either jointly or in and of themselves, shall be considered as a part of the Contract and shall be executed by the Contractor in the same manner and with the same character of material as other portions of the Contract without extra compensation.

C. Add new subparagraph:

- 1.2.6** In case of difference between the Drawings and Specifications, the Specifications shall govern except in case of discrepancies between the Specifications and large scale drawings in which case the latter shall govern. The Drawings are intended to agree and to be mutually explanatory. Should any difference be found, whichever is more definite and complete shall be preferred to conflicting drawn out indications. Large scale details will be preferred to small scale drawings and figured dimensions to scale measurements. Where figures are lacking, scale measurements may be followed, but in all cases the measurements are to be checked from work in place. Should variations be found, they are to be referred to the Architect for instructions.

VOL 0035 PAGE 205

2.02 ARTICLE 2 - OWNER

- A. 2.2.5 - Add the following sentence:

However, misuse of and/or destruction of the original construction document sets by the Contractor or Subcontractor requiring replacement sets shall be cause for the Contractor to bear the cost of any and all such replacement documents.

2.03 ARTICLE 3 - CONTRACTOR

- A. Delete paragraph 3.6.1 and substitute the following: The WILLIAMSON COUNTY ANNEX PROJECT is exempt from all local and state sales taxes.

- B. Delete paragraph 3.7.1 in its entirety and substitute the following:

The Owner will secure all required building permits. General Contractor is not to include the cost of permits in his bid price.

2.04 ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

- A. Delete the following from paragraph 4.2.1 "(3) with the Owner's described in Paragraph 12.2" and substitute the following:

The Architect, along with a designated representative of the Contractor and Owner, will conduct a final project inspection during the eleventh month from the date of Substantial Completion. The purpose of this inspection will be to determine any project deficiencies requiring correction under the terms of the contractor's general project warranty as described in Paragraph 12.2.

- B. Insert the following before paragraph 4.5.1: Unless precluded by State of Texas legal statute, all references to arbitration shall be deleted.

Legal mediation shall also be considered as a means for dispute resolution.

2.05 ARTICLE 5 - SUBCONTRACTORS

A. Add the following paragraph:

5.2.5 The Contractor shall be responsible for determining, requiring, and procuring Performance, Labor, and Materials bonding on Subcontractors as he deems necessary. Failure to require bonding from any Subcontractor shall not relieve the Contractor from his overall duties and contractual responsibilities under the contract in the event of non-performance of any Subcontractor.

2.06 ARTICLE 7 CHANGES IN THE WORK

A. Add the following sub-paragraph:

7.3.6.1 The Contractor, in connection with any proposal he makes for a Contract Modification, shall furnish a price breakdown itemized as required by the Owner. Unless otherwise directed, the breakdown shall be in sufficient detail to permit an analysis of all material, labor, equipment, sub-contract and overhead cost as well as profit, and shall cover all work involved in the Modification, whether such work was deleted, added, or changed. Any amount claimed for subcontracts shall be supported by a similar price breakdown. In addition, if the proposal includes a time extension, a justification therefore shall also be furnished. The proposal, together with the price breakdown and time extension justification, shall be furnished within thirty (30) days of the date first requested by the Architect.

a. In such proposals, profit and overhead shall be as follows:

- 1) Subcontractor's profit and overhead shall not exceed 15% of total direct costs.
- 2) The Contractor's profit and overhead on work performed by his own crews shall not exceed 15% of total direct costs.
- 3) The Contractor's profit and overhead on work performed by his subcontractors shall not exceed 5% of total direct costs.
- 4) On credit changes, profit and overhead on the originally estimated work will not have to be returned to the Owner.

2.08 ARTICLE 9 - PAYMENTS AND COMPLETION

A. Add the following to the end of paragraph 9.2.1:

Each item on the schedule of values shall show separate amounts for labor and materials and the total for all items scheduled shall equal the amount of the contract.

B. Delete paragraph 9.6.1 as written and substitute the following:

Based upon Certificates for Payment submitted by the Architect to the Owner, the Owner will make progress payments on the account of the Contractor as provided in the conditions of the contract as follows:

1. Not later than fifteen days from receipt of the Architect's approved Certificate for Payment, 90 percent of the proportion of the Contract Sum properly allocated to labor, materials, and equipment incorporated into the work, and 90 percent of the portion of the Contract Sum properly allocated to materials and equipment suitably stored at the site or some other location agreed upon in writing by the parties, up to the first day of the month, less the aggregate of previous payments in each case.
2. The remaining 10 percent is to be paid after Substantial Completion of the work, its acceptance by the Architect and Owner, and after satisfactory evidence has been given by the Contractor that all of his bills have been paid, a Contractor's Affidavit of Payment of Debts and Claims (A.I.A. Document G706) has been properly executed and submitted to the Architect, the entire project is free from any liens resultant from the Contract for Construction, and a Contractor's Affidavit of Release of Liens (A.I.A. Document G706A) has been properly executed and submitted to the Architect. Substantial Completion is defined as that time when the Architect completes a final inspection of the Project and issues a Certificate of Substantial Completion (A.I.A. Document G704).
3. The Owner may, after completion of not less than seventy percent of the work, and if he and the Architect concur that satisfactory progress is being made, reduce the amount of retainage withheld from future payments to five percent (5%).
4. No Certificate given, or payment made under this contract shall be conclusive of the performance of this contract, either wholly or in part and no payment or certificate shall be construed to be an acceptance of defective work or improper materials.

C. Add the following:

9.7.2 Notwithstanding the foregoing, the Owner shall, pursuant to Article 5469, Texas Revised Civil Statutes, withhold during the progress of the work and for thirty (30) days following completion of the work, an amount equal to ten percent (10%) of the Contract Sum to pay any artisans, mechanics, laborers, or material-men who perfect claims for unpaid services.

D. 9.8.3 Add the following:

The Owner shall withhold funds due to the Contractor sufficient to satisfy any claims filed by laborers or material-men, as authorized by Article 5463, Texas Revised Civil Statutes.

E. Add the following:

9.10.5 The Contractor shall include with his final Application for Payment, copies of all manufacturer's guarantees or warranties specified, service contracts and all other guarantees or warranties specified to extend beyond the one year period of his own guarantee; submitted in the format and manner specified. Additionally, the Contractor shall include, if applicable, a fully executed copy of Consent of Surety to Final Payment (A.I.A. Document G707).

2.09 ARTICLE 11 - INSURANCE AND BONDS**A. Add the following to 11.1.2:**

The Contractor shall submit to the Architect, for forwarding to the Owner, three copies of the Certificate for Insurance (A.I.A. Document G705) showing no less than the following coverage applicable to liability which could be incurred in conjunction with this project:

1. Workman's Compensation: (As required by law)
2. Bodily Injury Liability:
each person \$300,000.00
each accident \$500,000.00
3. Property Damage Liability:
each accident \$100,000.00
all accidents \$300,000.00
4. Automobile Bodily Injury:
each person \$300,000.00
each accident \$500,000.00
5. Automobile Property Damage:
each accident \$ 50,000.00
all accidents \$100,000.00
6. General Umbrella:
all accident \$ 1,000,000.00

B. 11.3 "Property Insurance" shall be revised to reflect the following:

The Contractor shall be required to provide a Builder's Risk Insurance Policy, covering the entire project. The policy shall be made payable to the Contractor, Subcontractors, and the Owner as their interests appear and apply. Submit three copies of the policy, executed on, or along with, the Certificate of Insurance - Construction (A.I.A. Document G705), to the Architect for forwarding to the Owner. Fire and Extended Coverage shall be equal at all times to the amount which has been paid by the Owner for the work and materials plus the value of work accomplished and materials on the site which have not yet been paid for by the Owner. The policy shall include "All Risk" insurance for physical loss or damage including, without duplication, theft, vandalism and malicious mischief.

C. Delete the following from paragraph 11.3.9: "or in accordance with an arbitration award in which case the procedure shall be as provided in Paragraph 4.5."**D. Delete the following from paragraph 11.3.10:**

1. The semi-colon(;) after the word "power"
2. "if such objection be made, arbitrators shall be chosen as provided in paragraph 4.5. The Owner as fiduciary shall, in that case, make settlement with insurers in accordance with directions of such arbitrators. If distribution of insurance proceeds by arbitration is required, the arbitrators will direct such distribution.

E. Delete paragraph 11.4.1 and substitute the following:

11.4.1 No Performance Bond and Labor & Material Payment Bonds will be required by the Owner of the General Contractor.

F. Add the following:

11.5 HOLD HARMLESS AGREEMENT

11.5.1 In addition to obtaining insurance coverage as required above, the Contractor shall indemnify and save the Owner, the Architect, and their agents and employees harmless from and against any and all liability, demands, causes of action, or claims thereof, whether well-founded or otherwise, including the cost of defending the same, for bodily injury to any person whatsoever (including the employees of the Owner or the Architect) or damage to property of any person in the course of construction as a result of the negligence of the Contractor, the subcontractors or material-men, their agents or employees.

11.5.2 In addition to the foregoing, the Contractor shall be liable to defend the Owner in any lawsuit filed by any subcontractor or material-men as a result of the building project which is the subject matter of this Contract.

11.5.3 No subcontract shall relieve the Contractor of any of his liability or obligation under the Contract. The Contractor agrees that he is fully responsible to the Owner for acts or omissions of his subcontractors and their material-men and of persons either directly or indirectly employed by them.

2.10 Add new Article:

a. **ARTICLE 15 - ADDITIONAL CONDITIONS**

A. **15.1 PRIOR USE AND OCCUPANCY**

15.1.1 The Contractor agrees that the Project, or a portion or part of the Project, may be subject to use and occupancy before formal acceptance by the Owner under the following conditions:

1. A Certificate of Substantial Completion shall be prepared and executed as provided in Article 9 of the General Conditions of the Contract and as modified by these Supplemental Conditions, except that where, in the opinion of the Architect, and the Owner, the Contract is chargeable with unwarranted delay in completing the work or other contract requirements, the Contractor's signature will not be required. The Certificate of Substantial Completion shall be accompanied by a written endorsement by the insurance carrier, and surety of all contractors involved, if applicable, which permits the Owner's occupancy during the remaining period of the work on the Project.
2. The Owner's occupancy of the Project shall not be deemed as an acceptance by the Architect or Owner of the part of the Project that is occupied by the Owner per previously approved punch list items.
3. The Owner's occupancy shall not be deemed as a waiver by either the Owner or the Contractor of existing claims that they may have against one another.

4. No Contractor shall be deemed responsible for any damage that results from the Owner's occupancy to that part of the Project occupied by the Owner.

B. 15.2 CONTRACTOR'S DUTIES AND STATUS

15.2.1 The Contractor accepts the relationship of trust and confidence established by virtue of the Contract for Construction between him and the Owner. He covenants with the Owner to furnish his best skill and judgment and to cooperate with the Architect in furthering the interests of the Owner. He agrees to furnish efficient business administration and superintendent, and to use his best efforts at all times to assure an adequate supply of workmen and materials, and to perform the work in the best way and in the most expeditious and economical manner consistent with the specified quality of work and interests of the Owner.

C. 15.3 WORKMANSHIP

15.3.1 The entire installation shall be of the highest grade of workmanship. Only competent and experienced workmen are to be allowed on the project. Upon written request of the Architect or his authorized representative, the Contractor is to promptly remove from the project any workman who proves incompetent or fails to cooperate with other crafts or fails to deliver a work product in keeping with the highest standards of construction quality and craftsmanship.

END OF SUPPLEMENTARY CONDITIONS

DOCUMENT 00850

DRAWINGS INDEX

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Index of Drawings as contained herein and repeated as part of the Drawings is for convenience only. It shall not be construed to be necessarily all encompassing; nor shall it be limiting in and of itself as to the entire composite of drawings which have been, or may be issued for the Project.
- B. Additional drawings may from time to time be issued as addenda items or supplementary instructions, or for other job related purposes. These additional drawings, though not specifically included in the Index of Drawings, are no less a part of the Contract Documents and requirements of the Contract for Construction.

END OF SECTION

SECTION 00851

INDEX OF DRAWINGS

0.0	COVER
0.1	ABBREVIATION SHEET
0.2	BUILDING CODE EVALUATION SHEET
0.3	BUILDING CODE EVALUATION SHEET
C-2.1	GRADING AND DRAINAGE PLAN
C-2.2	WATER AND WASTEWATER PLAN
C-3.1	WATER AND WASTEWATER PLAN DETAILS
C-3.2	CONSTRUCTION DETAILS
A-1.1	ARCHITECTURAL SITE PLAN
A-1.2	SITE PLAN DETAILS
A-1.3	SITE PLAN DETAILS
A-1.4	LANDSCAPE PLAN
A-2.1	FLOOR PLAN - FIRST FLOOR
A-2.2	FLOOR PLAN - SECOND FLOOR
A-2.3	ENLARGED FLOOR PLAN - FIRST FLOOR UPPER HALF
A-2.4	ENLARGED FLOOR PLAN - FIRST FLOOR LOWER HALF
A-2.5	ENLARGED FLOOR PLAN - SECOND FLOOR UPPER HALF
A-2.6	ENLARGED FLOOR PLAN - SECOND FLOOR LOWER HALF
A-2.7	REFLECTED CEILING PLAN - FIRST FLOOR
A-2.8	REFLECTED CEILING PLAN - SECOND FLOOR
A-2.9	ROOF PLAN AND DETAILS
A-2.10	COLUMN DETAILS
A-2.11	COLUMN DETAILS
A-3.1	BUILDING ELEVATIONS
A-4.1	BUILDING SECTIONS
A-4.2	WALL SECTIONS
A-4.3	DETAILS
A-4.4	ELEVATOR AND STAIR SECTIONS
A-4.5	DETAILS
A-4.6	DETAILS
A-4.7	DETAILS
A-5.1	DOOR SCHEDULE AND DETAILS
A-5.2	DOOR SCHEDULE AND DETAILS (CONT.)
A-5.3	WINDOW SCHEDULE AND DETAILS
A-5.4	WINDOW DETAILS
A-6.1	MILLWORK ELEVATIONS
A-6.2	MILLWORK ELEVATIONS
A-6.3	MILLWORK ELEVATIONS AND DETAILS
A-6.4	MILLWORK DETAILS

S-1	STRUCTURAL GENERAL NOTES
S-2	FOUNDATION PLAN
S-3	SECOND FLOOR FRAMING PLAN
S-4	ROOF FRAMING PLAN
S-5	STRUCTURAL DETAILS
S-6	STRUCTURAL DETAILS
S-7	STRUCTURAL DETAILS
S-8	CHILLER PAD DETAILS
MPE-1	SITE PLAN - UTILITIES
M-2	MECHANICAL SYMBOLS
M-3	FIRST FLOOR PLAN - HVAC
M-4	SECOND FLOOR PLAN - HVAC
M-5	ENLARGED MECHANICAL ROOM PLANS
M-6	MECHANICAL DETAILS
M-7	MECHANICAL DETAILS
E-2	ELECTRICAL SYMBOLS
E-3	FIRST FLOOR PLAN - POWER
E-4	FIRST FLOOR PLAN - LIGHTING
E-5	SECOND FLOOR PLAN - POWER
E-6	SECOND FLOOR PLAN - LIGHTING
E-7	ELECTRICAL RISER AND PANEL BOARD DIAGRAMS
E-8	ELECTRICAL PANEL BOARD SCHEDULES
E-9	LIGHT FIXTURE SCHEDULE AND DETAILS

SECTION 00900**ADDENDA AND MODIFICATIONS**

1. During the course of the bidding process, the Architect may issue contract document clarifications, amendments, or revisions. These clarifications, amendments, or revisions will be issued in the form of an addenda.
2. Addenda when issued by the Architect will be forwarded to all bidding General Contractors, and local area plan rooms as applicable. It shall be the General Contractors' responsibility to inform bidding subcontractors whose work may be affected by the contents of the addenda as to the subject matter contained within the addenda.
3. Written addenda may be issued by the Architect up to and until 72 hours prior to the specified bid opening time.
4. Telephone/facsimile addenda will be used only for forwarding information deemed by the Architect as crucial to the bidding accuracy and completeness for the project. Telephone/facsimile addenda items may be issued by the Architect up to and until three hours prior to the specified bid opening time. Acknowledgment of receipt of telephone/facsimile addenda information will be requested on the bid form. Subsequent to the bid opening, the successful bidder, or apparent low bidder, will be given a written telephone/facsimile memorandum describing the actions taken or directives made by the telephone/facsimile addenda. The bidder will be requested to affirm that his understanding of the telephone/facsimile addenda corresponds with that contained in the written telephone memorandum. In the event that he indicates having a different understanding to the addenda material than that indicated by the telephone memorandum, he will be requested to modify his bid accordingly in order to properly reflect inclusion of the addenda material. Should such modifications adversely affect his bid price, the Owner will have the right to entrain similar confirmations and discussions with the next lowest bidder until he is satisfied of the accuracy and fairness of the affect of the telephone/facsimile addenda.
5. Subsequent to the bidding of the project, but prior to an actual contract for construction being executed, the Architect may issue modifications to the contract documents. In such instance, the successful bidder will be requested to revise his bid accordingly so as to properly include the affect of the modifications.
6. Subsequent to the execution of a contract for construction the Architect may issue additional modifications to the contract documents. These modifications may be the result of the Contractor's formal Request for Information, the Architects Field Authorizations, or Request for Change Order Pricing issued by the Architect.

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work by Owner.
- B. Contractor use of site and premises.

1.02 WORK BY OWNER

- A. The Owner will award contracts which will commence subsequent to the beginning of General Construction Work under this contract, these contracts include:
 - 1. Phone Systems
 - 2. Interior Furnishings
 - 3. Numbering System

1.03 CONTRACTOR USE OF SITE AND PREMISES

- A. Limit use of site and premises to allow:
 - 1. Work by others, work by Owner, and work by Contractor.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01011

SUMMARY OF PROJECT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project; Work covered by Contract Documents.
- B. Contracts.
- C. Administrative and Procedural Sections applicable to all Contracts.
- D. Temporary facilities and services Sections applicable to all Contracts.
- E. Example Article titles.

1.02 PROJECT - WORK COVERED BY CONTRACT DOCUMENTS

- A. Unless otherwise provided, Contractor shall provide at his expense all materials, labor, equipment, tools, transportation, utilities necessary for successful completion of the project.

1.03 TEMPORARY FACILITIES AND SERVICES SECTIONS APPLICABLE

- A. Section 01500 - Construction Facilities and Temporary Controls: Temporary electricity, extension cords from distribution boxes, lighting and work lights special power required for the Work.
- B. Section 01500 - Construction Facilities and Temporary Controls: Separate telephone service required for the Work.
- C. Section 01500 - Construction Facilities and Temporary Controls: Water hoses required for the Work.
- D. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning of the Work; delivery of debris to collection receptacles.
- E. Section 01590 - Field Offices and Sheds.

1.07 CONTRACT FOR GENERAL CONSTRUCTION**A. Division 1 - General Requirements:**

1. Administrative and procedural Sections listed within Division 1 and the General Conditions.
2. Temporary facilities and controls Sections listed.
3. Section 01500: Utility services to point of delivery, and installation of meters.
4. Section 01500: Payment of costs of temporary utilities and services consumed.
5. Section 01500: Temporary Heating, Cooling, and Ventilating.
6. Section 01500: General cleaning, provide debris receptacles, remove debris from site.
7. Section 01700: Final Cleaning.

B. Provide all Work identified in Divisions 2 through 16 except Work specifically assigned to other contractors.**1.08 WORK BY OWNER (Section 01010).****1.09 CONTRACTOR USE OF SITE AND PREMISES (SECTION 01010).****PART 2 PRODUCTS**

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01020

ALLOWANCES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Cash allowance amounts include the cost of the Product to the Contractor or Subcontractor less applicable trade discounts, and labor to install the Product.
- B. Cash allowance amounts do not include costs associated with product transportation and delivery to site, handling at the site, storage prior to installation, or protection of the Product.
- C. Incidental costs mentioned herein which are stipulated not to be part of, or deducted from, cash allowances are to be included as part of the General Conditions and included in the Contract Sum.
- D. Funds are to be drawn from cash allowances as required and approved by the Architect and Owner. Documentation of allowance expenditures shall be by change order.

PART 2 PRODUCTS

Not Used.

PART 2 EXECUTION

Not Used.

END OF SECTION

SECTION 01021
CASH ALLOWANCES

VOL 0095 PAGE 219

PART 1 GENERAL

1.01 DESCRIPTION

- A. Monetary allowances for certain elements of work are provided in the contract. Work provided under allowances shall be as directed by the Architect.
- B. The amount provided in the contract shall be exclusive of profit overhead, or sales tax if applicable.
- C. Costs not included in allowance amounts:
 - 1. Product delivery to site.
 - 2. Handling at site.
 - 3. Protection at site.
 - 4. Labor for installation.
- D. The General Contractor shall provide a reconciliation of the expenditures or allowance items prior to the request for final payment. Should the actual cost be more or less than the allowance, the contract sum shall be adjusted by change order equal to the amount of difference.

1.02 RELATED WORK

- A. Section 01020 - Allowances.
- B. Section 01022 - Inspection Testing Allowances.
- C. Section 01023 - Contingency/Project Betterment Allowance.
- D. Section 01150 - Measurement and Payment.
- E. Section 01152 - Applications for Payment.
- F. Section 01410 - Testing Laboratory Services.
- G. Section 01700 - Contract Close-out.

1.03 ALLOWANCES

- A. Provide in the Contract Sum \$75,000.00 for Ward System HVAC controls.

PART 2 PRODUCTS

Not used.

055

PART 3 EXECUTION

Not used.

END OF SECTION

915

220

Section 01021 - 2

SECTION 01022**INSPECTION TESTING ALLOWANCES****PART 1 GENERAL****1.01 ALLOWANCE**

- A. Provide in the Contract Sum \$18,000.00 for construction materials testing.

1.02 RELATED SECTIONS

- A. Section 01020 - Allowances.
- B. Section 02220 - Structural Excavation and Backfilling.
- C. Section 02230 - Base for Asphaltic Paving.
- D. Section 02250 - Compaction Control and Testing.
- E. Section 02513 - Asphaltic Paving.
- F. Section 03300 - Cast-In-Place Concrete.
- G. Section 03310 - Structural Concrete.

1.03 DESCRIPTION OF WORK

- A. Testing allowance shall be expended as directed by the Architect for the following construction materials:
1. Concrete work.
 2. Compacted structural fill.
 3. Sub-grade compaction.
 4. Asphalt paving and base course.
- B. Construction testing laboratories selection will be as directed by Architect.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01023

CONTINGENCY/PROJECT BETTERMENT ALLOWANCE

PART 1 GENERAL

1.01 ALLOWANCE

- A. Provide in the Contract Sum \$75,000.00 for Project Betterment Allowance.

1.02 REQUIREMENTS

- A. Monetary Allowances for certain elements of work are provided in the contract. Work provided under allowances shall be as directed by the Architect.
- B. The amount provided in the contract shall be exclusive of profit, overhead, or sales tax if applicable.
- C. Costs not included in Allowance Amounts:
 - 1. Product delivery to site.
 - 2. Handling at site.
 - 3. Protection at site.
 - 4. Labor for installation.
- D. The General Contractor shall provide a reconciliation of the expenditures for allowance items prior to the request for final payment. Should the actual cost be more or less than the allowance, the contract sum shall be adjusted by change order equal to the amount of the difference.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01040

COORDINATION

VOL 0095
PAGE 223

PART 1 GENERAL

1.0 SECTION INCLUDES

- A. Coordination.
- B. Field engineering.
- C. Cutting and patching.
- D. Pre-construction conference.
- E. Progress meetings.

1.02 RELATED SECTIONS

- A. Section 01045 - Cutting and Patching.

1.03 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.04 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
- E. Cut rigid materials using masonry saw or core drill.
- F. Restore Work with new Products in accordance with requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- J. Identify any hazardous substance or condition exposed during the Work to the Architect/Engineer for decision or remedy.

1.05 PRECONSTRUCTION CONFERENCE

- A. Architect will schedule a conference after Notice of Award/Notice to Proceed.
- B. Attendance Required: Owner, Architect and Contractor, Plumber, Electrician, and HVAC subcontractors.
- C. Agenda:
 - 1. Submission of executed bonds and insurance certificates.
 - 2. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract close-out procedures.
 - 4. Scheduling.

1.06 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to Architect and those affected by decisions made.
- C. Attendance Required: Job superintendent, Architect, and major Subcontractors and suppliers, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business relating to Work.
 - 14. Review of monthly pay request.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work, 01011 - Summary of Project.
- B. Section 01300 - Submittals.
- C. Section 01600 - Materials and Equipment: Product Options and Substitutions.
- D. Individual Product Specification Sections:
 - 1. Cutting and patching incidental to work of the Section.
 - 2. Advance notification to other Sections of openings required in work of those Sections.
 - 3. Limitations on cutting structural members.

1.03 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather-exposed or moisture-resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate contractor.
- B. Include in request:
 - 1. Identification of Project.
 - 2. Location and description of affected work.
 - 3. Necessity for cutting or alteration.
 - 4. Description of proposed work, and Products to be used.
 - 5. Alternatives to cutting and patching.
 - 6. Effect on work of Owner or separate contractor.
 - 7. Written permission of affected separate contractor.
 - 8. Date and time work will be executed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials, submit request for substitution under provisions of Section 01600.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, inspect conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.
- C. Maintain excavations free of water.

3.03 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching, including excavation and fill, to complete Work.
- B. Fit Products together, to integrate with other work.
- C. Uncover work to install ill timed work.
- D. Remove and replace defective or non-conforming work.
- E. Remove samples of installed work for testing.
- F. Provide openings in the Work for penetration of mechanical and electrical work.

3.04 PERFORMANCE

- A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- B. Employ original installer to perform cutting and patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.
- C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- D. Restore work with new Products in accordance with requirements of Contract Documents.
- E. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- F. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated fire resistant material to full thickness of the penetrated element.

- G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Contractor shall employ skilled personnel, or surveyors, for the proper establishment of all necessary grades, lines, levels, etc. to permit proper execution of the work.

1.02 RESPONSIBILITY

- A. The Contractor shall be solely responsible for the proper verification of existing conditions pertaining to project bench marks, grades, lines, levels, etc.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

1.01 VERIFICATION

- A. Verify existing grades and project bench mark(s) as required for establishment of permanent reference point(s).
- B. Verify all project layout requirements with respect to property lines, existing trees, and existing construction (where applicable).
- C. Notify the Architect immediately if actual conditions do not permit proper layout of contract document requirements.
- D. Maintain project reference point(s) throughout the entire course of the work.

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Contractor, and his subcontractors, shall endeavor, to the combined best efforts of their collective abilities, to construct the Project with complete compliance and adherence to local, State, and Federal requirements.
- B. The Contractor, and his subcontractors, shall be aware that the issuance of a building permit by local permitting authorities does not resolve him, or them, from their obligation to construct to the best of their abilities, the Project in strict compliance with the building codes.

1.02 REGULATORY AGENCIES

- A. Jurisdiction
 - 1. The Project is to be built within the corporate limits of the City of Cedar Park, Texas
 - 2. The county of record is the County of Williamson in the State of Texas.

1.03 COMPLIANCE TO BUILDING CODES

- A. The Contractor, and his sub-contractors, shall have the responsibility to bring to the attention of the Architect any perceived non-conformance to building codes or zoning ordinances of any specified project requirement. Such instances will be reported in writing and delivered to the Architect in the form of a "Request for Action" as soon as the instance of perceived non-compliance is discovered.
- B. The Architect will investigate all such instances of perceived non-compliance and render his decision to the Contractor in writing within seven days from the date of receipt of the Contractor's "Request for Action".

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01061 (S)**BUILDING CODES****PART 1 GENERAL****1.01 DESCRIPTION**

- A. The Project is governed by the following building codes (Latest Edition adopted by Local Building Authorities).
1. Southern Building Code Congress International:
 - a. Standard Plumbing Code.
 - b. Standard Mechanical Code.
 - c. Standard Fire Prevention Code.
 2. National Electric Code.
 3. National Fire Prevention Association including NFPA Life Safety Code.
- B. Local Amendments are included without specific individual reference to all the included building codes.

1.02 RELATED SECTIONS

- A. Section 01060 - Regulatory Requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01070

ABBREVIATIONS AND SYMBOLS

PART 1 GENERAL

1.01 DESCRIPTION

- A. A key to abbreviation and symbols used in the Contract Documents is included as part of the drawings.
- B. Should there be any symbol or abbreviation used in the Contract Documents not clearly understood by the Contractor he shall request an interpretation from Architect, in writing.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01080**IDENTIFICATION SYSTEMS****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide and install all required identification systems where specified.

1.02 RELATED WORK

- A. Section 15050: Basic Materials and Methods.
- B. Any and all related Division 15 Sections.
- C. Section 16050: Basic Materials and Methods.
- D. Any and all related Division 16 Sections.

PART 2 PRODUCTS**1.01 MATERIALS**

- A. All materials for identification systems are to be new and unused.
- B. Products are to be of a manufacture appropriate for the intended use.
- C. Any identification systems requiring customized labeling shall be legibly typed and covered with protective clear plastic, mylar, vinyl or other transparent materials.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install all materials in a neat and workmanlike manner and in accordance with manufacturers instructions.
- B. Place all identifying labels and devices in accordance with requirements of related specification sections.

END OF SECTION

SECTION 01090**REFERENCE STANDARDS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Quality assurance.
- B. Schedule of references.

1.02 RELATED SECTIONS

- A. Document 00705 - General Conditions: Reference Standards.

1.03 QUALITY ASSURANCE

- A. For Products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on [date of Contract Documents] [date for receiving bids] [date of Owner-Contractor Agreement when there are no Bids] [date specified in Product Sections].
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy at job-site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 SCHEDULE OF REFERENCES

- | | |
|--------|--|
| AA | Aluminum Association
818 Connecticut Avenue, NW
Washington, DC 20006 |
| AABC | Associated Air Balance Council
1000 Vermont Avenue, NW
Washington, DC 20005 |
| AASHTO | American Association of State Highway and Transportation Officials
444 North Capitol Street, NW
Washington, DC 20001 |

ACI American Concrete Institute
Box 19150
Reford Station
Detroit, MI 48219

ADC Air Diffusion Council
230 North Michigan Avenue
Chicago, IL 60601

AGC Associated General Contractors of America
1957 E Street, NW
Washington, DC 20006

AI Asphalt Institute
Asphalt Institute Building
College Park, MD 20740

AIA American Institute of Architects
1735 New York Avenue, NW
Washington, DC 20006

AITC American Institute of Timber Construction
333 W. Hampden Avenue
Englewood, CO 80110

AISC American Institute of Steel Construction
400 North Michigan Avenue
Eighth Floor
Chicago, IL 60611

ISI American Iron and Steel Institute
1000 16th Street, NW
Washington, DC 20036

AMCA Air Movement and Control Association
30 West University Drive
Arlington Heights, IL 60004

ANSI American National Standards Institute
1430 Broadway
New York, NY 10018

APA American Plywood Association
Box 11700
Tacoma, WA 98411

ARI Air-conditioning and Refrigeration Institute
1815 North Fort Myer Drive
Arlington, VA 22209

ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
1791 Tullie Circle, NE
Atlanta, GA 30329

ASME American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017

ASPA American Sod Producers Association
Association Building
Ninth and Minnesota
Hastings, NE 68901

ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

AWWA American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

AWPA American Wood-Preservers' Association
7735 Old Georgetown Road
Bethesda, MD 20014

AWS American Welding Society
550 LeJeune Road
Miami, FL 33135

CDA Copper Development Association 57th Floor, Chrysler Building
405 Lexington Avenue
New York, NY 10174

CLFMI Chain Link Fence Manufacturers Institute
1101 Connecticut Avenue, NW
Washington, DC 20036

CRSI Concrete Reinforcing Steel Institute
933 Plum Grove Road
Schaumburg, IL 60195

EJCDC Engineers' Joint Contract Documents Committee
American Consulting Engineers Council
1050 15th Street, NW
Washington, DC 20005

EJMA Expansion Joint Manufacturers Association
707 Westchester Avenue
White Plains, NY 10604

FGMA Flat Glass Marketing Association
3310 Harrison
White Lakes Professional Building
Topeka, KS 66611

FM Factory Mutual System
 1151 Boston-Providence Turnpike
 Norwood, MA 02062

FS Federal Specification
 General Services Administration
 Specifications and Consumer Information
 Distribution Section (WFSIS)
 Washington Navy Yard, Bldg. 197
 Washington, DC 20407

GA Gypsum Association
 1603 Orrington Avenue
 Evanston, IL 60201

IEEE Institute of Electrical and Electronics
 Engineers
 345 East 47th Street
 New York, NY 10017

IMIAC International Masonry Industry All-Weather Council
 International Masonry Institute
 815 15th Street, NW
 Washington, DC 20005

MFMA Maple Flooring Manufacturers Association
 2400 East Devon
 Suite 205
 Des Plaines, IL 60018

MIL Military Specification
 Naval Publications and Forms Center
 5801 Tabor Avenue
 Philadelphia, PA 19120

ML/SFA Metal Lath/Steel Framing Association
 221 North LaSalle Street
 Chicago, IL 60601

NAAMM National Association of Architectural Metal Manufacturers
 221 North LaSalle Street
 Chicago, IL 60601

NEBB National Environmental Balancing Bureau
 8224 Old Courthouse Road
 Vienna, VA 22180

NEMA National Electrical Manufacturers' Association
 2101 L Street, NW
 Washington, DC 20037

NFPA National Fire Protection Association
 1619 Massachusetts Avenue, NW
 Washington, DC 20036

NSWMA National Solid Wastes Management Association
1120 Connecticut Avenue, NW
Washington, DC 20036

NTMA National Terrazzo and Mosaic Association
3166 Des Plaines Avenue
Des Plaines, IL 60018

PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

PCI Pre-stressed Concrete Institute
201 North Wacker Drive
Chicago, IL 60606

PS Product Standard
U. S. Department of Commerce
Washington, DC 20203

RIS Redwood Inspection Service
One Lombard Street
San Francisco, CA 94111

RCSHSB Red Cedar Shingle and Hand-split Shake Bureau
515 116th Avenue
Bellevue, WA 98004

SDI Steel Deck Institute
Box 3812
St. Louis, MO 63122

SDI Steel Door Institute
712 Lakewood Center North
Cleveland, OH 44107

SIGMA Sealed Insulating Glass Manufacturers
Association
111 East Wacker Drive
Chicago, IL 60601

SJI Steel Joist Institute
1703 Parham Road
Suite 204
Richmond, VA 23229

SMACNA Sheet Metal and Air Conditioning Contractors'
National Association
8224 Old Court House Road
Vienna, VA 22180

SSPC Steel Structures Painting Council
4400 Fifth Avenue
Pittsburgh, PA 15213

VOL 0095 PAGE 239

TAS Technical Aid Series
Construction Specifications Institute
601 North Madison Street
Alexandria, VA 22314

TCA Tile Council of America, Inc.
Box 326
Princeton, NJ 08540

UL Underwriters' Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062

WCLIB West Coast Lumber Inspection Bureau
Box 23145
Portland, OR 97223

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Review of Contractor Pay Request.
- B. Payment to Contractor.

1.02 RELATED WORK

- A. Section 01020 - Allowances.
- B. Section 01151 - Unit Prices.
- C. Section 01152 - Application for Payment.
- D. Section 01300 - Submittals.

1.03 PROCEDURES

- A. During the monthly progress meetings conducted at the site, the Contractor will submit to the Architect his proposed Request for Payment indicating work completed, and percentages thereof, during the billing period.
- B. The Architect will evaluate the accuracy of the stated completion of work and amounts proportionately due.
- C. The Architect will endeavor to make determinations of accuracy to the best of his abilities. The decision of the Architect regarding disputed amounts due will be final.
- D. Payments will be made by the Owner to the Contractor, less appropriate retainages, as stipulated in the General and Supplemental Conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

Section 01150-1

SECTION 01151

UNIT PRICES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide unit prices in the unit pricing schedule (00420) portion of the Bidders proposal, for the items shown below. Unit prices shall include all contractor costs to include acquisition, installation, transportation, overhead and profit.

1.02 UNIT PRICES

- A. _____

B. _____

C. _____

D. _____

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01152

APPLICATION FOR PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Submit three copies of each application on AIA Form G702 - Application and Certificate for Payment.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: Thirty days.
- D. All applications for payment must be notarized originals, not photocopies.
- E. Applications for payment must clearly indicate proportionate expenditures made for any portion of the work occurring during the Payment Period.

1.02 RELATED SECTIONS

- A. Section 01020 - Allowances.
- B. Section 01150 - Measurement and Payment.
- C. Section 01153 - Change Order Procedures.
- D. Section 01300 - Submittals.
- E. Section 01310 - Construction Schedule.
- F. Section 01320 - Progress Reports.
- G. Section 01370 - Schedule of Values.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01153

CHANGE ORDER PROCEDURES

VOL 0095 PAGE 243

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by AIA A201 Article 12.4 by issuing supplemental instructions on AIA Form G710 Architect's Supplemental Instructions.
- B. The Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within 20 days.
- C. The Contractor may propose a change by submitting request for change to the Architect, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by other contractors.
- D. Stipulated Sum Change Order: Based on Proposal Request and Contractor's fixed request for a Change Order as approved by Architect.
- E. Overhead and Profit: Refer 00800 Supplementary Conditions for method for determining Contractor and Sub-Contractor overhead and profit percentages.
- F. Construction Change Authorization: Architect may issue a directive, on AIA Form G713 Construction Change Authorization signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Documentation will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.
- G. Change Order Forms: AIA G701 Change Order.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.02 RELATED SECTIONS

- A. Section 01150 - Measurement and Payment.
- B. Section 01152 - Application for Payment.

PART 2 PRODUCTS

Not Used.

115

PART 3 EXECUTION

Not Used.

END OF SECTION

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed Products list.
- D. Shop drawings.
- E. Product data.
- F. Samples.
- G. Manufacturers' instructions.
- H. Manufacturers' certificates.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work.
- B. Section 01011 - Summary of Project.
- C. Section 01152 - Applications for Payment.
- D. Section 01310 - Construction Schedules.
- E. Section 01370 - Schedule of Values.
- F. Section 01630 - Substitutions and Product Options.
- G. Section 01730 - Operation and Maintenance Data.
- H. Section 01740 - Warranties and Bonds.

1.03 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Architect accepted form
- B. Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic suffix. Reference specification section as applicable.

- C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite the Project, and deliver to Architect at business address. Coordinate submission of related items.
- F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- G. Provide space for Contractor and Architect review stamps.
- H. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.04 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number or each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.05 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.06 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturers' certificate to Architect for review, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect.

1.07 SCHEDULE

- A. The following is a list of required submittals and criteria. Refer individual specifications sections for additional requirements:

1. Certificates of Insurance: Original and 1 copy.
2. List of Subcontractors: Three copies.
3. Schedule of Values: Two copies.
4. Construction Schedule: Three copies.
5. Shop Drawings: One Reproducible, Two Prints.
6. Product Data: Six Brochures.
7. Color Selection Choices: Three sets minimum of 2 inches x 3 inches minimum size.
8. Change Order Cost Data: Three copies.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Format.
- B. Content.
- C. Revisions to schedules.
- D. Submittals.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work, 01011 - Summary of Project.
- B. Section 01150 - Measurement and Payment.
- C. Section 01152 - Applications for Payment.
- D. Section 01300 - Submittals: Shop drawings, product data, and samples and Schedule of Values.

1.03 FORMAT

- A. Prepare Schedules as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first work day of each week.
- B. The chronological order of the start of each item of Work.
- C. Scale and Spacing: To provide space for notations and revisions.
- D. Sheet Size: Multiples of 8-1/2 x 11 inches.

1.04 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by Specification section number.
- C. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the last day of each month.

- D. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including Products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision data for selection of finishes.
- E. Indicate delivery dates for Products identified under Allowances.
- F. Coordinate content with Schedule of Values specified in Section 01370.

1.05 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

1.06 SUBMITTALS

- A. Submit initial Schedules within 15 days after date established in Notice to Proceed. After review, resubmit required revised data within ten days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Submit three copies.

1.07 DISTRIBUTION

- A. Distribute copies of reviewed Schedules to project site file, Subcontractors, suppliers, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in Schedules.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01320
PROGRESS REPORTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Construction Progress Reports.

1.02 RELATED WORK

- A. Section 01040 - Coordination.
- B. Section 01152 - Applications for Payment.
- C. Section 01300 - Submittals.
- D. Section 01310 - Construction Schedule.

1.03 REQUIREMENTS

- A. Contractor shall submit monthly, along with monthly pay requests, written reports clearly indicating project adherence to construction schedule, action items required, outstanding requests for information, and any and all matters affecting project programs.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01340**SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES****PART 1 GENERAL****1.01 DESCRIPTIONS**

- A. Submit to Architect Shop Drawings, Product Data and Samples required by Contract Documents.
- B. Designate in construction schedule, or in a separate coordinated schedule, dates for submission and dates that reviewed Shop Drawings, Product Data and Samples will be needed.
- C. Identify each submittal (Shop Drawings and Product Data) with consecutive number by general work category (Architectural, structural, elevators, plumbing, mechanical, electrical).

1.02 RELATED SECTIONS

- A. Uniform General Conditions and Supplemental Conditions.
- B. Section 01300 - Submittals.
- C. Section 01310 - Construction schedules.
- D. Section 01370 - Schedule of Values.
- E. Section 01630 - Substitutions and Product Options.
- F. Section 01720 - Project Record Documents.
- G. Section 01730 - Operation and Maintenance Data.
- H. Section 01740 - Warranties and Bonds.

1.03 SHOP DRAWINGS

- A. Prepare drawings in a clear and thorough manner.
- B. Identify plans and details by reference to sheet number and detail, schedule, or room numbers shown on Contract Documents.
- C. Submit drawings in accordance with the requirements of Section 01300.

1.04 PRODUCT DATA

- A. Manufacturer's standard schematic drawings and diagrams:
 - 1. Modify drawings to delete information which is not applicable to Work.
 - 2. Supplement standard information to provide additional information specifically applicable to Work.
- B. Manufacturer's standard printed descriptive data:
 - 1. Clearly mark each copy to identify pertinent
 - 2. Show dimensions and clearances required.
 - 3. Show performance characteristics and capacities.
 - 4. Show wiring or piping diagrams and controls.
- C. Submit product data in accordance with the requirements of Section 01300.

1.05 SAMPLES

- A. Submit full range of manufacture's standard colors, textures and patterns for Architect's selection.
- B. Do not submit samples for Architect consideration and/or selection which contain discontinued products or colors; or products which can not be delivered to the site in a timely fashion.
- C. Size and extent of field and fabricated samples as specified in respective specification sections.
- D. Erect field Samples at Project Site, at location acceptable to Architect. Fabricate each sample complete and finished.
- E. Provide samples in accordance with the requirements of Section 01300.

1.06 CONTRACTOR RESPONSIBILITIES

- A. Review Shop Drawings, Product Data and Samples prior to submission. Affix Contractors stamp and initial indicating appropriate review.
- B. Verify:
 - 1. Field Measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.
 - 4. Conformance with Contract Documents.
- C. Coordinate each submittal with requirements of Work and of Contract Documents.
- D. Notify Architect, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
- E. Begin no fabrication or work which requires submittals until return of submittals with Architect's; and Engineer's stamp where necessary, and initials or signature indicating review.

1.07 SUBMISSION REQUIREMENTS

- A. Schedule submissions at least 30 days before date reviewed submittals will be needed or in accordance with approved submittal schedule, and in such sequence as to cause no delay in the Work.
- B. Submit one reproducible transparency and 2 opaque prints of Shop Drawings.
- C. Submit number of copies of Product Datum which Contractor requires for distribution, plus 3 copies which will be retained by Architect.
- D. Submit number of Samples specified in each Specification section.
- E. Accompany submittals with 2 copies of dated transmittal letter containing:
 - 1. Project title and number.
 - 2. Contractor's name and address.
 - 3. Name and identification number of each Shop Drawing, Product Datum and Sample submitted.
 - 4. Notification of deviations from Contract Documents.
- F. Submittals shall include:
 - 1. Date and revision dates.
 - 2. Project title.
 - 3. Names of Architect, Contractor, subcontractor, supplier and manufacturer.
 - 4. Identification of product by specification section number.
 - 5. Submittal identification number.
 - 6. Relation to adjacent structure, materials or other critical features.
 - 7. Field dimension, clearly identified as such.
 - 8. Applicable reference standards.
 - 9. Identification of deviations from Contract Documents.
 - 10. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, compliance with Contract Documents and coordination with requirements of Work.
- G. Coordinate submittals into logical grouping to facilitate interrelation of Products and systems:
 - 1. Finishes requiring selection of colors, textures or patterns.
 - 2. Associated items of system which require correlation for efficient function and installation.

1.08 RESUBMISSION REQUIREMENTS

- A. Resubmission: Make corrections and changes in submittals required by Architect and resubmit until approved.
- B. Shop Drawings and Product Data:
 - 1. Revise initial drawings or data and resubmit as specified for initial submittal.
 - 2. Indicate changes which have been made other than those requested by Architect.
- C. Samples: Submit new Samples as specified for initial submittal.

1.09 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute approved copies of Shop Drawings and Product Data which carry Architect's stamp, and Engineer's stamp when necessary, as follows: Contractor's file, job site file, Record Documents file, other prime contractors, subcontractors' supplier and fabricator.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01350

MOCK-UPS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide on-site product mock-ups as and where required by individual sections of these specifications.
- B. Construct mock-ups to sizes required.
- C. Utilize proper back-up materials for mock-ups to adequately support and display product sample.

1.02 RELATED WORK

- A. Section 01300 - Submittals.
- B. Section 01340 - Shop Drawings, Product Data and Samples.
- C. Section 01630- Substitutions and Product Options.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Submit typed schedule on AIA Form G703 - Application and Certificate for Payment continuation Sheet.
- B. Submit Schedule of Values in duplicate within 15 days after date established in Notice to Proceed.
- C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify bonds and insurance where applicable. Each item shall be broken into labor and materials categories.
- D. Include in each line item, the amount of Allowances specified in this Section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
- E. Include separately from each line item, a directly proportional amount of Contractor's overhead and profit.
- F. Revise schedule to list approved Change Orders, with each Application for Payment.

1.02 RELATED SECTIONS

- A. Section 01020 - Allowances.
- B. Section 01150 - Measurement and Payment.
- C. Section 01152 - Application for Payment.
- D. Section 01300 - Submittals.
- E. Section 01320 - Progress Reports.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide construction photographs as stipulated herein. Photographs are to be in color print format.
- B. Photographs are to be of 4" x 6" minimum size.

1.02 RELATED SECTIONS

- A. General conditions and Section 00800 - Supplementary conditions.
- B. Section 01150 - Measurement and Payment
- C. Section 01300 - Submittals
- D. Section 01320 - Progress Reports

1.03 REQUIREMENTS

- A. Provide record photographs of the following phases/activities:
 - 1. Underground Utility Trenches, Piping, and Bedding
 - 2. Building and Site Excavation
 - 3. Drilled Piers
 - 4. Beam Trenches and Foundation Reinforcing
 - 5. Concrete Placement
 - 6. Structural Frame
 - 7. Rough Framing
 - 8. Sheathing
 - 9. Roofing Installation
 - 10. Pavement Base Installation
 - 11. Pavement Installation
 - 12. Plumbing Rough-in

- 13. Fire Sprinkler Rough-in
- 14. HVAC Rough-in
- 15. Electrical Rough-in
- 16. Landscape Irrigation Rough-in

B. Provide **one** set of progress photographs to the Architect and **one** to the Owner. Submit progress photographs with each monthly pay request.

PART PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance and control of installation.
- B. References.

1.02 RELATED SECTIONS

- A. Section 01040 - Coordination.
- B. Section 01030 - Field Engineering.
- C. Section 01060 - Regulatory Requirements.
- D. Section 01090 - Reference Standards.
- E. Section 01300 - Submittals.
- F. Section 01410 - Testing Laboratory Services.
- G. Section 01600 - Material and Equipment: Requirements for material and product quality.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. The General Contractor shall establish and require cooperation and coordination between trades whose work is dependent upon the performance of others. The General Contractor shall schedule the work to prevent delays in other work dependent upon its timely completion. No additional compensation for extra work incurred through lack of cooperation or untimely scheduling shall be paid by the Owner.

- G. Sub-Contractors whose work is executed in relation to or dependent upon prior work shall carefully inspect this prior work and submit written notice to the General Contractor of any defects that would affect the satisfactory completion or performance of his work. No further work should be done until such defects have been satisfactorily corrected. Absence of such written notification shall be construed as acceptance by the Sub-Contractor of all prior related work.
- H. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- I. The intent of this contract is to insure complete and usable facilities for the Owner. All equipment and appliances shown on the drawings or described in the specifications are to be fully installed, wired in or otherwise connected, checked out and fully operational. It is not necessary to note such requirements for each and every item. The General Contractor shall insure that sub-contractors are aware of this requirement and include all work necessary to accomplish this intent in their bids. Where particular items are indicated on the contract documents which require operational devices and such devices are not shown or not clearly indicated, unless specifically noted as "furnished by others/Owner", these devices shall be provided and installed by the Contractor. No allowance will be made by the Owner for requests for additional compensation to the Contractor related to providing inter-related devices necessary for fully operational systems, appliances, equipment.

1.04 REFERENCES

- A. Conform to reference standard by date of issue current on date of Contract Documents.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 REPAIR OF DAMAGE

- A. The General Contractor assume responsibility for loss or damage to existing structures, trees, adjacent property or any new work being constructed under terms of this contract. The General Contractor shall make good any equipment loss, damage or personal injury resulting therefrom without cost to the Owner.

1.06 MEASUREMENTS

- A. The General Contractor shall verify any field measurements prior to ordering material or doing any work. No extra compensation shall be allowed on account of differences between actual distances and dimensions shown on the drawings.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01405

MANUFACTURER CERTIFICATION.

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide manufacturer's certifications as required by individual specification sections.

1.02 RELATED SECTIONS

- A. Section 01060 - Regulatory Requirements.
- B. Section 01090 - Reference Standards.
- C. Section 01300 - Submittals.
- D. Section 01340 - Shop Drawings, Product Data, and Samples.
- E. Section 01630 - Substitutions and Product Options.
- F. Section 01700 - Contract Close-out.

1.03 REQUIREMENTS

- A. When required by individual specification sections, manufacturer's certifications shall clearly indicate certification provided, product name, specification section, manufacturer's name, name of certifier, and date of certification.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01410
TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 PAYMENT

- A The Contractor's bid includes an amount specified as an allowance to cover the cost of services for an independent testing laboratory, which will be selected by the Architect. Payments to the laboratory will be made by the Contractor upon authorization of the Architect.
- B Employment of a testing laboratory in no way relieves the Contractor of his obligation to perform the work according to the contract documents.

1.02 RELATED WORK

- A General Conditions of the Contract for Construction. Inspections and testing required by laws, ordinances, rules and regulations or orders of public authorities are the responsibility of the Contractor.
- B Specification Sections. Contained in the various specification sections are requirements for certification of products, testing, adjusting and balancing of equipment; and other tests and standards.

1.03 WORK INCLUDED

Testing and inspection are required for the following items of work:

- a. Subgrade preparation and compaction.
- b. Fill material evaluation, placement and compaction.
- c. Drilled piers.
- d. Asphalt concrete paving.
- e. Asphalt densities.
- f. Portland cement concrete paving.
- g. Concrete reinforcement.
- h. Cast-in-place concrete.
- i. Structural metal framing.
- j. Structural steel welding.
- k. Bolted structural steel connections.
- l. Steel deck welding.

m. Roofing membrane installation.

PART 2 TESTING LABORATORY

2.01 QUALIFICATIONS

A Standards.

1. Meet "Recommended Requirements for Independent Laboratory Qualification," latest edition, published by American Council of Independent Laboratories.
2. Meet basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."

B Testing Equipment.

1. Calibrated at maximum 12-month intervals by devices of accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.
2. Submit copy of certificate of calibration, made by accredited calibration agency.

2.02 TESTING SERVICES

A Drilled Pier Inspection.

1. Provide continuous inspection during pier drilling operations.
2. Maintain a log of each drilled pier identifying pier location by column grid or pier mark, shaft size, depth, embedment depth into tan or dark tan limestone, top of pier elevation and bottom of pier elevation.
3. Visually inspect bottom of shaft to verify that loose soil has been removed, confirm proper bearing strata, and for presence of water.
4. Inspect reinforcing steel (size and number of bars) and placement (side and bottom clearance).

B Earthwork.

1. Soil Analysis Tests (Site and Select Fill). One analysis required for each type of soil under building and paving.
 - a. Gradation analysis
 - b. Liquid limit.
 - c. Plastic limit.
 - d. Plasticity index.
 - e. Maximum laboratory density (Proctor) tests.
2. Field density tests under building and paving for subgrade and each lift of fill: one for each 5000 square feet.

C

Paving - Base Course.

1. Field density tests for each lift, one for each 5000 square feet.
2. Installed thickness.

D Concrete Reinforcement.

1. The day preceding each schedule concrete pour, inspect reinforcing steel for size, location, number of bars, and placement (bottom, side and top clearance).

E Concrete - Conform to ACI 301, as modified below.

1. Mix Designs. One for each class of concrete required, Method 1, Section 3.8.2, ACI 301, as required.
2. Controlled Concrete Projects.
 - a. Verify mix design at start of pour.
 - b. Laboratory technician at site at all times during concrete pouring operations.
 - c. Samplings. One per 50 cubic yards or fraction thereof of each mix design placed in any one day consisting of slump and air tests temperature and five cylinders. Test two at 7 days, two at 28 days and one in reserve.

F Steel.

1. Provide visual inspection of all steel framing.
2. Visually inspect all steel welds, bolted connections and metal deck welds.

G Roofing.

1. Provide continuous inspection during installation of roofing systems.

2.03**DUTIES**

A Cooperate with the Architect/Engineer and Contractor; provide qualified personnel promptly on notice.

B Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards, ASTM, other recognized authorities, and as specified.
2. Ascertain compliance with requirements of the contract documents.

C Promptly notify the Architect/Engineer and Contractor of irregularities or deficiencies of work which are observed during performance of services.

D Prepare and distribute reports of inspections and tests within 3 days of test completion or weekly on continuous work as follows:

1. Architect: one copy.

2. Engineer: one copy.
3. Contractor: one copy.
4. Owner: one copy.

- E Include the following information for each test as well as additional data specified in the applicable section.
1. Date of test.
 2. Location of test.
 3. Specified standards.
 4. Test results.
 5. Remarks.

2.04 LIMITS OF AUTHORITY

The laboratory is not authorized to:

- A Release, revoke, alter, or enlarge on requirements of the contract documents.
- B Approve or accept any portion of the work.
- C Perform any duties of the Contractor.

PART 3 CONTRACTOR'S RESPONSIBILITIES

- A Cooperate with laboratory personnel; provide access to the work or to manufacturer's operations.
- B Provide to laboratory preliminary representative samples of materials to be tested, in required quantities.
- C Furnish copies of mill test reports.
- D Furnish labor and equipment:
 1. To provide access to the work to be tested.
 2. To obtain and handle samples at the site.
 3. To facilitate inspections and tests.
 4. For laboratory's exclusive use for storage and curing of test samples.
- E Notify the laboratory at least 48 hours in advance of operations to allow for his assignment of personnel and scheduling of tests.
- F When the Testing Laboratory is prevented from testing, taking samples or visually inspecting the work in accordance to the determined scheduled

due to incompleteness of work, the extra costs attributable to the delay shall be the responsibility of the Contractor.

- G Inspections and tests required by codes or ordinances, or by plan approved authority, or as required by a legally constituted authority, shall be the responsibility of, and shall be paid for by, the Contractor without deduction from the allowance.
- H Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor without deduction from the allowance.
- I Retesting or Failure to Meet Requirements - In the event that structural members do not meet the specified requirements, the Engineer may require additional inspection, testing or analysis. Any and all such additional inspection, testing or analysis, or reinspection or retesting of previously observed work shall be at the Contractor's sole expense, without deduction from the allowance, whether such testing or analysis demonstrates adequate strength or not.

END OF SECTION 01410

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES (As Applicable)

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, water, and sanitary facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, and protection of the Work.
- C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.

1.02 RELATED SECTIONS

- A. Section 01590 - Field offices and Sheds.
- B. Section 01700 - Contract Close-out: Final cleaning.

1.03 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from Utility source.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes as required.
- C. Provide main service disconnect and over-current protection at convenient location.
- D. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
 - 1. Provide 20 ampere duplex outlets, single phase circuits for power tools.
 - 2. Provide 20 ampere, single phase branch circuits for lighting.

1.04 TEMPORARY LIGHTING

- A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq. ft.
- B. Maintain lighting and provide routine repairs.
- C. Permanent building lighting may be utilized during construction with Architect's approval.

1.05 TEMPORARY HEAT

- A. Provide and pay for heat devices and heat as required to maintain specified conditions for construction operations.

- B. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.06 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases. No earlier than 30 days nor later than 15 days prior to achieving Substantial Completion, raise building internal temperature to 85 - 90 degrees F and maintain for thirty minutes. Shut down heat and entirely ventilate facility. Repeat this procedure twice each day over a period of three consecutive days. The submittal of a request for Substantial Completion review by the Contractor shall be deemed to be a binding statement by the Contractor that he has performed this work.

1.07 TELEPHONE SERVICE

- A. Provide, maintain and pay for telephone service to field office at time of project mobilization.

1.08 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations.

1.09 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures.

1.10 FENCING

- A. Construction: Contractor's option.

1.11 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

1.12 TREE, SHRUB, LANDSCAPE PROTECTION

- A. Provide and maintain all necessary protective devices and barriers for existing vegetation (landscape features). Existing trees shall be protected to insure no damage to entire dripline (root system), canopy (branches) and main trunk(s). Existing shrubbery and landscape planting beds designated to remain shall be protected from damage. Contractor shall assume full responsibility for all damage to existing landscape vegetation. Contractor shall pay the following amounts for any construction damage to existing trees, shrubs, groundcovers, and/or lawns:
 1. Trees: \$50.00 per caliper inch.
 2. Shrubs: \$25.00 per shrub.
 3. Groundcover: \$20.00 per square foot.
 4. Lawns: \$2.00 per square yard.

1.13 ACCESS ROADS

- A. Provide proper access to the building site. Install all weather temporary road/drive of 3" minimum thickness compacted road base.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION**3.01 PROTECTION OF INSTALLED WORK**

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.
- G. Protect final paved surfaces from damage. Do not allow heavy equipment on paved surfaces.

3.02 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Remove waste materials, debris, and rubbish from site weekly and dispose off-site.

3.03 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

END OF SECTION

VOL 0095 PAGE 271

105

Section 01500-4

271

SECTION 01568

EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Providing and installing all required and specified erosion control measures.

1.02 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls.
- B. Section 01700 - Contract Close-out: Final cleaning.
- C. Section 02270 - Slope Protection and Erosion Control.

1.03 REQUIREMENTS

- A. The Contractor will provide and install erosion control materials as stipulated herein, noted on the drawings, and specified in Division 2 - Sitework.
- B. The following measures shall be employed:
 - 1. Periodically inspect protective devices to assure that integrity of installations is maintained.
 - 2. Repair and replace any materials which become damaged or unserviceable.
 - 3. Do not remove any protective devices until all permanent storm water control devices are in place, have been accepted by the Local Building Official, and are satisfactory to the Design Engineer and Architect.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01580**PROJECT IDENTIFICATION AND SIGNS****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Providing and installing temporary project identification signage.

1.02 REQUIREMENTS

- A. Sign shall be not larger than four feet by eight feet square (4'0" x 8'0"). Layout and descriptive lettering shall be as directed by the Architect.
- B. No other contractor signs shall be installed.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Sign Board: 3/4" thick exterior grade plywood; grade A/C or A/B.
- B. Paint: exterior semi-gloss enamel-oil base.
- C. Posts: 4x4 pressure treated.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install sign within boundaries of property.
- B. Provide any City required set-backs.
- C. Do not block critical views for ingress/egress vehicular traffic.
- D. Install sign to withstand wind gusts.
- E. Remove sign at project completion.

END OF SECTION

SECTION 01590

FIELD OFFICES AND SHEDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Field Offices and Sheds.
- B. Maintenance and Cleaning.
- C. Removal.

1.02 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls. Temporary electricity, Temporary sanitary facilities, and Temporary telephone.
- B. Section 01620 - Material and Equipment: Storage and protection.

1.03 USE OF PERMANENT FACILITIES

- A. When permanent facilities are enclosed with operable utilities, the Contractor may relocate offices and storage into building, and remove temporary buildings.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

- A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

PART 3 EXECUTION

3.01 PREPARATION

- A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION

- A. Install office spaces ready for occupancy not more than 15 days after date fixed in Notice to Proceed.

3.03 CONSTRUCTION

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

- B. Construction: Structurally sound, secure, weather- tight enclosures for office and storage spaces. Maintain during progress of Work; remove when no longer needed.
- C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
- D. Exterior Materials: Weather resistant.
- E. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.
- F. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

3.04 ENVIRONMENTAL CONTROL

- A. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions.
- B. Storage Spaces: Heating and Ventilation as needed to maintain products in accordance with Contract Documents; adequate lighting for maintenance and inspection of products.

3.05 CONTRACTOR OFFICE AND FACILITIES

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Telephone: As specified in Section 01500.
- C. Equipment:
 - 1. Four adjustable band protective helmets for visitor use.
 - 2. Facsimile transmission machine.
 - 3. Electrostatic copier.
 - 4. Plan table suitable for viewing project documents.

3.06 STORAGE AREAS AND SHEDS

- A. Size to storage requirements for products of individual Sections. Allow for access and orderly provision for maintenance and for inspection of products.

3.07 REMOVAL

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Materials incorporated into Project shall be new, except as otherwise indicated in the Specification of specified quality, and furnished in sufficient quantity to facilitate proper and speedy execution of the Work.
- B. Contractor shall, if required, furnish evidence of the quality of any materials.
- C. Materials not meeting requirements of the Contract Documents shall be removed from Project by Contractor without expense to Owner.
- D. No asbestos or products containing asbestos have been knowingly specified for this Project. Notify the Architect immediately if:
 - 1. Materials containing asbestos are brought to the site for inclusion in the Work.
 - 2. Asbestos materials are encountered in any work being performed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01610**TRANSPORTATION AND HANDLING****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01620

STORAGE AND PROTECTION

PART 1 GENERAL

1.01 DESCRIPTION

- A. Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated Products, place on sloped supports, above ground.
- C. Provide off-site storage and protection when site does not permit on-site storage or protection. Such storage must be in a bonded warehouse.
- D. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Store loose granular materials on solid flat surfaces in a well-drained areas. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement or damage.
- G. Arrange storage of Products to permit access for inspection. Periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01630

SUBSTITUTIONS AND PRODUCT OPTIONS

VOL 0095
PAGE 279

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Architect will consider requests for Substitutions only within 15 days after date established in Notice to Proceed.
- B. Substitutions required as a result of a contractor's failure to order specified items in a timely manner will not be considered.
- C. Substitutions resultant from a manufacturer's discontinuing production of a specified item will be considered only upon:
 - 1. Clear documentation that the product was unavailable at the date of the "Notice to Proceed". Such documentation must be from the manufacturer.
 - 2. An original product submitted has not previously been reviewed by the Architect for the specified item.
- D. In the case of C.2 above, the Architect will be compensated by the Contractor for additional review time.
- E. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- F. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- G. A request constitutes a representation that the Bidder and Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - 2. Will provide the same warranty for the Substitution as for the specified Product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities, if required.
- H. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- I. Substitution Submittal Procedures:
 - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit shop drawings, Product data, and certified test results attesting to the proposed Product equivalence.

3. The Architect/Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01650

STARTING OF SYSTEMS

VOL 0095 PAGE 281

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Procedures for starting of mechanical systems.

1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work, Section 01011: Summary of Project.
- B. Section 01040: Coordination.
- C. Section 01400: Quality Control.
- D. Section 01660: Testing, Adjusting, and Balancing of Systems.
- E. Section 01600: Material and Equipment: Systems demonstration.
- F. Individual Sections: Specific requirements for start-up.
- G. Division 15
- H. Division 16

1.03 QUALITY CONTROL

- A. When specified in individual Sections, require manufacturer to provide authorized representative to be present at site under provisions of Section 01400 to inspect, check and approve equipment installation prior to start-up: to supervise placing equipment in operation; and to provide a written report that equipment has been properly installed and lubricated, is in accurate alignment, is free from any undue stress imposed by connecting lines or anchor bolts, and has been satisfactorily operated under full load conditions.

1.04 SUBMITTALS

- A. Submit preliminary schedule listing times and dates for start-up of each item of equipment in sequence prior to proposed dates.
- B. Submit manufacturer's representative reports within one week after start-up, listing satisfactory start-up dates.

1.05 PROJECT CONDITIONS

- A. Building enclosure is complete and weathertight.
- B. Excess packing and shipping bolts are removed.

- C. Interdependent systems have been checked and are operational.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that Project conditions comply with requirements.
- B. Verify that status of Work meets requirements for starting of equipment and systems.

3.02 PREPARATION

- A. Coordinate sequence for start-up of various items of equipment including any Owner-provided equipment.
- B. Notify Architect/Engineer seven days prior to start-up of each item of equipment.
- C. Have Contract Documents, shop drawings, product data, and operation and maintenance data at hand during entire start-up process.
- D. Verify that each piece of equipment has been checked for proper lubrication, drive rotation, belt tension, control sequence, and other conditions which may cause damage.
- E. Verify control systems are fully operational in automatic mode.
- F. Verify that tests, meter readings, and specific electrical characteristic agree with those specified by electrical equipment manufacturer.
- G. Where Applicable:
 - 1. Verify wiring to motors and controls required by mechanical work for operational smoke and fire protection demonstrations is complete.
 - 2. Verify wiring and support systems for equipment installed under separate contracts is complete and checked.
 - 3. Bearings: Inspect for cleanliness; clean and remove foreign matter. Verify alignment; take corrective measures.
 - 4. Drives: Inspect for tension on belt drives, adjustment of varipitch sheaves and drives, alignment, proper equipment speed, and cleanliness. Take corrective action.
 - 5. Motors: Verify that motor amperage agrees with nameplate value. Inspect for conditions which produce excessive current flow and which exist due to equipment malfunction. Take corrective action.

3.03 STARTING SYSTEMS

- A. Execute start-up under supervision of responsible manufacturer's representative, Contractor personnel, as specified.

B. Place equipment in operation in proper sequence.

END OF SECTION

SECTION 01660

TESTING, ADJUSTING, AND BALANCING OF SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. All work associated with building systems, materials, equipment, testing, adjusting, and balancing.

1.02 RELATED SECTIONS

- A. Section 01400: Quality Control.
- B. Section 01650: Starting of Systems.
- C. Section 01700: Contract Close-out: System operation and maintenance data and extra materials.
- D. Divisions 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, and 16: Making all adjustments required to achieve design tolerances and performance criteria as specified or shown on drawings.

1.03 TESTING, ADJUSTING, AND BALANCING

- A. Testing
 - 1. Perform all required operational tests to adequately assure proper performance of systems.
 - 2. Provide documentation of test results.
 - 3. make any corrections necessary to obtain proper system performance.
- B. Adjusting
 - 1. Adjust any and all building materials, systems, or equipment necessary to achieve proper tolerance criteria as specified.
- C. Balancing
 - 1. Refer Division 15: Air Balancing.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

VOL 0095 PAGE 285

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Close-out Procedures.
- B. Final Cleaning.
- C. Adjusting.
- D. Project Record Documents.
- E. Operation and Maintenance Data.
- F. Warranties.
- G. Spare Parts and Maintenance Materials.

1.02 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.
- B. Section 01650 - Starting of Systems: System start-up, testing, adjusting, and balancing.
- C. Section 01710 - Cleaning.
- D. Section 01720 - Project Record Documents.
- E. Section 01730 - Operation and Maintenance Data.
- F. Section 01740 - Warranties and Bonds.
- G. Section 01750 - Spare Parts and Maintenance Materials.

1.03 SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work is substantially complete, he shall submit to the Architect the following information:
 - 1. A written notice that the Work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, Architect and Owner's Representative will make an inspection to determine the status of completion.

- C. Should Architect and Owner's Representative determine that the Work is not substantially complete.
 - 1. Architect will promptly notify the Contractor in writing, giving the reasons thereof.
 - 2. Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Architect.
- D. When Architect and Owner's Representative concur that the Work is substantially complete, the Architect will:
 - 1. Prepare a Certificate of Substantial Completion on AIA Form G704, accompanied by Contractor's list of items to be completed or corrected as verified and amended by the Architect and Engineering Consultants.
 - 2. Submit the Certificate to Owner and Contractor for their written acceptance of the responsibility assigned to them in the certificate.

1.04 FINAL INSPECTION

- A. When Contractor considers the Work and all punch list items complete, he shall submit written certification that:
 - 1. Contract documents have been reviewed.
 - 2. Work has been inspected in compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
- B. Architect and Owner's Representative will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Architect and Owner's Representative consider that work is incomplete or defective:
 - 1. Architect will promptly notify the Contractor in writing, listing the incomplete or defective work.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Architect that the Work is complete.
 - 3. If Architect and Owner's Representative then find that the Work is acceptable under the contract Documents, the Architect shall request the Contractor to make close-out submittals.

1.05 REINSPECTION FEES

- A. Should Architect perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor.
 - 1. Owner will compensate Architect for such additional services.
 - 2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ARCHITECT

- A. Evidence of compliance with requirements of governing authorities:
 - 1. Certificate of Occupancy.
 - 2. Certificates of Inspection.
 - 3. Certificate of Compliance with Applicable Laws and Regulations.
- B. Project Record Documents.

- C. Operating and Maintenance Data, Instructions to Owner's Personnel.
- D. Warranties and Bonds.
- E. Keys and Keying Schedule: See Section 08700 - Finish Hardware.
- F. Spare parts, maintenance, and extra materials as required by these specifications.
- G. Evidence of Payment and Release of Liens: See General and Supplementary Conditions.

1.07 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to Architect. The statement shall reflect all adjustments to the Contract Sum:
 - 1. The original Contract Sum.
 - 2. Additions and deductions resulting from:
 - a) Previous Change Orders
 - b) Allowances
 - c) Unit Prices
 - d) Deductions for Uncorrected Work
 - e) Deductions for Re-inspection Payments
 - f) Other Adjustments
 - 3. Total Contract Sum, as adjusted.
 - 4. Previous Payments.
 - 5. Sum remaining due.
- B. Architect will prepare a final Change Order, as necessary, reflecting approval adjustments to Contract Sum which were not previously made by Change Orders.

1.08 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01710

CLEANING

PART 1 GENERAL

1.01 DESCRIPTION

- A. The General Contractor is expected to maintain premises and public properties free from accumulation of waste, debris and rubbish, caused by operations during the entire course of the work. At completion of work, remove waste materials and clean all sight exposed surfaces; leave project clean and ready for occupancy.

1.02 SAFETY

- A. Standards: Maintain project in accord with applicable safety and insurance standards.
- B. Hazard Control: Store volatile wastes in covered metal containers and remove from premises daily. Prevent accumulation of waste which create hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site unless approved in writing from the local Fire Marshall.
 - 2. Do not dispose of volatile wastes such as mineral spirit oil or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute cleaning to ensure building, ground and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. At reasonable intervals (maximum each week) during progress of work, clean site and public properties and dispose of waste materials, debris and rubbish.

- D. Provide on-site containers for collection of waste materials, debris and rubbish.
- E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- F. Broom clean interior building areas and continue cleaning on an as-needed basis until building is ready for occupancy.
- G. Handle materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights.
- H. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.02 FINAL CLEANING

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials, from sight-exposed interior or exterior surfaces; polish surfaces so designated for shine finish.
- D. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
- E. Broom clean paved surfaces; rake clean other surfaces of grounds.
- F. Replace all air conditioning filters.
- G. Clean ducts, blowers and coils of air conditioning equipment.
- H. Owner will assume responsibility for cleaning as of time designated on Certificate of Substantial Completion for Owner's acceptance of project or portion thereof.

END OF SECTION

SECTION 01720

RECORD DOCUMENTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. The General Contractor is responsible to prepare and keep current a complete record of all work done as a result of his contract. The record documents shall be available for review by the Architect as the job progresses.

1.02 DOCUMENTS

- A. Maintain at Job Site one copy of:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Reviewed Shop Drawings
 - 5. Change Orders
 - 6. Other Modifications to Contract
 - 7. Field Test Records
- B. Store Documents in temporary Field Office apart from Documents used for construction.
- C. Provide files and racks for storage of Documents.
- D. Maintain Document in clean, dry, legible condition.
- E. Do not use Record Documents for construction purposes.
- F. Make Documents available at all times for inspection by Architect, Engineer and Owner.
- G. Maintain records even though no changes are made from original documents.

1.03 MARKING DEVICES

- A. Provide colored pencil for marking, conforming to follow color code.
 - 1. Red for Architectural Work
 - 2. Blue for Structural Work
 - 3. Green for Plumbing Work
 - 4. Orange for HVAC Work
 - 5. Brown for Electrical Work
 - 6. Black for other written notations
- B. Use colored pencils compatible with mylar sepi.

1.04 PROJECT RECORDS DOCUMENTS

- A. Label each document "Project Record" in 2 inch high printed letters.

- B. Keep Record Documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction, if applicable.
 - 1. Depths of various elements of foundation in relation to First floor Level.
 - 2. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - 3. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - 4. Field changes of dimension and detail.
 - 5. Changes made by change order or written directive.
 - 6. Details not on original Contract Drawings.
- E. Specification and Addenda" Legibly mark up each Section to record:
 - 1. Manufacturer, Trade Name, Catalog Number and Supplier of each product and item of equipment actually installed.
 - 2. Changes made by change order or written directive.
 - 3. Other matters not originally specified.
- F. Shop Drawings: Maintain as Record Documents; legibly annotate following drawings to record changes made after review:
 - 1. Structural Steel
 - 2. Reinforcing Steel
 - 3. Millwork

1.05 SUBMITTALS

- A. At completion of project, transfer all Project Record Data to one complete set of mylar sepias and deliver one complete set of mylar sepias of all drawings and one set of specifications containing all changes in modifications that occurred during construction to the Architect. The cost of printing the mylar sepias shall be paid by the Contractor.
- B. Accompany submittal with transmittal letter, in
 - 1. Date
 - 2. Project Title and Number
 - 3. Contractor's Name and Address
 - 4. Title and Number of Each Record Document
 - 5. Certification that each Document as submitted is complete and accurate.
 - 6. Signature of Contractor, or his Authorized Representative.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01730**OPERATIONAL AND MAINTENANCE DATA****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring capacity expansion binders with durable plastic covers.
- B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on 24 pound white paper.
- E. Part 1: Directory, listing names, address, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
- F. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
 - 1. Significant design criteria.
 - 2. List of equipment.
 - 3. Parts list for each component.
 - 4. Operating instructions.
 - 5. Maintenance instructions for equipment and systems.
 - 6. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
- G. Part 3: Project documents and certificates, including the following:
 - 1. Shop drawings and product data.
 - 2. Air and Water Balance reports.
 - 3. Certificates.
 - 4. Photocopies of warranties and bonds.
- H. Submit one copy of completed volumes in final form 7 days prior to final inspection. This copy will be returned after final inspection with Architect/Engineer comments. Revise content of documents as required prior to final submittal.
- I. Submit final volumes revised, along with final pay request.

PART 2 PRODUCTS

Not Used.

292

PART 3 EXECUTION

Not Used.

END OF SECTION

VOL 0095
PART 293

0095

Section 01730-2

1

293

SECTION 01740

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Compile warranties specified in the quality control portion of each specification section and submit to Architect. Warranties to commence no earlier than the date of Substantial Completion.

1.02 RELATED WORK

- A. Contract Close-out - Section 01700.
- B. General Warranty of Construction - General Conditions.

1.03 SUBMITTALS

- A. Assemble warranties and guarantees executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Provide two original signed copies of each submittal.
- C. Table of Contents: Neatly typewritten table of contents as follows:
 - 1. Product of work item.
 - 2. Firm of origination of warranty, with name of Principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond or service and maintenance contract.
 - 5. Duration of warranty, bond or service maintenance contract.
 - 6. Provide information for Owner's personnel
 - a) Proper procedure in case of failure.
 - b) Instances which might affect the validity of warranty or bond.
 - 7. Contractor, name of responsible principal, address and telephone number.
- D. Bind warranty material in three D side ring binder with durable plastic cover. Label outside with Job Name, Date and "Warranty Manual" title.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

Section 01740-1

SECTION 01750

SPARE PARTS AND MAINTENANCE MATERIALS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02010

SUBSURFACE INVESTIGATION

PART 1 GENERAL

- A. Owner has secured the services of a soils engineer to aid in design of the structure. Following conditions apply:
1. A soils investigation report has been prepared by Kohutek Engineering and Testing, Inc., referred to as the Soils Engineer.
 2. A copy of this report may is contained herein.
 3. This report was obtained only for use in design by Project Engineer.
 4. A report and log of borings are available for Contractor's information but are not a warranty of subsurface conditions.
- B. Job Conditions:
1. Visit site and become acquainted with site conditions.
 2. Prior to bidding, Contractor may make his own subsurface investigations to satisfy himself with site and subsurface conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

GEOTECHNICAL INVESTIGATION

Proposed Williamson County Annex Cedar Park, Texas

Report For:

Williamson County
c/o Spencer Godfrey Architects
Attn: Mr. Mike Godfrey
1106 S. Mays, Suite 120
Round Rock, Texas 76574

December 6, 1996

Project No.: 6185.001

Kohutek Engineering & Testing, Inc.
Geotechnical, Construction Materials
and Environmental



Gordon L. Kohutek
Gordon L. Kohutek, P.E.
President

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297

Kohutek
Engineering & Testing, Inc.

Section 02011-1

TABLE OF CONTENTS

	<u>PAGE</u>
BACKGROUND	1
ARCHITECTURAL AND STRUCTURAL ASSUMPTIONS	2
FIELD INVESTIGATION	2
SITE TOPOGRAPHY, DRAINAGE AND VEGETATION	3
SUBSURFACE CONDITIONS AND LOCAL GEOLOGY	3
CONCLUSIONS	4
ENGINEERING ANALYSIS	5
RECOMMENDATIONS - FOUNDATIONS	7
1. Support of Structural Loads	
2. Floor Slab Systems	
RECOMMENDATIONS - FLEXIBLE PAVEMENT	8
RECOMMENDATIONS - OTHER CONSIDERATIONS	10
SELECT FILL SPECIFICATIONS	12
QUALITY ASSURANCE CONSIDERATIONS	14
REFERENCES	17
LIMITATIONS OF REPORT	18
APPENDIX A - GEOTECHNICAL DATA	
Site Location Map	
Plan of Borings	
Logs of Boring	
APPENDIX B - STANDARD FIELD AND LABORATORY PROCEDURES	

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GEOTECHNICAL INVESTIGATION

Proposed Williamson County Annex Cedar Park, Texas

BACKGROUND

This report transmits the findings of a geotechnical investigation that was completed at the site of a proposed Williamson County Annex to be located in Cedar Park, Texas. The purpose of this investigation was to provide foundation recommendations for the proposed facility. Specifically, the study was planned to determine the following:

1. Subsurface stratigraphy at the location of the exploratory borings performed.
2. Classification, engineering and physical characteristics of the soils encountered at the exploratory boring locations.
3. Where expansive soils were identified, the Potential Vertical Rise (PVR) of each critical soil strata.
4. Interior floor slab recommendations to accommodate anticipated subgrade movements.
5. Suitable foundation systems and allowable soil bearing pressures.
6. Pavement thickness for parking areas.

This study was performed in accordance with our proposal number 96P119. The scope of services was authorized on November 19, 1996 by Honorable John C. Doerfler, County Judge of Williamson County. Coordination for technical information and design for foundation recommendations was provided by Mr. Mike Godfrey, Project Architect, of the firm Spencer Godfrey and through Mr. Gary Pickett, P.E., Project Structural Engineer, of the firm Pickett, Kelm & Associates, Inc. No additional analysis was requested or performed. A brief description of the various field and laboratory tests and their respective results is included in the Appendix of this report.

This report has been prepared for the exclusive use of the Williamson County and their design consultants for specific application to the proposed project in accordance with generally

- 1 -

299

accepted soils and foundation engineering practice. This report is not intended to be used as a specification or construction contract document, but as a guide and information source to those qualified professionals who prepare such documents.

ARCHITECTURAL AND STRUCTURAL ASSUMPTIONS

The proposed structure is be a two-story office structure with an approximate foundation area of 16,300 square feet. It is anticipated that the construction will consist of concrete slab-on-ground with masonry exterior. According to Mr. Gary Pickett, P.E., Project Structural Engineer, the typical column loads are expected to be in the range of 180 to 200 Kips. Masonry wall loads are assumed not to exceed 2 Kips per linear foot. The design vehicle for the adjacent parking areas is to be a light passenger vehicle.

If the assumptions concerning the structural loads for the proposed building are not valid, this office should be notified to review the effects it may have on the design recommendations submitted herein.

FIELD INVESTIGATION

Five exploratory borings were completed on this site. The exploratory borings were drilled to the depths shown on the enclosed *Logs of Boring* in the approximate vicinity of the proposed building and parking area with the locations as depicted on a site plan furnished by the Project Architect, *see attached Plan of Borings*. The field investigation included completing the soil borings and recovery of samples. The borings were completed by use of a Mobile B-53 drilling rig. Water was not used during the drilling operations. Borings were located in the field by procedures as outlined in Appendix B, *see Appendix B for detailed field and laboratory procedures as applicable*.

SITE TOPOGRAPHY, DRAINAGE AND VEGETATION

In the immediate vicinity of the proposed building, the topography consists of a relatively flat to very gently sloping surface. According to field observations, the overall slope across the site is in the range of less than one to two percent. During the field investigation, no abrupt grade changes or fill were noted.

The ground surface is currently covered with native grasses, predominantly range grasses. The immediate vicinity of the building foundation area was void of trees; however, the south portion of the subject tract did have a sparse cover of cedars.

Based on field observations during this investigation, surface drainage appeared to be adequate.

SUBSURFACE CONDITIONS AND LOCAL GEOLOGY

The subject site is underlain by an outcropping of the Fredericksburg Group Cretaceous Age Limestone formation consisting of the Keys Valley Marl (Kkv). (1, 2) The Keys Valley Marl is a characteristically soft, white fossiliferous limestone outcrop existing locally in thicknesses up to 50 feet. Typical indicator fossils are the *Exogyra texana*; however, during this investigation these fossils were not encountered. In Williamson County, the principal area of exposure of the Keys Valley Marl formation is north of Buttercup Creek. The Keys Valley Marl is typically a compressed chalky-limy, gray to tan to white limestone. These limestones are found to be very chalky and soft.

According to the USDA/Soil Conservation Service (3), the soils in this vicinity are of the Doss silty clay series, DoC. These soils were formed in limey materials interbedded with weakly cemented limestone. The solum soils are a dark grayish brown to brown clay intermixed with limestone particles; typically the matrix will consist of 10 to 30 percent of sand to cobble size limestone particles. The soils will exhibit liquid limits in the range of 41 to 61; thus, having a

Unified Soil Classification of CL or CH. The underlying marly limestone is typically within 36 to 48 inches of the surface.

Surface soil at the project site varies from one to two feet of highly plastic clay to approximately one foot of low plasticity clay. The potential for volumetric change with respect to varying moisture contents, the shrink/swell potential of the soil, will be taken into consideration for foundation recommendations.

During the field investigation ground water was not encountered in any of the borings. However, the determination of ground water gradients and flow quantities was beyond the scope of this investigation. Based upon the stratigraphy encountered, it is believed that the extent of the possibility of ground water will be dependent upon the antecedent rainfall. Thus, it may be possible to encounter ground water during the construction process.

CONCLUSIONS

Excavation and site work: Excavation may be completed by ordinary power equipment to the depths of the exploratory borings.

Stability of vertical excavation walls will be generally good to depths of approximately 5 feet, for short periods of time while using common precautionary measures. If personnel are to enter excavations, these excavations should be braced and shored in accordance with applicable regulations.

Ground water is possible in excavations or pier holes depending on antecedent rainfall. The amount of ground water actually encountered will be dependent upon the preceding rainfall.

Settlement potential: According to published literature (4), if the in-situ moisture content is in close proximity to the plastic limit, the soil is preconsolidated. By examining the laboratory data it is apparent that this condition prevails. Thus, it is concluded that the soils encountered are preconsolidated. For preconsolidated soils of the characteristics of that which were encountered,

settlement potential of the natural soils delineated in this report for light structures may be categorized as negligible.

However, heavy structures or structures more than three stories in height will require analysis beyond the scope of this report.

Expansive Soil Potential: The soils encountered beneath the structure's foundation exhibited plasticity indices up to 35. The potential vertical rise (PVR) (5) of this soil profile calculated by the Texas Department of Transportation test method TEX-124-E was found to be in the order of 1.5 inches. Thus, the potential for disruptive foundation movements due to the swelling soils may be categorized as moderate. This expansive clay must be respected for possible detrimental shrink/swell behavior, and will be considered in the final foundation recommendations.

Safe Bearing Capacity: On this site shallow footings which may be strip, square, or beam, established in the natural soils as specified may be sized for safe bearing pressures of 3,500 pounds per square foot, PSF. Allowable bearing capacities are discussed further in subsequent sections of this report.

Safe bearing pressures as given above are for ensuring against shear failure of the foundation soil immediately below the footings and do not account for possible long term volumetric changes, such as swelling or settlement which could contribute to foundation movements. Such phenomena must be considered in the design approach.

ENGINEERING ANALYSIS

In order to design a foundation to withstand the shrink-swell movements of a moderately expansive clay subgrade, it is necessary to quantify the potential of the soil to exhibit volume changes. Soils that are most likely to exhibit appreciable swell are clays with liquid limits greater than 50, plasticity indices greater than 30 and the natural moisture content at or below the plastic

limit. The most frequent cause for clay soils to exhibit a change in its volume is a change in its moisture condition. Thus, as the clay soil increases in moisture content, it increases in volume or swells. Likewise, as the moisture content of the clay soil decreases, the volume will likewise decrease, or shrinks. There are several methods for predicting the expansive potential of clay soils. The most frequently used method in this locale for quantifying a soil's potential for shrink-swell movements is the potential vertical rise, PVR (5). This method was utilized during this investigation.

When examining the various methods of predicting swell potential, the intended use of the structure must first be considered. According to the Standard Building Code, the amount of deflection that a foundation is permitted to experience depends upon the class of structure. Thus, the intended use of a structure will dictate to a certain degree the analysis required to predict the amount of potential swelling that a certain soil may experience in relation to the amount of foundation deflection that is allowable.

For an moderately expansive clay site, such as the subject site, the necessity for the owner to be involved in quantifying the degree of foundation movement that will be acceptable is an essential part of a successful design. The owner's performance expectations combined with past experiences will greatly influence the selected foundation system. Considering the subject site, the most stable foundation system and thus exhibiting the least amount of differential movement would be a suspended slab and grade beam system suspended from contact with the underlying soil. However, this type of pier and beam foundation will be more costly to construct than the conventional slab on ground. Thus, the final selection of the foundation system will require the owner to evaluate his performance expectations with the economics of construction.

Discussed in the subsequent sections of this report, are specific foundation recommendations. These systems will perform to acceptable industry standards.

RECOMMENDATIONS - FOUNDATIONS

1. Support of Structural Loads.

Structural loads may be transmitted within the surficial soils by means of continuous footings. An allowable bearing capacity value of 3,500 pounds per square foot, PSF, may be used to proportion the footings. This allowable bearing capacity value considers a factor of safety of 3 against a bearing capacity failure.

As an alternative, the continuous footings may be founded entirely within the select fill pad when constructed as specified. Within the select fill pad, an allowable bearing capacity of 4,000 PSF can be utilized.

Continuous footings should be a minimum of 12 inches wide by 24 inches deep, founded a minimum of 12 inches of penetration into the approved bearing stratum. It is recommended that the bearing stratum be uniform; i.e., the footings should be founded entirely in the silty clay or entirely within the select fill material.

Concentrated point loads should be supported by auger-excavated straight shaft reinforced concrete drilled piers. With the drilled piers bearing a minimum of 2 feet into the tan to dark tan medium hard limestone with a minimum depth of pier at 16 feet below the existing ground surface, an allowable end bearing capacity of 20,000 PSF may be used. (6) Within the tan to dark tan medium hard limestone, an allowable skin friction value of 1,500 PSF may be additive to the allowable end bearing capacity.

2. Floor Slab System.

A stiffened, soil supported slab on-ground will perform satisfactorily on this site. This type of slab will be both economical and sufficiently stable for a lightly loaded structure. For design of a soil supported stiffened slab bearing on a foundation pad prepared as recommended, the following design parameters are recommended for use in sizing the foundation elements. These procedures should be used only as a guide by the structural engineer and should be

modified to consider the geometrics and loadings of the proposed structure. Typically, it is recommended that any soil movements (or potential vertical rise) beneath the slab be limited to less than 1.0 inch or as an alternative, the slab should be designed sufficiently rigid to withstand the anticipated vertical movements. In order to achieve this, several alternatives were evaluated, see Table 2.

TABLE 2

<u>Option</u>	<u>Underslab Fill Condition</u>	<u>Potential Vertical Rise, inches</u>	<u>Equivalent Design PI (7)</u>
1	in-situ conditions	1.5	35
2	remove 12" & replace with 24" select fill	0.49	28

The floor slab should be a minimum of 4.0 inches thick and be provided with sufficient reinforcing to control shrinkage cracking to an acceptable limit, see ACI 224, 302 and 318. The concrete should contain a minimum of 5.0 sacks of cement per cubic yard and develop a 28 day compressive strength of 3,000 PSI. Fly ash may be substituted for up to a maximum of 25 percent, weight basis, of the cement content. All concrete placed in the foundation should contain sufficient air entraining agent such that a minimum of five percent entrained air will be achieved. Other provisions of ACI Practices 211, 302, 304, 318, 360 and other applicable practice codes should be followed in designing the foundation.

RECOMMENDATIONS - OTHER CONSIDERATIONS

The following information has been assimilated after examination of numerous problems dealing with similar subsurface conditions throughout the area. It is presented here for your convenience. If these features are incorporated in the overall design of the project, the performance of the proposed structure will be improved.

- 8 -

306

1. During the drilling of the pier shafts, a qualified materials technician under the supervision of the Geotechnical Engineer should be on-site to inspect each pier and verify the bearing stratum. Concrete should be placed in the drilled shaft as soon as possible after approval of the shaft by the Geotechnical Engineer. In no case should the shaft be left open longer than eight hours without being filled with concrete.
2. Prior to placing the select underslab fill, all vegetation and top soil should be removed to a minimum depth of six inches or more if required by the above recommendations. Additional excavation must be carried to whatever depth is required to allow a minimum of the required thickness of selected and compacted fill beneath the slab as recommended in the respective specifications item as enclosed with this report.
3. Excavate haunched beam trenches into compacted fill.
4. In the event that a deep beam section in excess of 36 inches is required due to site grading, the Geotechnical Engineer should be contacted to determine if additional analysis is required to consider the effects of the foundation elements on the stability of the cross-slope.
5. Place a 6 mil vapor barrier under the entire concrete area.
6. Where ducts or plumbing over six inches must pass through a beam, the beam must be deepened accordingly.
7. Surface and roof drainage must be carried well away from the building foundations.
8. The design of the superstructure should consider the foundation conditions and some flexibility should be built into the system. Control joints at not over 25 foot spacing should be used in masonry walls, with a wall control joint located at each foundation slab control joint.
9. Prior to construction, the Geotechnical Engineer should be given the opportunity to review the plans in order to ensure that all recommendations have been properly implemented. Additionally, it is recommended that the Geotechnical Engineer be retained to inspect and test the foundation elements during the construction phase. The construction phase inspection and testing

should, as a minimum, adhere to the enclosed schedule entitled, *Quality Assurance Considerations*.

SELECT FILL SPECIFICATIONS

1. **GENERAL:** Select fill, if called for on the plans, shall be placed over prepared compacted foundation soil to the dimensions shown on the plans.
2. **MATERIAL:** Select fill material shall be composed of hard durable particles of gravel or crushed stone and shall meet the following criteria:

A. Gradation shall be as follows:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
1-3/4"	100
1-1/2"	85 - 100
3/4"	45 - 75
No. 4	25 - 70
No. 40	10 - 40

B. Material passing the No. 40 sieve shall meet the following:

<u>Percent Passing No. 40</u>	<u>Max. PI</u>	<u>Min. PI</u>
25 - 40	15	3
10 - 25	20	4

C. Maximum liquid limit of the no. 40 material shall be 35.

D. No organic matter is permitted.

3. **PLACEMENT AND COMPACTION:** Stump holes or other small excavations in the limits of the fill shall be backfilled with suitable material and thoroughly tamped by approved methods before commencing embankment construction. If the surface is roughened by small washes or otherwise, it shall be restored to approximately its original slope by blading or other methods.

Top soil and vegetation shall be stripped within the area to receive fill to a minimum depth of six inches. More soil may be required to be removed if indicated on plans. The subgrade shall be compacted as stated below and approved by the engineer prior to placement of the select fill.

Trees, stumps, roots, vegetation, or other unsuitable materials shall not be placed in the fill.

Compaction should be to 95 percent of maximum laboratory density determined in accordance with ASTM D 698. Material should be within two percentage points of optimum moisture at time of compaction.

Placement should be in lifts not exceeding six inches after compaction. Each compacted lift should be inspected and tested for density compliance prior to placing the next lift.

After completion, not less than plan thickness of select, compacted fill as herein specified shall exist beneath any portion of the foundation, even if additional excavation of existing ground is required to meet this requirement.

4. **INSPECTION, TESTING AND CONTROL:** A 50 lb. sample of the proposed fill material should be submitted to the Engineer for approval and for determination of Moisture-Density Relationship, at least seven days in advance of placement. Fill placement operations will be inspected and tested for uniformity, acceptable material and filed densities, at the Engineer's option.

TYPE OF WORK	ITEM	SAMPLE FREQUENCY	SAMPLE SIZE	MINIMUM TESTING
General Earthwork and Fill	Soil Material	1 per soil Type	50 lbs.	-Gradation -P.I. -Moisture-Density Relationship
	Compaction	1 per 5000 sq. ft. per lift (min. of 3 per lift)		Field Density Test
Flexible Base	Base Material	1 per type per 1000 cu. yds.	50 lbs.	-sieve -P.I. -Moisture-Density
	Compaction	1 per 5000 sq. ft. per lift (min. of 3 per lift)		Field Density Test
Hot Mix Paving	Job Mix Formula	1 per HMAC Type		Review and Approval
	Cold Aggregate	Weekly	50 lbs.	Sieve, Sand Equivalent and Examination
	Asphalt	Each transport delivery	1 qt.	As required.
	Uncompacted Mix	2 Daily	35 lbs.	Extraction, Density, Stability
	Compacted Mix on Job	1 per 1000 sq. yds. or 3 daily whichever is more		Field Density (Nuclear is permitted)

TYPE OF WORK	ITEM	SAMPLE FREQUENCY	SAMPLE SIZE	MINIMUM TESTING
Concrete	Mix Design	1 per concrete class		-review & approval with confirmatory cylinders -Plant & materials approval, testing if questionable
	Aggregates (coarse & fine)	1 per 500 cu.yd., min. 1 per job	50 lbs.	Sieve, organic, impurities, specific gravity
	Cement	1 per 100 cu. yds. 10 lbs. min. 1 per job		-fineness -chemical compound -see mill reports
	Concrete Placement	1 per 50 cu. yds. or each days pour if less		-slump -air test -5 compressive cylinder test, test 2 at 7 days, 2 at 28 day, 1 hold
Welded Steel Inspection	All of Welds at shop & field			
	Qualifications of Welders	Each		Observe and verify for required positions
	X-ray welds or Ultra-Sonic Testing of Welds			-all bending stress sections -20% of all other welds

TYPE OF WORK	ITEM	SAMPLE FREQUENCY	SAMPLE SIZE	MINIMUM TESTING
Bolted Steel	Torque Test	10% 50% 100%		-of all bolts on job -of all shear conn. -visually inspect
All Steel Including reinforcing	Material	Per Lot		See Mill Report
Foundation	Reinforcing beams and concrete	Each Pour		Qualified inspector
	Drilled Piers	Each		Qualified inspector

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2. "The Geology of Texas, Volume I, Stratigraphy", The University of Texas Bulletin No. 3232: August 22, 1932, The University of Texas, Austin, Texas, 1981.
3. "Soil Survey of Williamson County, Texas", United States Department of Agriculture, Soil Conservation Service, Washington, D.C., January 1983.
4. "Foundation Engineering Handbook", Edited by Winterkorn, Hans F. and Hsai-Yang Fand, Van Nostrand Reinhold Company, New York, New York, 1975.
5. "Method for Determining the Potential Vertical Rise, PVR, Tex-124-E", Volume I, Manual of Testing Procedures, Texas Department of Transportation, Austin, Texas, 1991.
6. "Soil Mechanics in Engineering Practice", Second Edition, Terzaghi, Karl and Ralph B. Peck, John Wiley & Sons, New York, New York, 1967.
7. "Criteria for Selection and Design of Residential Slabs-on-Ground", Building Research Advisory Board, U. S. Department of Commerce, Washington, D.C., 1968.

LIMITATIONS OF REPORT

Conditions of the site at locations other than the boring locations are not expressed or implied, and conditions may be different at different times from the time of borings. Contractors or others desiring more complete information are advised to secure their own supplemental borings. The analysis and recommendations contained herein are based on the available data as shown in this report and the writer's professional expertise, experience and training, and no other warranty is expressed or implied concerning the satisfactory use of these recommendations or data.

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- 17 -

315

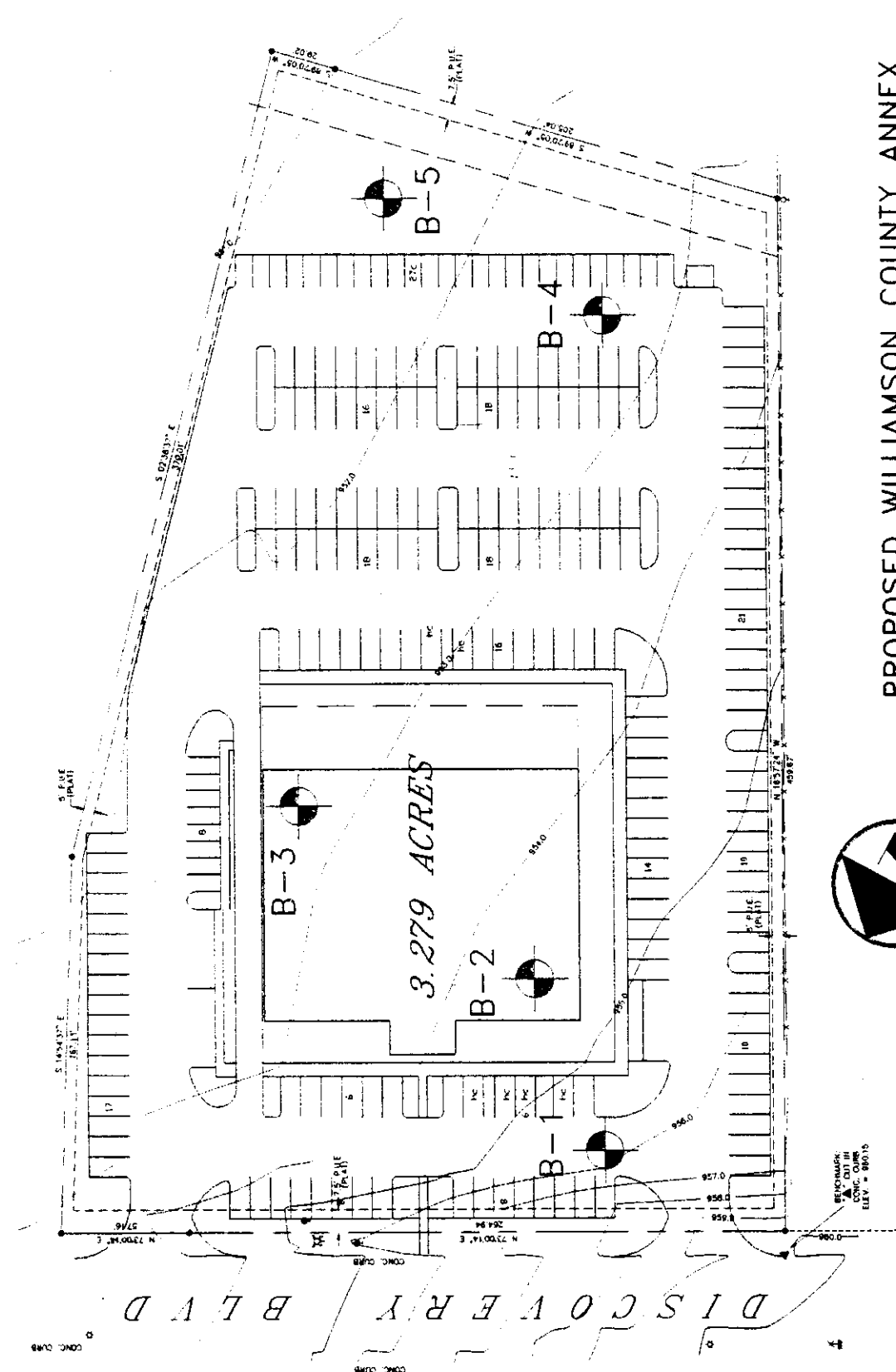
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Section 02011-19

APPENDIX A
GEOTECHNICAL DATA



Site Location Map
Proposed Williamson County Annex
Cedar Park, Texas
Project No. 6185.001



PROPOSED WILLIAMSON COUNTY ANNEX
CEDAR PARK, TEXAS
PROJECT NO.: 6185.001



SCALE:
1" = 66'-0"

318

318

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LOG OF BORING

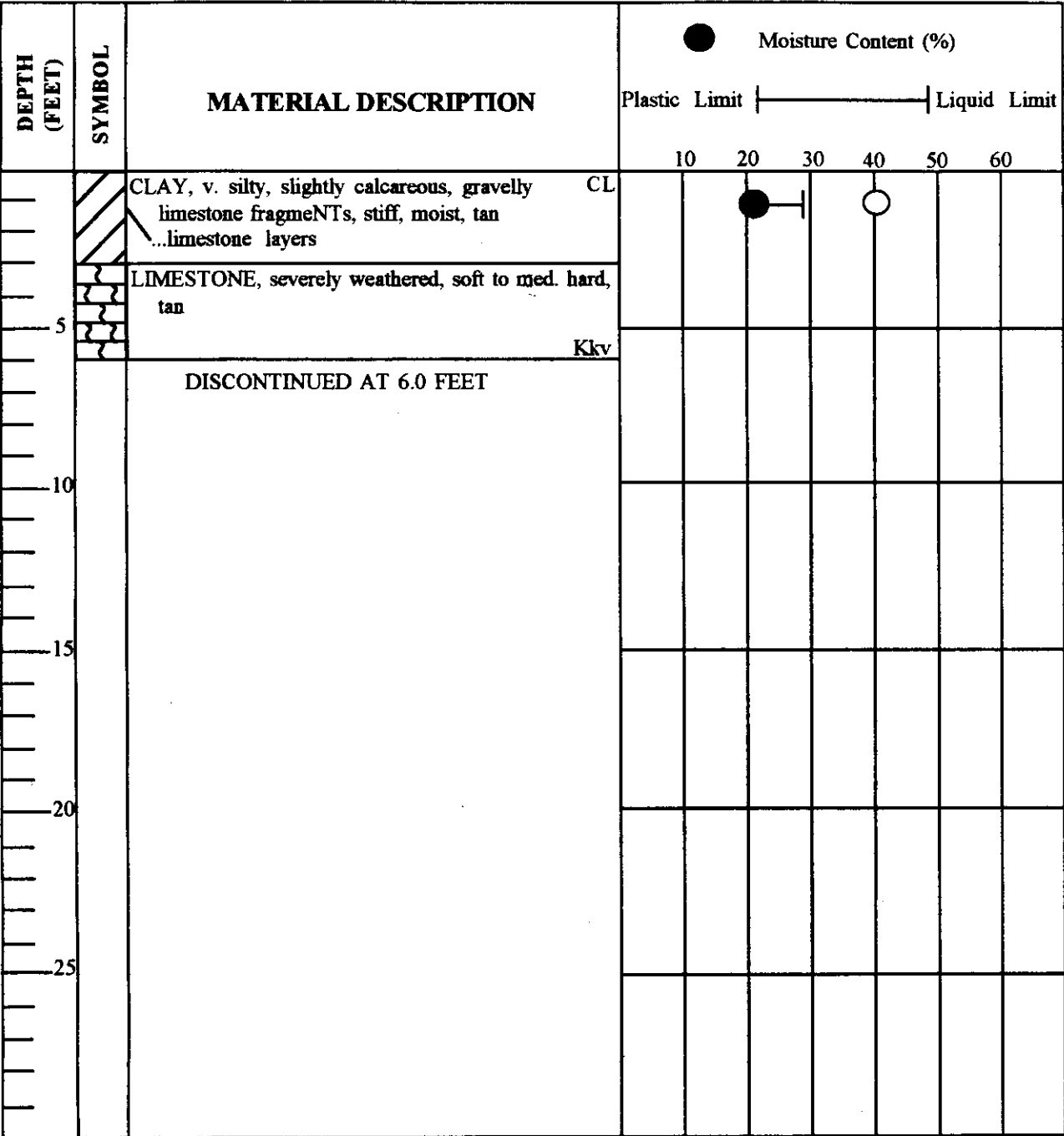
Project : Williamson County Annex
Cedar Park, Texas

Project No.: 6185.001

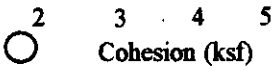
Date: November 14, 1996

Elevation :

Boring No. : B-1



Note: Boring advanced without the use of drilling fluid. Cohesion from hand Penetrometer.



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319

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Section 02011-23

VOL 0095 PAGE 319

LOG OF BORING













Project : Williamson County Annex
Cedar Park, Texas

Project No.: 6185.001

Date: November 14, 1996

Elevation :

Boring No. : B-2

DEPTH (FEET)	SYMBOL	MATERIAL DESCRIPTION	Moisture Content (%)					
			Plastic Limit ———— Liquid Limit					
			10	20	30	40	50	60
		CLAY, silty, limestone fragments (sand & gravel CH size), stiff, damp, dk. brown ...layered, soft to med. hard, tan ...marly		●		○		
		CLAY, v. silty, slightly marly, v. stiff, dry, tan CL						
5		LIMESTONE, severely weathered, marly, soft, tan ...soft to med. hard N=50/3"						
		...layered, med. hard						
		...becoming dk. tan, med. hard						
10		N=50/2"						
		...shaly, med. hard, gray						
		...becoming grayish tan						
15		N=50/2"						
		...layered, soft to med. hard, dk. tan ...med. hard						
		...clayey to marly, soft, lt. tan ...med. hard						
20		N=50/2" Kkv						
		DISCONTINUED AT 20.0 FEET						
25								

Note: Boring advanced without the use of drilling fluid.
Cohesion from hand Penetrometer.

0 1 2 3 4 5
○ Cohesion (ksf)

LOG OF BORING

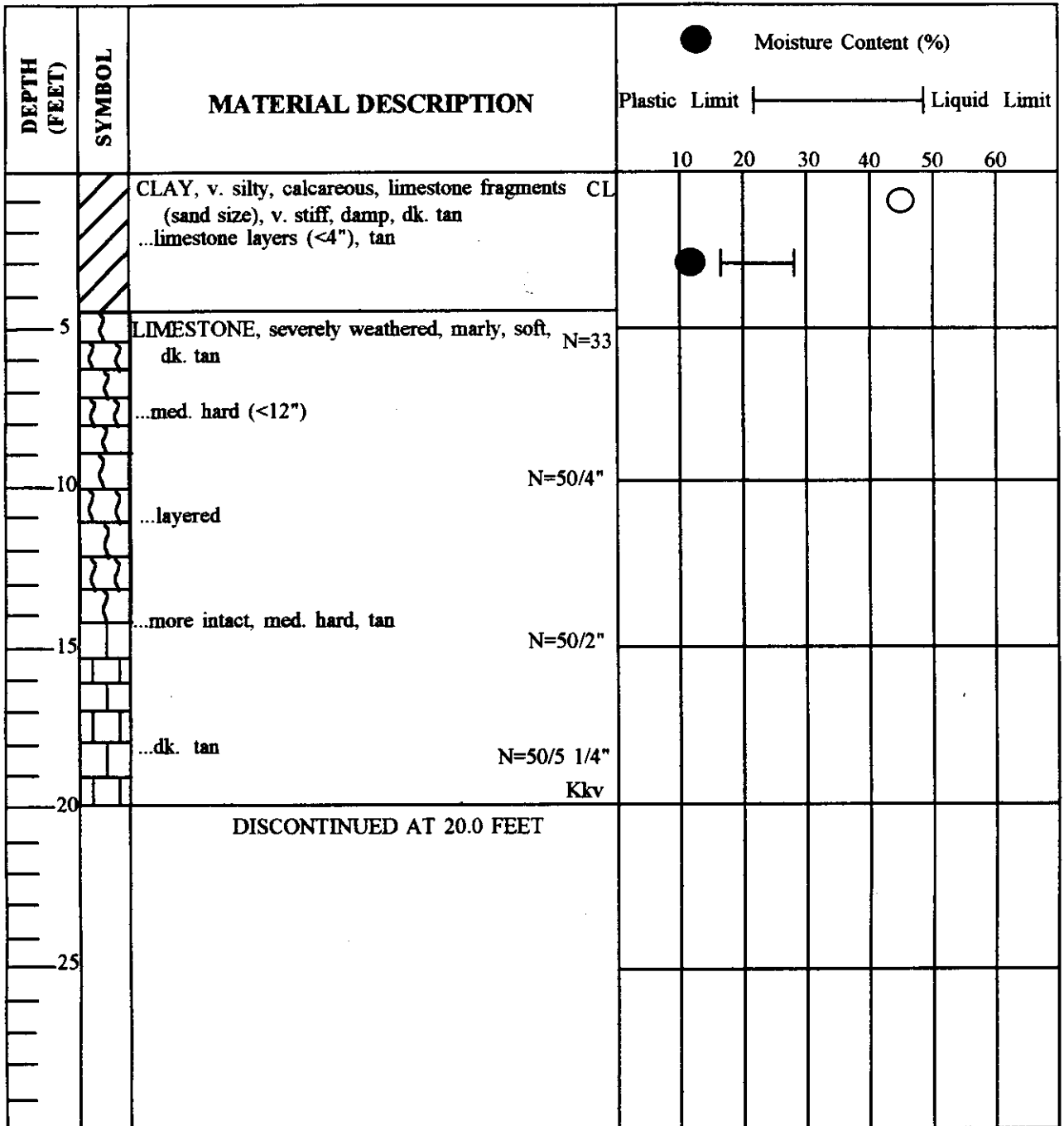
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Cedar Park, Texas

Project No.: 6185.001

Date: November 15, 1996

Elevation :

Boring No. : B-3



Note: Boring advanced without the use of drilling fluid.
Cohesion from hand Penetrometer.

0 1 2 3 4 5
○ Cohesion (ksf)

321

321

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Section 02011-25

VOL 0095 PAGE 321

LOG OF BORING

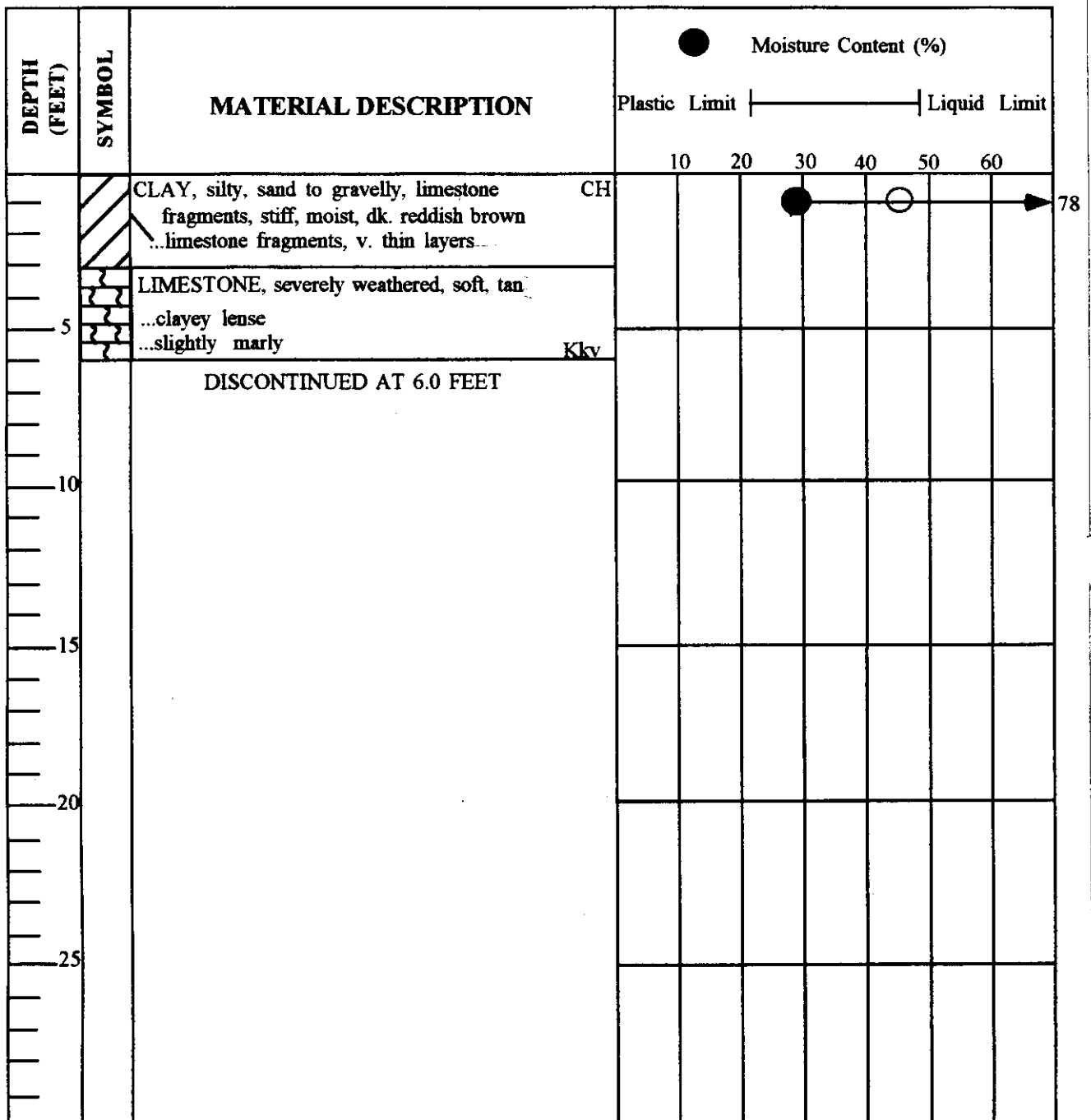
Project : Williamson County Annex
Cedar Park, Texas

Project No.: 6185.001

Date: November 14, 1996

Elevation :

Boring No. : B-4

Note: Boring advanced without the use of drilling fluid.
Cohesion from hand Penetrometer.0 1 2 3 4 5
○ Cohesion (ksf)

LOG OF BORING

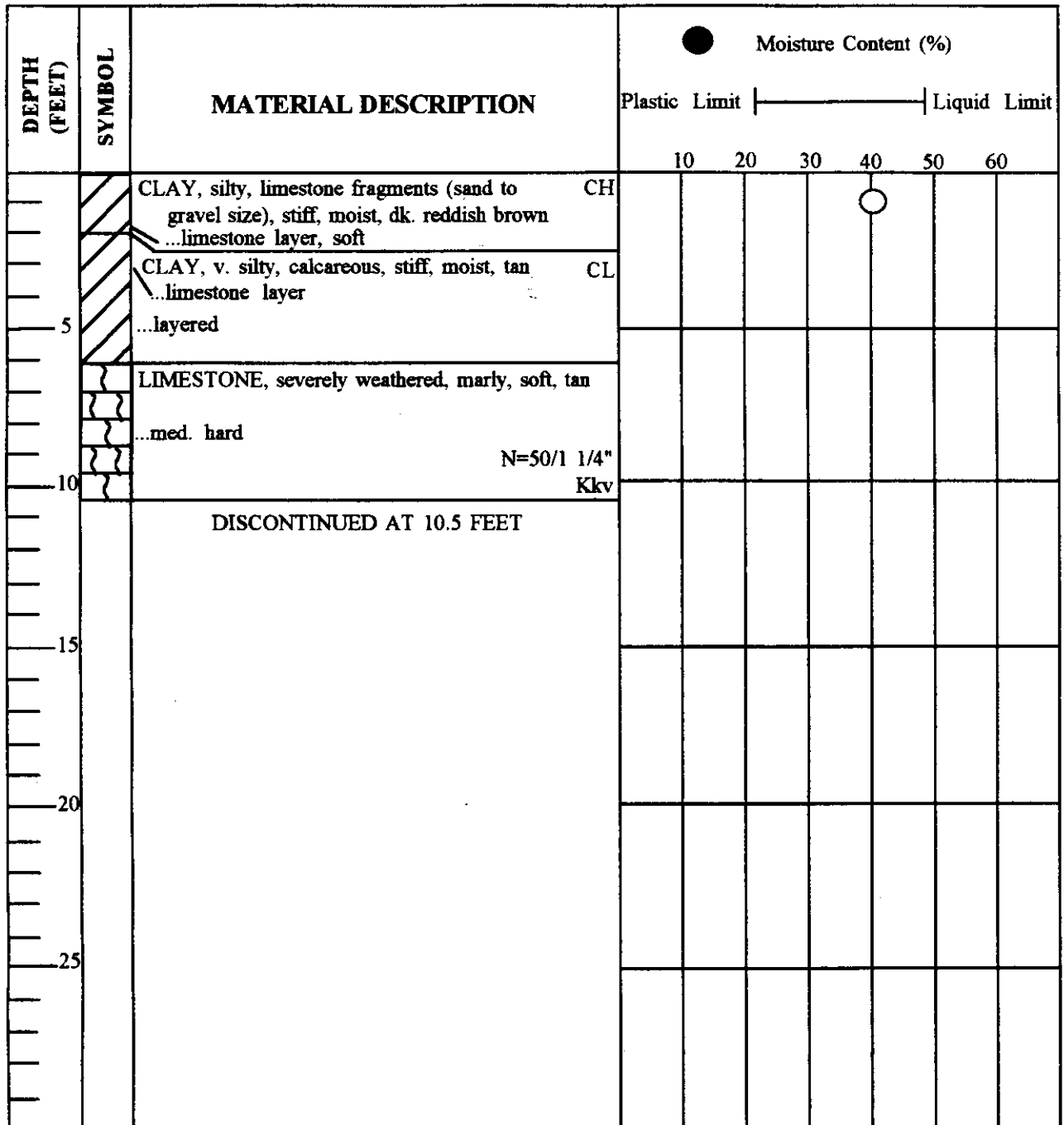
Project : Williamson County Annex
Cedar Park, Texas

Project No.: 6185.001

Date: November 14, 1996

Elevation :

Boring No. : B-5



Note: Boring advanced without the use of drilling fluid.
Cohesion from hand Penetrometer.

0 1 2 3 4 5
Cohesion (ksf)

A KEY TO SOIL CLASSIFICATIONS & SYMBOLS

UNIFIED SOILS CLASSIFICATION SYSTEM(1)				TERMS	
Major Divisions	Letter	Symbol	Name	CHARACTERIZING SOILS(2)	
GRAVEL AND GRAVELLY SOILS	GW		Well-graded gravels or gravel-sand mixtures, little or no fines	SLICKENSIDED-having inclined planes of weakness that are slick and glossy in appearance.	
	GP		Poorly-graded gravels or gravel-sand mixtures, little or no fines	FISSURED-containing shrinkage cracks, frequently filled with fine sand or silt, usually more or less vertical.	
	GM		Silty gravels, gravel-sand-silt mixtures	LAMINATED (VARVED)-composed of thin layers of varying color and texture, usually grading from sand or silt at the bottom to clay at the top.	
	GC		Clayey gravels, gravel-sand-clay mixtures	CRUMBLY-cohesive soils which break into small blocks or crumbs on drying.	
SAND AND SANDY SOILS	SW		Well-graded sands or gravelly sands, little or no fines	CALCAREOUS-containing appreciable quantities of calcium carbonate, generally nodular.	
	SP		Poorly-graded sands or gravelly sands, little or no fines		
	SM		Silty sands, sand-silt mixtures		
	SC		Clayey sands, sand-clay mixtures		
SILTS AND CLAYS L < 50	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Med. MEDIUM	Brn. BROWN
	CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Sev. SEVERELY	Dk. DARK
	OL		Organic silts and organic silt-clays of low plasticity	Wx. WEATHERED	Lt. LIGHT
SILTS AND CLAYS L > 50	MH		Inorganic silts, micaceous or diatomaceous fine, sandy or silty soils, elastic silts	Fer. FERRUGINOUS	Yel. YELLOW
	CH		Inorganic clays of high plasticity, fat clays	Frac. FRACTURED	Blk. BLACK
	OH		Organic clays of medium to high plasticity, organic silts	V. VERY	Or. ORANGE
HIGHLY ORGANIC SOILS	PT		Peat and other highly organic soils	Ls. LIMESTONE	Caics. CALCAREOUS
				Moi. MOIST	Frac. FRACTURED
				Ang. ANGULAR	Frag. FRAGMENTS
				Cemd. CEMENTED	Nod. NODULES
				Chlky. CHALKY	w/ WITH
				Chty. CHERTY	

1-From Waterways Experiment Station Technical Memorandum No. 3-357

2-From 'Soil Mechanics Engineering Practice' by Terzaghi and Peck

APPENDIX B
STANDARD FIELD AND LABORATORY PROCEDURES

325

STANDARD FIELD AND LABORATORY PROCEDURES**STANDARD FIELD PROCEDURES****Drilling and Sampling**

Borings are typically staked in the field by the drillers, using simple taping procedures and locations are assumed to be accurate to within several feet. Unless noted otherwise, ground surface elevations (GSE) when shown on logs are estimated from topographic maps and are assumed to be accurate to within a foot. A plan of Borings, showing the boring locations and the proposed structures is provided in the Appendix.

A log of each boring was prepared as drilling and sampling progressed. In the laboratory, the driller's classification and description is reviewed by a Geotechnical Engineer. Individual logs of each boring are provided in the Appendix. Descriptive terms and symbols used on the logs are in accordance with the Unified Soil Classification System (ASTM D 2487). A reference key is also provided. The stratification of the subsurface material represents the soil conditions at the actual boring locations, and variations may occur between borings. Lines of demarcation represent the approximate boundary between the different material types, but the transition may be gradual.

A truck-mounted rotary drill rig utilizing rotary wash drilling or continuous flight hollow or solid stem auger procedures is used to advance the borings, unless otherwise noted. Samples of soil are obtained from the borings for subsequent laboratory study. Samples are sealed in plastic bags and marked as to depth and hole locations in the field. Cores are wrapped in a polyethylene wrap to preserve field moisture conditions, placed in core boxes and marked as to depth and core runs. Unless notified to the contrary, samples and cores will be stored for 90 days, then discarded.

Standard Penetration Test and Split-Barrel Sampling of Soils (ASTM D 1586) (SPT)

This sampling method consists of driving a 2 inch outside diameter split barrel sampler using a 140 pound hammer free falling through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven an additional 12 inches. The number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance. The results of the SPT is recorded on the boring logs as "N" values.

Thin-Walled Tube Sampling of Soils (ASTM D 1587) (Shelby Tube Sampling)

This method consists of pushing thin walled steel tubes, usually 3 inches in diameter, into the soils to be sampled using hydraulic pressure or other means. Cohesive soils are usually sampled in this manner and relatively undisturbed samples are recovered.

Soil Investigation and Sampling by Auger Borings (ASTM D 1452)

This method consists of auguring a hole and removing representative soil samples from the auger flight or bit at intervals or with each change in the substrata. Disturbed samples are obtained and this method is, therefore, limited to situations where it is satisfactory to determine the approximate subsurface profile and obtain samples suitable for index property testing.

Diamond Core Drilling for Site Investigation (ASTM D 2113)

This method consists of advancing a hole into hard strata by rotating a single or double tube core barrel equipped with a cutting bit. Diamond, tungsten carbide, or other cutting agents may be used for the bit. Wash water or air is used to remove the cuttings and to cool the bit. Normally, a 3 inch outside diameter by 2-1/8 inch inside diameter coring bit is used unless otherwise noted. The rock or hard material recovered within the core barrel is examined in the field and in the laboratory and the cores are stored in partitioned boxes. The intactness of all rock core specimens is evaluated in two ways. The first method is the Standard Core Recovery expressed as the length of the total core recovered divided by the length of the core run, expressed as a percentage:

$$\text{SCR} = \frac{\text{total core length recovered}}{\text{length of core run}} \times 100\%$$

This value is exhibited on the boring logs as the Standard Core Recovery (SCR).

The second procedure for evaluating the intactness of the rock cores is by Rock Quality Index (RQI). The RQI provides an additional qualitative measure of soundness of the rock. This index is determined by measuring the intact recovered core unit which exceed four inches in length divided by the total length of the core run:

$$\text{RQI} = \frac{\text{all core lengths greater than 4"}{\text{length of core run}} \times 100\%$$

The RQI is also expressed as a percentage and is shown on the boring logs.

Vane Shear Tests

In-situ vane shear tests may be utilized to determine the shear strength of soft to medium cohesive soil. This test consists of placing a four-bladed vane in the undisturbed soil and determining the torsional force applied at the ground surface required to cause the cylindrical perimeter surface of the vane to be sheared. The torsional force sufficient to cause shearing is converted to a unit of shearing resistance or cohesion of the soil surrounding the cylindrical surface.

THD Cone Penetrometer Test

The THD Cone Penetrometer Test is a standard field test to determine the relative density or consistency and load carrying capacity of foundation soils. This test is performed in much the same manner as the Standard Penetration Test described above. In this test, a 3 inch diameter penetrometer cone is used in place of a split-spoon sampler. This test calls for a 170-pound weight falling 24 inches. The actual test in hard materials consists of driving the penetrometer cone and accurately recording the inches of penetration for the first and second 50 blows for a total of 100 blows. These results are then correlated using a table of load capacity vs. number of inches penetrated per 100 blows.

Ground Water Observation

Ground water observations are made during the boring operations and are reported on the boring logs. Moisture condition of cuttings are noted, however, the use of water for circulation precludes direct observation of wet conditions. Water levels after completing the borings are noted. Seasonal variations, temperatures and recent rainfall conditions may influence the levels of the ground water table and water may be present in excavations, even though not indicated on the logs.

STANDARD LABORATORY PROCEDURES

In order to adequately characterize the subsurface material at this site, some or all of the following laboratory tests were completed. Results of the actual tests performed are shown on the Summary of the Laboratory Test Results, and some are also shown graphically on the Logs of Borings.

Moisture Content - ASTM D 2216

Natural moisture contents of the samples (based on dry weight of soil) have been determined for selected samples at depths shown on the respective boring logs. These moisture contents are useful in delineating the depth of the zone of moisture change and as a gauge of correlation between the various index properties and the engineering properties of the soil. For example, the relationship between the plasticity index and moisture content is a source of information for the correlation of shear strength data.

Atterberg Limits - ASTM D 4318

The Atterberg Limits are the moisture contents at the time the soil meets certain arbitrarily defined tests. At the moisture content defined as the plastic limit, P_w , the soil is assumed to change from a semisolid state to a plastic state. By the addition of more moisture, the soil may be brought up to the moisture content defined as the liquid limit, L_w , or that point where the soil

B - 3

328

changes from a plastic state to a liquid state. A soil existing at a moisture content between these two previously described states is said to be in a plastic state. The difference between the liquid limit, L_w , and the plastic limit, P_w , is termed the plasticity index, I_w . As the plasticity index increases, the ability of a soil to attract water and remain in a plastic state increases. The Atterberg limits that were determined are plotted on the appropriate Log of Boring.

The Atterberg limits are quite useful in soil exploration as an indexing parameter. Using the Atterberg limits and grain size analysis, A. Casagrande developed the Unified Soils Classification System (USCS) which is widely used in the geotechnical engineering field. This system related the liquid limit to the plasticity index by dividing a classification chart into various zones according to degrees of plasticity of clays and silts. Although the Atterberg limits are an indexing parameter, K. Terzaghi has related these limits to various engineering properties of a soil. Some of these relationships are as follows:

1. As the grain size of the soil decreases, the Atterberg limits increase.
2. As the percent clay in the soil increases, the Atterberg limits increase.
3. As the shear strength increases, the Atterberg limits decrease.
4. As the compressibility of a soil increases, the Atterberg limits increase.

Triaxial Shear Test - ASTM D 2850-70

Triaxial tests may be performed on samples that are approximately 2.83 inches in diameter, unless a smaller diameter sample was necessary to achieve a more favorable length:diameter (L:D) ratio. In order to reduce end effects, the L:D ratio should be a minimum of 2.0.

The triaxial tests are typically unconsolidated-undrained using nitrogen gas for chamber confining pressure. Confining pressures are selected to conform to in-situ hydrostatic pressure considering the earth to be a fluid of 120 PCF. In this test, undisturbed Shelby tube samples are trimmed so that their ends are square and then pressed in a triaxial compression machine. The load at which failure occurs is the compressive strength. The results of the triaxial tests and the correlated hand penetrometer strengths can be utilized to develop soil shear strength values.

Unconfined Compressive Strength of Rock Cores - ASTM D 2938

The unconfined compressive strength is a valuable parameter useful in the design of foundation footings. This value, q_u , is related to the shearing resistance of the rock and thus to the capacity of the rock to support a load. In completing this test it is imperative that the length:diameter ratio of the core specimens are maintained at a minimum of 2:1. This ratio is set so that the shear plane will not extend through either of the end caps. If the ratio is less than 2.0 a

correction is applied to the result. The results of these tests are compiled in Appendix A if the tests were performed.

Grain Size Analysis - ASTM D 421 and D 422

Grain size analysis tests are performed to determine the particle size and distribution of the samples tested. The grain size distribution of the soils coarser than the Standard Number 200 sieve is determined by passing the sample through a standard set of nested sieves, and the distribution of sizes smaller than the No. 200 sieve is determined by a sedimentation process, using a hydrometer. The results are given on the "Summary of Laboratory Test Results" or on Grain Size Distribution semi-log graphs within the report.

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B - 5

330

RECOMMENDATIONS - PORTLAND CEMENT CONCRETE PAVEMENTS**A. Subgrade and Foundation Soil Preparation**

1. Strip and remove from construction area any top soil, organics and vegetation to a minimum depth of six inches below the existing natural ground surface. All noticeably soft spots or areas of deleterious material should be removed and replaced with a common fill as herein specified. Compaction of this common fill should be as stated below.
2. Scarify and recompact the subgrade under controlled density procedures to a depth of six inches. Compaction of the subgrade shall be to a minimum of 95 percent of Texas Department of Transportation (TxDOT) Tex-113-E. The subgrade should be within three percentage points of optimum moisture at time of compaction.
3. Fill sections may be composed of on-site material excluding top soil, vegetation or organics and should have a maximum particle size of 2 inches with a minimum of 10 percent passing the No. 40 sieve with no more than 50 percent passing the No. 40 sieve. The material used should have a plasticity index between 3 to 17. Fills should be compacted in lifts not exceeding eight inches after compaction and be compacted in accordance with item 2, above.

B. Base Course

1. Base material shall be Type A or B, Grade 2 or better, according to the TxDOT Specification Item 247.
2. Thickness of the base course should be in accordance with Table 1.
3. Base course compaction should be 100 percent of TxDOT Tex-113-E. Density control by means of field density determinations shall be exercised. The base course should be within 2 percent of optimum moisture at time of compaction.

- C. Concrete paving shall consist of thicknesses as given in Table 1. The concrete for paving should develop a 7-day flexural strength of 650 PSI (Tex-448-A). The concrete shall meet other requirements for Item 360, Concrete Pavement, of the TxDOT's Standard

Specifications for Construction of Highways, Streets and Bridges. Reinforcing should consist of a minimum of no. 3 reinforcing bars on 14-inch OCEW, 40 KSI. The reinforcing bars should be securely chaired and positioned no lower than the mid-section and no higher than 2 inches from the top. Control joints should be 20 feet on centers each way. The reinforcing steel should not run continuous through the joints. Full slip doweled expansion joints with bituminous fiber or red wood filler should be installed at contact with fixed structures.

D. General Conditions

1. Should at any stage in the construction of the pavement a non-stable or weaving condition of the subgrade or base course is noted under the wheel loads of construction equipment, such areas should be delineated and the Geotechnical Engineer consulted for remediation before completing the pavement section.
2. Seepage areas or unusual foundation soil conditions should be similarly brought to the Geotechnical Engineer's attention before proceeding with pavement completion.

TABLE 1

<u>Traffic Loading</u>	<u>PCC¹</u>	<u>CLB²</u>	<u>Subgrade³</u>
Light Vehicle Parking	5.0	0	6.0
Heavy duty areas	7.0	5.0	6.0

Notes: (all units are in inches)

1. PCC - Portland cement concrete, see following materials outline specifications
2. CLB - Crushed limestone base, see preceding materials outlining specifications.
3. Subgrade - minimum prepared thickness shown

SECTION 02100
SITE PREPARATION

VOL 0095
PAGE 333

PART 1. GENERAL

1.1 SUMMARY

- A. Remove interfering or objectionable material from designated areas of Work.
- B. Preserve vegetation and existing objects designated to remain from injury or defacement.

1.2 DEFINITIONS

A. CLEARING

- 1. Cutting, removing, and disposing of trees, snags, stumps, shrubs, brush, limbs, and other vegetative growth.
- 2. Removing all evidence of their presence from the surface, inclusive of sticks and branches greater than 2 inches in diameter or thickness.
- 3. Removing and disposing of trash piles, rubbish, and fencing.

B. GRUBBING

- 1. Removing and disposing of wood or root matter below the ground surface remaining after clearing.
- 2. Includes stumps, trunks, roots, or root systems greater than 2 inches in diameter or thickness to a depth of 18 inches below the ground surface.

C. STRIPPING

- 1. Removing and disposing of all organic sod, topsoil, grass and grass roots, and other objectionable material from the areas designated to be stripped that remain after clearing and grubbing.

1.3 RELATED SECTIONS

- A. Section 02200 - Earthwork.

PART 2. MATERIALS

2.1 GENERAL

- A. Provide materials, suitable and in adequate quantity, required to accomplish Work of this Section.

END

333

PART 3. EXECUTION

3.1 PREPARATION

- A. Review with Engineer's representative the location, limits, and methods to be used prior to commencing Work under this Section.

3.2 CLEARING AND GRUBBING LIMITS

- A. Clear and grub areas within the limits of construction.
- B. Clear and grub in stages as the construction area is increased to avoid unnecessary clearing and grubbing.

3.3 DISPOSAL OF CLEARING AND GRUBBING DEBRIS

- A. Haul the material from the Work site and dispose of in accordance with state, federal, and local laws.
 - 1. Off-site disposal shall be at the Contractor's sole expense.

3.4 AREAS TO BE STRIPPED

- A. The exact depth of stripping will be determined by the Engineer.
- B. Topsoil requirements are specified in Section 02200.
- C. Strip areas that are cleared and grubbed.
- D. Strip areas in stages to avoid unnecessary stripping.

3.5 DISPOSAL OF STRIPPINGS

- A. Do not mix strippings with borrow excavation.
- B. Stockpile topsoil from the strippings for use in landscape grading.
- C. Dispose of excess topsoil.
- D. Strippings not suitable for use as topsoil shall become the property of the Contractor and shall be removed from the site.

END OF SECTION

334

SECTION 02110

CLEARING

VOL. 0095
PART 335

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide site clearing as required in order to properly prepare the site for construction activities and to meet the intent and requirements of the contract documents.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions.
- B. Division 1
- C. Section 02010 - Subsurface Investigation.
- D. Section 02050 - Demolition.
- E. Section 02200 - Earthwork.
- F. Section 02500 - Paving and Surfacing.
- G. Section 02700 - Piped Utilities.

1.03 EXISTING CONDITIONS

- A. Verify existing conditions prior to commencing work.
- B. Contact all local Utility Companies for verification of location of existing utilities prior to beginning any clearing work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 CLEARING

- A. Do not destroy any project survey control features or permanent bench marks.
- B. Verify any requirements for stockpiling of stripped topsoil.
- C. Remove all debris from site.

D. Site burning is permissible only with documented authorization of local Fire Marshall.

END OF SECTION

Section 02110-2

336

SECTION 02200

EARTHWORK

VOL 0095
PAGE 337

PART 1. GENERAL

1.1 WORK INCLUDED

- A. Layout of site improvements.
- B. Layout of building.
- C. Excavating for below grade work.
- D. Filling and backfilling.
- E. Rough and finish grading of site.

1.2 RELATED SECTIONS

- A. Section 01001 - Basic Requirements.
- B. Section 02100 - Site Preparation.
- C. Section 02225 - Trench Excavation.
- D. Section 02900 - Landscaping.

1.3 REFERENCES

- A. Texas Department of Transportation, Standard Specifications for Construction of Highways, Streets, and Bridges, latest edition.
 - 1. Item 248 - Flexible Base Course.
- B. American Society for Testing and Materials, 1916 Race St. Philadelphia, PA 19103.
 - 1. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5lb (2.49-kg) Rammer and 12-in. (304.8-mm) Drop.
 - 2. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10lb (4.54-kg) Rammer and 18-in. (457-mm) Drop.
 - 4. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
 - 5. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place of Nuclear Methods (Shallow Depth).

- C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P = Excavations.

1.4 DEFINITIONS

- A. Structure: Includes concrete footings, foundations, and slabs on grade.
- B. Site: Any area of the work not associated with a structure.
- C. Subgrade: Natural underlaying material in place remaining after clearing, grubbing, and stripping work completed. Free of debris and lumps larger than 3 inches.
- D. Pond: An excavation and/or embankment intended to contain water.
- E. Borrow: Material suitable for fill or embankment obtained from an area not designated as excavation incidental to sitework.
- F. Relative Compaction:
 - 1. The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by the Standard Proctor Test, ASTM D698, or as determined by the Modified Proctor Test, ASTM D1557, as applicable.
- G. Completed Course:
 - 1. A course or layer that is ready for the next layer or the next phase of construction.
- H. Stripping:
 - 1. Removing and disposing of all organic sod, topsoil, grass and grass roots, and other objectionable material from the areas designated to be stripped that remain after clearing and grubbing.
- I. Excavation: All material excavated is defined as unclassified excavation, regardless of the material encountered, unless the Bid Form specifically provides for payment for differing materials.

1.5 SUBMITTALS

- A. Submittals shall be made in accordance with Sections 01300 and the requirements of this Section. Fill materials are subject to approval by Engineer.
- B. Provide the following:
 - 1. Samples of all imported material.
 - 2. Samples of all onsite material to be used as fill.

3. Certification that imported materials conform to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory.
4. Proctor curves on fill material as prepared by approved laboratory.

1.6 PROJECT CONDITIONS

- A. Beginning work of this Section means acceptance of existing conditions.
- B. Contractor shall make his own estimate of the kind and extent of the various materials to be excavated in order to accomplish the work.
- C. There will be no extra compensation for dewatering.

1.7 PROTECTION

- A. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from equipment and vehicular traffic which are not designated to be demolished.
- B. Identify and flag surface and known underground utilities, maintain and protect above and below grade utilities which are to remain.
- C. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
- D. Underpin adjacent structures which may be damaged by excavation Work, including service utilities and pipe chases.
- E. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.
- F. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.
- G. Grade excavation top perimeter to prevent surface water runoff into excavation.

PART 2. PRODUCTS

2.2 SITE FILL

- A. Free from roots, organic matter, trash, and debris with maximum particle size of 6 inches.

339

- B. It is intended that fill material be obtained from on site to the maximum extent possible. Contractor to verify that stockpiled fill to be reused is approved.
- C. Site fill under roads and parking areas to be ASTM D2487 CL or shale fragment mixture as approved. Liquid limit not to exceed 45.

2.1 IMPORTED GRANULAR FILL

- A. Imported granular fill to consist of a natural or artificial mixture of gravel and soil mortar, uniformly well graded from coarse to fine.
- B. Conform to the TxDOT Item 248 classifications for Base Courses as designated on the Drawings.

2.2 UNDERSLAB DRAINAGE FILL

- A. Crushed stone or washed gravel, uniformly graded from 3/4-inch to 1-1/2-inch maximum size

2.3 BORROW MATERIAL

- A. Locate and purchase a site near the construction area for obtaining borrow material.
- B. Perform the following acceptance tests:
 - 1. Site fill:
 - a. Standard and Modified Proctor.

2.4 COMPACTION EQUIPMENT

- A. Provide compaction equipment of suitable type and adequate to obtain the densities specified.
- B. Operate compaction equipment in strict accordance with the manufacturer's instructions and recommendations.
- C. Maintain equipment in such condition that it will deliver the manufacturer's rated compactive effort.

2.5 MOISTURE CONTROL EQUIPMENT

- A. Provide equipment for applying water be of a type and quality adequate for the work; it shall not leak; and shall be equipped with a distributor bar or other approved device to assure uniform application.
- B. Provide equipment for mixing and drying out material consisting of blades, discs, or other approved equipment.

2.6 WATER REMOVAL EQUIPMENT

340

- A. Provide and operate equipment adequate to keep excavation and trenches free of water.

2.7 "B" STONE

- A. Hard, durable upgraded crushed stone aggregate ranging in size from 2-inch minimum to 5-inch maximum. As manufactured by local quarries.

2.8 MATERIAL ACCEPTANCE

- A. For materials requiring approval prior to placement, forward test results to the Engineer at least 10 days before the material is required for use. If tests indicate that the material does not meet Specification requirements, the material shall not be installed in the work.
- B. Material which is placed in the work but does not conform to the Specification requirements shall be removed and replaced at the Contractor's sole expense.

2.9 GEOTEXTILE FABRIC

- A. Typar 3401; or equal.

PART 3. EXECUTION

3.1 LAYOUT OF FOUNDATIONS AND SITE IMPROVEMENTS

- A. Contractor responsible for correct layout of building foundations and site improvements in accordance with the Drawings. Employ a Professional Surveyor to establish building lines, grades and elevations called for on the Drawings.

3.2 CLEARING AND GRUBBING

- A. Complete clearing and grubbing work as specified in Section 02100 prior to beginning work in this Section.

3.3 STRIPPING TOPSOIL

- A. Remove existing grass and overburden before excavating topsoil.
- B. Prior to beginning any excavation or fill, strip the topsoil to a depth of at least 6 inches or to a depth sufficient to remove all organic material and stockpile for future use.
- C. In general, remove topsoil where structures are to be built, trenches dug, and roads, parking lots, walks, and

similar improvements constructed within the areas presently covered with topsoil.

- D. Stockpile topsoil clear of the construction area for use in landscape grading. Take reasonable care to prevent the topsoil from becoming mixed with subsoil or eroding. Do not mix strippings with borrow excavation.
- E. Strippings not suitable for use as topsoil shall become the property of the Contractor and shall be removed from the site at no additional cost to the Owner.

3.4 DUST CONTROL

- A. Control dust on and near the work if dust is caused by Contractor's operations during performance of the work or if resulting from condition in which Contractor leaves the site.

3.5 STRUCTURAL EXCAVATION

- A. The method of excavation used is optional; however, no equipment shall be operated within 5 feet of existing structures or newly completed construction.
- B. Excavation that cannot be accomplished without endangering present or new structures shall be done with hand tools.
- C. Do not interfere with normal 45 degree bearing splay of foundations.
- D. Excavate outside walls to allow for inspection, placing, and removal of forms.
- E. Do not carry excavation for footings and slabs deeper than the elevation shown. Fill over-excavations under footings with concrete of equal strength to that of the footing. Correct over-excavated areas and unauthorized excavation at the Contractor's sole expense. Correct over-excavated areas and unauthorized excavation at the Contractor's sole expense.
- F. Hand trim excavation and leave free of loose matter.
- G. Stockpile excavated material in area designated on site. Remove excess subsoil not being reused from site.
- H. Protect bottom of excavation and soil adjacent to and beneath foundations from frost.

3.6 EXCAVATION SAFETY

- A. The Contractor shall be solely responsible for trench and excavation safety systems in accordance with City of Austin Specification 509 and OSHA requirements.

3.7 DEWATERING EXCAVATION

- A. Remove all water during periods when concrete is being deposited, pipe is being laid, and placing of backfill unless water settling is required, and at such other times as required for efficient and safe execution of the work.
- B. Accomplish removal of groundwater in a manner that will preserve the strength of the foundation soils, will not cause instability of the excavation slopes, and will not result in damage to existing structures.
- C. Where necessary to these purposes, lower the water level in advance of excavation, utilizing wells, wellpoints, or similar methods.
- D. Maintain the water level as measured in piezometers, a minimum of 3 feet below the prevailing excavation level or as needed to prevent bottom heave of the excavation.
- E. Open pumping, sumps, and ditches will not be permitted if these result in boils, loss of fines, softening of the ground or instability of slopes.
- F. Where used, wells and wellpoints fit with suitable screens and filters so that continuous pumping of fines does not occur. Operate well points continuously so as to prevent boils and loss of consolidation. Arrange discharge to facilitate collection of samples by the Engineer.
- G. Avoid settlement or damage to adjacent property.
- H. Dispose of water in a manner that will not damage adjacent property.

3.8 UNDERCUTTING

- A. Undercut areas on the site that do not meet the material or density requirements, or that cannot be properly compacted, to such depth as to allow placement of acceptable fill material.
- B. Prior to placement of fill in the undercut area, perform Foundation Preparation as specified in this Section.

343

- C. Unless otherwise specified or specifically approved use "B" stone to fill to replace material from undercut areas, except under building structures.

3.9 FOUNDATION PREPARATION

- A. After completion of excavation, and prior to foundation or fill construction, proofroll the excavation surface with a minimum 20,000-lb. pneumatic-tired roller, loaded tandem-axle dump truck or similar heavy-wheeled vehicle to detect soft or compressible areas.
- B. Conduct proofrolling in the presence of the Engineer.
- C. If soft or loose zones are found, excavate the soft or loose material to a depth accepted by the Engineer, then fill and compact as specified for the overlying fills.
- D. Prior to placement of any overlying fill or concrete, compact the foundation subgrade.

3.10 UNDERSLAB DRAINAGE FILL

- A. Place material in horizontal lifts and in a manner which avoids segregation. Do not exceed loose lifts of 6 inches.
- B. Place and compact minimum a 6-inch layer of granular drainage fill, or as shown on Drawings, immediately beneath spread footings, slabs on grade, or other concrete structures. Level and compact fill as required for placement of moisture barrier.

3.11 BACKFILL AROUND STRUCTURES

- A. Verify areas to be backfilled are free of form materials, debris, snow, ice, or water, and ground surfaces are not frozen.
- B. Place earth fill in all areas not designated to be structural fill or granular fill.
- C. Deposit material in maximum 6-inch loose lifts.
- D. Backfill around concrete structures only after the concrete has attained the specified compressive strength.
- E. Obtain the Engineer's acceptance of concrete work prior to backfilling.
- F. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- G. Verify foundation or walls are braced to support surcharge forces imposed by backfilling operations.

- H. Do not operate earth-moving equipment within 5 feet of walls of concrete structures for the purpose of depositing or compacting backfill material.
- I. Compact backfill adjacent to concrete walls with hand-operated tampers or similar equipment that will not damage the structure.
- J. Backfill water-holding basins only after satisfactory leakage tests have been conducted.

3.12 SITE FILL

- A. Compact top 8 inches of subgrade surfaces to density requirements.
- B. Undercut soft areas of subgrade as determined by proofrolling test. Backfill as specified in Undercutting of this Section.
- C. Place earth fill in maximum 6-inch loose lifts and compact. Use unfrozen materials.
- D. Make proper allowance for topsoil where required.
- E. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be plowed, stepped, or broken up, as directed, in such manner that full material will bond with the existing surface. Prepared surfaces on which compacted fill is to be placed shall be wetted or dried as required to obtain specified moisture content and density.

3.13 MOISTURE CONTROL

- A. At the time of compaction, maintain water content throughout each lift at optimum moisture content, plus or minus 2 percentage points, except as otherwise specified for pond embankments.
- B. If necessary, maintain proper moisture content by either adding water or aerating the material by mechanical means.

3.14 FIELD DENSITY TESTS

- A. Acceptance of completed work to be based in part on compaction of the various types of materials. Initial compaction testing to be in accordance with ASTM D698 or ASTM D1557. Engineer may substitute subsequent testing, at his discretion, in accordance with ASTM D2922 or ASTM D1556 correlated to proctor tests.

B. Compaction Requirements:

- 1. Pond embankment: 95 percent standard.

345

2. Select fill, structure foundation subgrade (top 10 inches): 95 percent modified.
 3. Site fill under piping, walks, roads, and parking areas: 95 percent modified.
 4. Granular fill under footings, foundations, and slabs on grade: 95 percent modified.
 5. Backfill around structures: 95 percent standard.
 6. Disposed excess excavation (spoil): 90 percent standard.
 7. Subgrade (site): 90 percent standard.
 8. All other site fill: 90 percent standard.
 9. Perform compaction tests on completed work to the specified percentage of maximum density obtained and in accordance with the following:
 - a. Standard Proctor: ASTM D698.
 - b. Modified Proctor: ASTM D1557.
- C. Cooperate with this testing work by leveling small test areas designated by the Engineer.
- D. Backfill test areas.
- E. Engineer may order testing of any lift of fill at any time, location, or elevation.
- F. Provide for visual inspection of bearing surfaces.
- G. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.15 SITE GRADING

- A. Perform earthwork to lines and grades as shown with proper allowance for topsoil or compacted structures where specified or shown. Tolerance for top surface elevation of rough grade to be plus or minus 0.1 foot.
- B. Shape, trim, and finish slopes to conform with the lines, grades, and cross sections shown. Elevations and contours shown on Drawings represent finished grade of the completed Work at that point, unless otherwise noted.
- C. Finish surfaces of all disturbed areas shall be free of all exposed roots and stones exceeding 3-inch diameter.
- D. Round tops of banks to circular curves, in general, not less than a 6-foot radius.
- E. Finished site grading will be reviewed by the Engineer.
- F. Upon completion of removal of on-site borrow material, grade the borrow site to drain, place topsoil on all disturbed areas, and establish grass as outlined in Landscaping Sections.

3.16 DISPOSAL OF EXCESS EXCAVATION

- A. Dispose of all excess excavated materials, not required or suitable for use as backfill or fill, outside of the area of work.
- B. Dress the completed disposal area to slopes no greater than 4:1 (horizontal:vertical), and slope to drain.

3.17 SETTLEMENT

- A. Settlement in backfill, fill, or in structures built over the backfill or fill, which may occur within the 1-year guarantee period in the General Conditions will be considered to be caused by improper compaction methods.
- B. Correct and repair subsequent damage to slabs, piping, concrete structures, or other structures caused by settlement of fill material to their original condition.

END OF SECTION

347

SECTION 02210

SITE GRADING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide all site grading as shown on the drawings or specified in the Specification Manual.

1.02 RELATED SECTIONS

- A. Section 02010 - Subsurface Investigation
- B. Section 02100 - Site Preparation
- C. Section 02110 - Site Clearing
- D. Section 02111 - Tree and Shrub Removal/Protection
- E. Section 02200 - Earthwork
- F. Section 02213 - Rough Grading
- G. Section 02220 - Structural Excavation and Backfilling
- H. Section 02222 - Trenching for Utilities
- I. Section 02225 - Cement-Sand Backfill
- J. Section 02250 - Compaction Control and Testing
- K. Section 02260 - Finish Grading
- L. Section 02270 - Slope Protection and Erosion Control
- M. Section 02400 - Drainage
- N. Section 02430 - Drainage Structures, Pipe and Fittings
- O. Section 02500 - Paving and Surfacing
- P. Section 02513 - Asphaltic Concrete Paving

1.03 QUALITY ASSURANCE

- A. Inspection and Testing Service
 - 1. The Contractor shall coordinate the efforts of the selected Testing Laboratory during all earthwork operations.

2. Payment for these services will be from the Inspection Testing Allowance.
3. During all filling operations, field density tests shall be performed to check for proper compaction. Densities shall be run on each layer of compacted material at the rate of 1 test per 5,000 square feet, including tests on sub-grade. Should the results of these tests fall below the specification requirements, the material shall be reworked until the required density is obtained. Additional density tests shall be made to confirm the satisfactory compaction and the costs of these re-tests shall be borne by the Contractor and shall not be deducted from the Testing Allowance funds.

1.04 SUBMITTALS

- A. Test Reports: Submit two copies of the physical properties and a moisture density curve for Select Fill, Structural Fill, and existing subgrade. The costs for these tests shall be paid by the Contractor and not drawn against the Testing Allowance funds.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer related specification sections for requirements of fill materials for building structural pad, pipe bedding material, and base for paving areas.

PART 3 EXECUTION

3.01 PREPARATION

- A. All site grading work shall be performed in such a manner as to fully accomplish the intent and requirements illustrated on the site grading plan.
- B. Coordinate the Testing Laboratory service in order for all required tests to be performed in a timely manner.

END OF SECTION

ROUGH GRADING

PART 1 DESCRIPTION

1.01 DESCRIPTION

- A. All rough grading work associated with preparing the site for structural select fill placement, structural backfill, site paving, and finish grading.

1.02 RELATED SECTIONS

- A. Section 02010 - Subsurface Investigation
- B. Section 02100 - Site Preparation
- C. Section 02200 - Earthwork
- D. Section 02210 - Site Grading
- E. Section 02221 - Structural Backfilling
- F. Section 02230 - Base for Asphaltic Paving
- G. Section 02231 - Base for Concrete Paving
- H. Section 02250 - Compaction Control and Testing

1.03 TOLERANCES

- A. Maximum variation from indicated grades shall be 1/10 of one foot.

1.03 QUALITY CONTROL

- A. Refer Section 02210.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer Section 02220, Section 02221, Section 02230, and Section 02231.

PART 3 EXECUTION

3.01 PREPARATION

- A. Carefully examine the site prior to beginning work to pre-plan procedures for making cuts, placing fills, storing excess materials, and other necessary work.

- B. Contact local utility companies for verification of location of all utilities prior to performing any excavation.
- C. Before making cuts, determine areas needing fill and organize operations to most efficiently use and place fill.
- D. Before making cuts, remove top soil not previously removed by other operations and stockpile as directed by the Architect.
- E. Compaction of fills shall be as specified in Section 02250.
- F. Make proper allowances for final finishes of parking and drive areas, and planting areas as indicated and specified:
 - a) Seeded Lawn Areas: 6 1/2 inches below top of walk or curb.
 - b) Sodded Lawn Areas: 7 1/2 inches below top of walk or curb.
 - c) Shrub or Ground Cover Areas 19 1/2 inches below top of walk or curb.
- G. If soft spots, water, or other unusual excavating conditions are encountered, stop work and notify the Architect.

END OF SECTION

SECTION 02220**STRUCTURAL EXCAVATION, FILL AND BACKFILL****PART 1 GENERAL****1.01 DESCRIPTION**

This section describes requirements for:

- A The excavation for all structures, backfilling around completed structures and the disposal of all excess excavated material. All operations required for the proper completion of the excavation work, including sheeting, shoring and bracing, dewatering of excavations and compaction of backfill are included.
- B All fill required for completion of the work as shown or specified.
- C Trenching and backfilling for all pipes under structures.
- D Vapor barrier membranes under slabs on ground.

1.02 RELATED WORK

- A Division 1 - General Requirements.
- B Division 2 - Site Work.
 - 1. Drilled Shaft Foundations.
- C Division 3 - Concrete Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A American Society for Testing and Materials (ANSI/ASTM).
 - 1. ANSI/ASTM C 33 - Standard Specification for Concrete Aggregate.
 - 2. ANSI/ASTM C 40 - Standard Test Method for Organic Impurities in Sands for Concrete.
 - 3. ANSI/ASTM C 136 - Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregate.
 - 4. ANSI/ASTM C 150 - Standard Specification for Portland Cement.
 - 5. ANSI/ASTM D 423 - Standard Test Method for Liquid Limit of Soil.
 - 6. ANSI/ASTM D 424 - Standard Test Method for Plastic Limit and Plasticity Index of Soils.

7. ANSI/ASTM D 698 - Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-Kg) Rammer and 12-in. (305-mm) Drop.
8. ANSI/ASTM D 1557 - Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-Kg) Rammer and 18-in. (457-mm) Drop.
9. ANSI/ASTM D 2049 - Standard Test Method for Relative Density of Cohesionless Soils.

- B U.S. Department of Commerce/National Bureau of Standards. PS-17 - Polyethylene Sheeting (Construction, Industrial and Agricultural Applications).

1.04 SUBMITTALS

Submit the following in accordance with the requirements of the General Conditions and Division 1 - General Requirements.

- A Testing laboratory reports, as specified or required, to show compliance with specifications for select fill material. The specified tests shall be performed by a certified independent testing laboratory employed and paid by the Contractor. Submit a moisture-density curve for the fill material.

1.05 PROTECTION OF FACILITIES

- A Before the start of earthwork operations, adequately protect existing structures, utilities, trees, shrubs and other permanent objects. Costs resulting from damage to permanent facilities due to negligence or lack of adequate protection will be the responsibility of the Contractor. The Contractor will also be charged for damage to facilities scheduled for later removal or demolition if the damage sufficiently impairs proper operation to the extent that temporary replacement or repair is required. Prior to beginning of the project, a joint inspection will be made by the Architect and Contractor to determine the condition of any existing structures or other permanent objects.
- B Provide surface drainage during the period of construction to protect the work and to avoid nuisance to adjoining property. Drainage shall be such that surface run off is routed around or away from the building site. Measures shall be taken to prevent ponding within the building area.
- C The Contractor shall conduct his operations in such fashion that trucks and other vehicles do not create a dirt nuisance in the streets. The truck beds shall be sufficiently tight, and shall be loaded in such a manner that

objectionable materials will not be spilled onto the streets. Any dirt, mud, or other materials that are spilled onto the streets or deposited onto the streets by the tires of vehicles shall be promptly cleared away by the Contractor.

1.06 BLASTING

Blasting will not be permitted.

1.07 QUALITY ASSURANCE

The Contractor will employ and pay for the services of a testing laboratory, as specified in Division 1 - General Requirements, to perform compaction tests on the compacted material. The Contractor shall cooperate with the testing laboratory in performing these tests. The Contractor shall notify the laboratory at least 48 hours in advance of the time at which tests will be required. Any area failing to comply with the specifications shall be reworked as required to conform to the specifications.

1.08 INSPECTION OF EXCAVATIONS

- A All excavations will be inspected by the Testing Laboratory. Notify the Testing Laboratory and the Engineer at least 48 hours prior to completion of the excavation so that the excavation can be inspected. Do not place any reinforcing steel or concrete in the excavation until it has been inspected and approved.
- B Notify the Engineer at least 48 hours prior to backfilling of pipe trenches. Do not begin backfilling of pipe trenches until all pipe joints have been inspected and approved unless the Engineer has given approval to backfill the trenches without inspection.

1.09 EXCAVATION SAFETY

- A All excavation and backfill operators shall be in accordance with the latest OSHA excavation safety standards OSHA 2226 and 29 CFR Part 1926 Subpart P.

1.10 PAYMENT FOR ADDITIONAL WORK

When suitable foundation soils are not encountered at plan depth, payment for additional excavation, as directed by the Engineer, will be in accordance with the General Conditions.

PART 2 PRODUCTS**2.01 REGULAR MATERIAL**

Where no other material is specified or shown, use suitable soils from the excavation. Do not use peat or other organic matter, silt, muck, debris or similar materials.

2.02 SELECT MATERIAL

- A Select fill material shall consist of well graded crushed limestone, meeting the following requirements:
1. Percent retained on 1-3/4" sieve: 0
 2. Percent retained on 1-1/2" sieve: 0-15
 3. Percent retained on 3/4" sieve: 25-55
 4. Percent retained on #4 sieve: 30-75
 5. Percent retained on #40 sieve: 60-90
- B Material passing the No. 40 sieve shall meet the following:
1. 25-40 percent passing No. 40 shall have a PI in the range of 3 to 15.
 2. 10-25 percent passing No. 40 shall have a PI in the range of 4 to 20.
- C Fill not specifically conforming to these requirements shall be submitted to the Geotechnical Engineer or Testing Laboratory for approval. The use of fill material other than crushed limestone is prohibited.

2.03 SAND

Where sand is shown or specified, use natural sand meeting ASTM C 33 requirements for fine aggregate.

2.04 VAPOR BARRIER MEMBRANE

Polyethylene sheeting conforming to U.S. Department of Commerce, National Bureau of Standards (NBS), Product Standard PS-17, not less than 6-mil nominal thickness.

PART 3: EXECUTION**3.01 CLEARING**

- A Remove shrubs, trees, stumps, roots, underbrush, weeds and other vegetation in the way of new construction.

- B Strip soil and vegetation at building area to an 18-inch minimum depth, or deeper as required to remove all vegetation, roots or other organic matter. All material not suitable for topsoil shall be removed from the site.
- C Topsoil consisting of friable material free of vegetation, clay lumps, stones or toxic substances shall be stockpiled in areas, as directed by the Architect, at the site for use in finish grading.

3.02 SLABS ON GROUND

- A Slabs at Grade.
 - 1. Subgrade. Scarify to a depth of 6 inches below the cleared depth and recompact to 95 percent maximum density as determined by ANSI/ASTM D 698 at a moisture content within 2 percent of optimum. Soft or wet areas not achieving compaction will require removal and replacement with select material of at least 12 inches compacted thickness. Depressions from stump removal shall be cleaned of all organic matter and filled with select material.
 - 2. Fill. Upon completion of subgrade preparation, place select material in uniform layers of loose material, 6 to 8 inches in depth, dried or moistened as required to obtain optimum moisture content, and compact each layer as specified. Fill shall be placed while subgrade is at its optimum moisture content.
 - 3. Final Grade. Conform to lines and grades shown on the drawings.
- B Compaction.
 - 1. The subgrade and fill material shall be compacted to a minimum of 95 percent of maximum density at a moisture content within 2 percent of optimum as determined by ANSI/ASTM D 698. The methods used to secure the specified compaction and moisture content will be the Contractor's responsibility. Wet soils shall be worked by plowing, disking, or scarifying and air drying as required to reduce the moisture content to optimum levels. The Contractor may, at his option, add flue dust or other drying material acceptable to the Engineer to speed up the drying procedure at no change in the contract sum.
 - 2. The compacting equipment and method of compaction shall be such that uniform density will be obtained over the entire area and depth of material being compacted. All fill materials deposited in place by dump trucks, end loaders or similar equipment shall be thoroughly broken up before being spread into uniform layers.
- C Vapor Barrier Membrane.
 - 1. As soon as practical after final grading, while the base material is still at its optimum moisture content, install a vapor barrier membrane over the prepared surface at locations shown on the

drawings. Provide membrane in the widest practical seamless widths.

2. Lay the membrane material continuously with the joints lapped a minimum of 6 inches. Carefully fit the membrane tight around all penetrations.
3. Before placing concrete, patch all holes and tears in membrane.

3.03 EXCAVATION

Excavation work shall be unclassified and includes removal of all types of materials encountered without exception. Make excavations to lines and grades indicated on drawings. Complete excavations within the tolerances specified.

A Sheeting, Shoring and Bracing.

1. Provide sheeting, shoring and bracing of excavations where required to properly and safely complete the work as shown. Construct sheeting, shoring and bracing to prevent the excavation from extending beyond specified or indicated limits, to protect adjacent structures or improvements and to protect workmen and the public. The design of sheeting, shoring and bracing shall be the responsibility of the Contractor.
2. Care shall be taken to prevent voids outside the sheeting. If voids are formed, they shall immediately be filled and compacted.
3. After completion of the structure, all sheeting, shoring and bracing shall be removed unless approval has been granted by the engineer, in writing, to leave any or all of it in place. The sheeting, shoring and bracing shall be removed as excavations are backfilled in a manner that will prevent injurious caving of the excavation or damage to the structure.
4. Voids left or caused by removal of sheeting shall immediately be filled with suitable material and compacted.

- #### B Pipe Trenches Under Foundations - Excavate by open cut methods.
- Make and maintain the sides of the trench as nearly vertical as practical. Provide shoring as required to maintain the sides of the trench in a vertical position and to protect workmen. Complete and shape the trench to provide free working space and to permit thorough tamping of backfill around the pipe. Grade trench bottoms accurately to provide uniform bearing on firm soil along the entire length of each pipe section. Remove rubbish, rock or debris encountered at grade to at least 6 inches below the bottom of the pipe. Reshape and compact the trench bottom. Working space measured from the outside of the pipe to the side of the trench must be at least 6 inches but not more than 24 inches. Provide bell holes where required for making proper connections at joints.

C Structures.

1. Wherever practicable, cut all footing excavations to neat lines with a tolerance of minus 1 inch or plus 3 inches, and place concrete to bear against earth sides. Where beams are shown to be monolithic with slabs on ground, shape soil to the profile shown. Excavate a sufficient distance from walls, shafts or similar elements of structures to allow for placing and removing forms and for inspection.
2. Excavate to the elevations shown on the drawings forming a level undisturbed surface free of mud or other soft material. All excavations will be inspected by the Testing Laboratory. Excavate to deeper levels, as directed by the Engineer, when suitable foundation soils are not encountered at the planned depth. Remove all pockets or soft or otherwise unstable material and replace with concrete or with suitable well-compacted material as directed by the Engineer.
3. Fill all unauthorized excessive excavation with concrete at no change in the contract sum.
4. Protect all open excavations from rainfall or excessive drying so as to maintain the foundation subgrade in a satisfactory, undisturbed condition. Keep excavations reasonably free of water at all times and completely free of water during placement of concrete. Soils below the foundation, which become soft, loose or otherwise unsatisfactory for support of the foundation as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced with satisfactory material, as directed by the Engineer, at the Contractor's expense.

3.04 BACKFILL

Complete backfill to the surface of natural ground or to the lines and grades shown on drawings. Use regular material except where special materials are shown or specified. Deposit backfill in uniform layers and compact each layer as specified.

- A Backfill at Structures - Place backfill as promptly as practicable after completion of each structure or portion of a structure. Do not, however, place backfill against concrete walls or similar structures until concrete has been cured at least 7 days. Where the top of walls are supported by slabs or intermediate walls, do not begin backfill operations until the slab or intermediate walls have been placed and the concrete has cured for a minimum of 7 days. Remove concrete forms before starting backfill and remove shoring and bracing as the work progresses. Take care to prevent

any wedging action of backfill against the structure. Step cut or serrat the slopes bounding the excavation as required to prevent wedging.

B Backfill of Pipe Trenches.

1. Do not backfill around pipe until the pipes have been inspected, tested and approved.
2. Use sand backfill in pipe trenches which will be beneath concrete slabs or footings. Place initial backfill in equal layers along both sides of the pipe and carefully tamp to specified compaction. Continue in this manner until the pipe is covered.

C Compacting Backfill - Place material in uniform layers of prescribed maximum thickness and wet or dry the material to approximately optimum moisture content. Compact with power-driven hand tampers to the prescribed density.

1. Regular and Select Material. Place in 8-inch maximum layers, loose measure. Compact to not less than 95 percent of maximum soil density as determined by ANSI/ASTM D 698.
2. Sand and Filter Material. Place in 6-inch maximum layers, loose measure. Compact to not less than 95 percent of maximum soil density as determined by ANSI/ASTM D 2049.
3. Cement Stabilized Sand. Place in 8-inch maximum layers. Compact to a dry density of 115 pounds per cubic foot.

3.05 DISPOSAL OF EXCESS MATERIAL

Dispose of excess or unsuitable material from the excavation off the job site.

END OF SECTION 02220

VOL 0095
PAGE 359

TRENCH EXCAVATION, BACKFILL, AND COMPACTING

PART 1. GENERAL

1.1 SUMMARY

- A. Perform trench excavation and backfill for pipeline construction.
- B. Work of this Section also includes:
 - 1. Replacing topsoil that contains regenerative material.
 - 2. Disposal of trees, stumps, brush, roots, limbs, and other waste materials from clearing operations.
 - 3. Imported topsoil.
 - 4. Crush rock backfill required by over-excavation.
 - 5. Imported pipe zone material.
 - 6. Trench settlement repair, including replacing roadway surfacing, sidewalk, or other structures.
 - 7. Replacing damaged culverts.
- C. Trench excavation is classified as common excavation and includes removal of material of whatever types encountered to depths shown or as directed by Engineer.
- D. Pipe zone includes full width of excavated trench from 4 inches below bottom of pipe to a point 6 inches above top outside surface of pipe barrel.
- E. Conform to federal, state, and local codes governing safe loading of trenches with excavated material.
- F. The right is reserved to modify the use, location, and quantities of the various types of backfill during construction as Engineer considers to be in the best interest of Owner.

1.2 RELATED SECTIONS

- A. Section 02100 - Site Preparation.
- B. Section 02200 - Earthwork.
- C. Section 02665 - Domestic Water System.
- D. Section 02730 - Sewage Collection System.

1.3 REFERENCES

- A. Texas Department of Transportation, Austin, Texas.
 - 1. Crushed Limestone Base Course.
- B. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
 - 1. ASTM D448 - Classifications for Standard Sizes of Aggregate and Bridge Construction.
 - 2. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb. (2.49-kg.) Rammer and 12-inch (304.8-mm) Drop.
 - 3. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-lb. (4.54-kg.) Rammer and 18-inch (457-mm) Drop.
 - 4. ASTM D2922 - Test Methods for Density of Soils and Soil-Aggregates in Place by Nuclear Method.
- C. Occupational Safety and Health Administration (OSHA) Standard for Excavation and Trenches Safety System, 29 CFR 1926, Subpart P = Excavations.

PART 2. PRODUCTS

2.1 FOUNDATION STABILIZATION

- A. Crushed gravel or crushed rock, free from dirt, clay balls, or organic material, well graded from coarse to fine, containing sufficient finer material for proper compaction, and meeting ASTM D448 Size No. 67 (Concrete Aggregate).

2.2 PIPE ZONE MATERIAL

- A. Select native material shall consist of fine loose earth or sand free from clods or rocks larger than 2-1/2 inches in any dimension and of proper moisture content for maximum consolidation.
- B. Crushed granular material conforming to ASTM D448, Size No. 67.
- C. Washed stone bedding size 1/4-inch to 3/4-inch.

2.3 COMMON FILL MATERIALS

- A. Material shall not contain pieces larger than 3 inches, and shall be free of roots, debris, or organic matter.

2.4 BEDDING MATERIAL

- A. Pea gravel, sand, or other locally available bedding material, as approved.

361

2.5 TRENCH BACKFILL

A. Granular Backfill:

1. Natural or artificial mixture of gravel and soil mortar uniformly well graded from coarse to fine.
2. AHTD Section 303 Class 3, Class 4, or Class 7 as specified in this Section.

2.6 PVC SEWER PIPE TRENCH

A. Class A: In general, Class A trench will be used in unsurfaced areas where subsequent trench settlement must be held to a minimum.

B. Class C: Class C trench will be used in unsurfaced areas where a high degree of compaction is not required and trench settlement is allowed to occur through the natural consolidation process.

C. Class D:

1. Class D trench will generally be limited to traveled roadways and crossings where final surfacing replacement will be made shortly after backfilling and subsequent trench settlement must be held to a minimum.
2. When directed by Engineer, Class D trench shall also be used under culverts; water, gas, irrigation, and sewer lines; buried telephone, power, and television cable; and other buried pipelines or cables that cross the excavated trench.
3. Use a minimum of 10 feet of Class D trench under crossings so constructed.

2.7 PVC FORCE MAIN, PVC WATER LINE, AND DUCTILE IRON WATER LINE PIPE TRENCH

A. Type I: In general, Type I trench will be used for all applications except traveled roadway crossings.

B. Type II:

1. Type II trench will generally be limited to traveled roadways and crossings where final surfacing replacement will be made shortly after backfilling and subsequent trench settlement must be held to a minimum.
2. Use a minimum of 10 feet of Type II trench under crossings so constructed.

2.8 COMPACTION EQUIPMENT

- A. Suitable type and adequate to obtain the amount of compaction specified.
- B. Operate in strict accordance with manufacturer's instructions and recommendations and maintain in such condition so that it will deliver manufacturer's rated compactive effort.

2.9 IMPORTED TOPSOIL

- A. Suitable sandy loam from an approved source.
- B. Must possess friability and a high degree of fertility.
- C. Free of clods, roots, gravel, and other inert material.
- D. Free of quackgrass, horsetail, and other noxious vegetation and seed.

PART 3. EXECUTION

3.1 PREPARATION

- A. Where clearing or partial clearing of right-of-way is necessary, complete prior to start of trenching.
- B. Cut trees and brush as near to surface of ground as practicable, remove stumps, and pile for disposal.
- C. Do not permit excavated materials to cover brush or trees prior to disposal.

3.2 DISPOSAL OF CLEARED MATERIAL

- A. Dispose of material in such a manner as to meet requirements of state, county, and local regulations regarding health, safety, and public welfare.
- B. Dispose of nonflammable and flammable material off the construction site in an approved location.
- C. Do not leave material on the Project site, place onto abutting private properties, or bury in embankments or trenches.

3.3 REMOVAL OF OBSTRUCTIONS

- A. Remove obstructions within trench area or adjacent thereto such as tree roots, stumps, abandoned piling, logs, and debris.

363

B. Engineer may, if requested, make changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the easement or right-of-way without adversely affecting the intended function of the facility.

C. Dispose of obstructions in accordance with this Section.

3.4 REMOVAL AND REPLACEMENT OF TOPSOIL

A. Where trenches cross lawns, garden areas, pasturelands, cultivated fields, or other areas on which reasonable topsoil conditions exist, remove topsoil for a depth of 6 inches for full width of trench to be excavated.

B. Use equipment capable of removing a uniform depth of material, such as a scraper or motor grader; a backhoe is not considered suitable.

C. Stockpile removed topsoil at regular intervals, and do not mix with other excavated material.

D. Locate stockpiles so that material of one ownership is not transported and stockpiled on property of another ownership.

E. Minimum finished depth of topsoil over trenches: 5 inches.

F. Imported topsoil may be substituted for stockpiling and replacing topsoil.

G. Maintain finished grade of topsoil level with area adjacent to trench until final acceptance by Engineer.

H. Repair damage to adjacent topsoil caused by work operations.
1. Remove rock, gravel, clay, and any other foreign materials from the surface.
2. Regrade.
3. Add topsoil as required.

3.5 TRENCH WIDTH

- A. Minimum width of unsheeted trenches in which pipe is to be laid shall be 18 inches greater than the outside diameter of the pipe, or as approved.
- B. Maximum width at top of trench will not be limited, except where excess width of excavation would cause damage to adjacent structures or property or cause undue stresses on the pipe.
- C. Confine trench widths to dedicated rights-of-way or construction easements, unless special written agreements have been made with affected property owner.

3.6 EXCAVATION SAFETY

- A. The Contractor shall be solely responsible for trench and excavation safety systems in accordance with City of Austin Specification 509 and OSHA requirements.

3.7 EXCAVATION

- A. Excavate trench to lines and grades shown or as established by Engineer with proper allowance for pipe thickness and for pipe base or special bedding when required.
- B. If trench is excavated below required grade, correct with foundation stabilization material.
- C. Place material over full width of trench in compacted layers not exceeding 6 inches deep to established grade with allowance for pipe base or special bedding.

3.8 PREPARATION OF TRENCH - LINE AND GRADE

- A. Do not deviate more than 1/2 inch from line or 1/2 inch from grade. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness.
- B. Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for pipe base when specified or indicated.
- C. Remove hard spots that would prevent a uniform thickness of bedding.
- D. Check the grade with a straightedge and correct irregularities found.

§ 365

- E. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

3.9 SHORING, SHEETING, AND BRACING OF TRENCHES

- A. Sheet and brace trench when necessary to prevent caving during excavation in unstable material or to protect adjacent structures, property, workers, and the public.
- B. Increase trench widths accordingly by the thickness of the sheeting.
- C. Maintain sheeting in place until pipe has been placed and backfilled at pipe zone.
- D. Remove shoring and sheeting as backfilling is done in a manner that will not damage pipe or permit voids in backfill.
- E. Conform to safety requirements of federal, state, or local public agency having jurisdiction for sheeting, shoring, and bracing of trenches; the most stringent of these requirements shall apply.

3.10 LOCATION OF EXCAVATED MATERIALS

- A. Place excavated material only within construction easement, right-of-way, or approved working area.
- B. Do not obstruct any private- or public-traveled roadways or streets.

3.11 REMOVAL OF WATER

- A. Provide and maintain ample means and devices to promptly remove and dispose of water entering trench during time trench is being prepared for pipe laying, during laying of pipe, and until backfill at pipe zone is completed.
 - 1. These provisions apply during the noon hour as well as overnight.
 - 2. Provide necessary means and devices, as approved, to positively prevent under any circumstances, water from entering the construction area of another contractor.
- B. Dispose of water in a manner to prevent damage to adjacent property.
- C. Drainage of trench water through the pipeline under construction is prohibited.

366

3.12 FOUNDATION STABILIZATION

- A. When existing material in bottom of trench is unsuitable for supporting pipe, excavate unsuitable material.
- B. Backfill trench to subgrade of pipe base with foundation stabilization material specified.
- C. Place foundation stabilization material over the full width of trench and compact in layers not exceeding 6 inches deep to required grade by making passes with a vibratory compactor (or equivalent).

3.13 ROCK IN PIPE TRENCH

- A. Where rock is encountered in bottom of trench, support pipe on bedding material.
- B. Minimum Bedding Thickness: 4 inches or one eighth of the outside diameter of pipe, minimum.
- C. Extend bedding up pipe sides one sixth of outside diameter of the pipe, minimum.
- D. Backfill over pipe according to pipe zone type.

3.14 PIPE ZONE BACKFILL

- A. Depth of the pipe zone above pipe barrel varies with pipe material.
- B. Particular attention must be given to area of pipe zone from flow line to centerline of pipe to ensure firm support is obtained to prevent lateral movement of pipe during final backfilling of pipe zone.
- C. Backfill area of pipe zone from bottom of pipe to horizontal centerline of pipe by hand-placing material around pipe in 4-inch layers.
- D. Effect continuous support beneath pipe haunches by "walking in" and slicing with shovel.
- E. Backfill area of pipe zone from horizontal centerline to top of pipe zone with pipe zone material as determined by class of backfill.
- F. In lieu of selected material for pipe zone in upper portion of pipe zone, imported pipe zone material approved by Engineer for trench backfill may be substituted.

VOL 0095
PAGE 367

367

- G. When, in opinion of Engineer, insufficient or unsuitable material exists at trench side for selected material for pipe zone in upper portion of pipe zone, provide suitable material from other trench excavation along pipeline or imported pipe zone material.

3.15 TRENCH BACKFILL ABOVE PIPE ZONE

- A. When backfill is placed mechanically, push backfill material onto slope of backfill previously placed and allow to slide down into trench.
- B. Do not push backfill into trench in such a way as to permit free fall of material until at least 2 feet of cover is provided over top of pipe.
- C. Under no circumstances allow sharp, heavy pieces of material to drop directly onto pipe or tamped material around pipe.
- D. Do not use backfill material of consolidated masses larger than 1/2 cubic foot.
- E. Class A Trench (Consolidated) for PVC Sewer Line:
 - 1. Use for dirt roadways, yard piping not to be graveled, and within 50 feet of river or stream banks.
 - 2. Backfill the trench above the pipe zone with excavated trench materials. Place in 6-inch layers and compact each layer by means of a vibratory compactor.
 - 3. Remove all boulders and stones 2 inches in diameter and larger from material used for backfill in the upper 12 inches of Class A backfilled trenches.
 - 4. Where Class A trench is specified in areas where topsoil conditions exist, replace topsoil in the top 5 inches of the trench.
 - 5. Rake to match ground surface adjacent to trench.
 - 6. Remove trash, construction debris, materials, brush, and other foreign objects.
 - 7. Maintain surface of backfilled trench level with existing grade until entire Project is accepted by Owner.
 - 8. Settlement of finished surface during warranty period shall be considered to be a result of improper or insufficient compaction and shall be promptly repaired.

96001

368

F. Class C Trench (Normal) for PVC Sewer Line:

1. Use in application areas with low erosion potential.
2. Backfill trench above pipe zone with excavated trench materials.
3. In untraveled areas on private or public street or road rights-of-way, leave trench with backfill material neatly mounded not more than 6 inches above existing ground for entire width of trench.
4. In lawn or garden areas, backfill trench and maintain it level with existing adjacent grade.
5. In other locations, estimate and provide amount of backfill material required so that after normal settlement finished surface will meet existing grade.
6. Neatly windrow material over trench, and remove excess.
7. Where Class C trench is specified in areas where topsoil conditions exist, replace topsoil in top 5 inches.
8. Any excess or deficiency of backfill material which becomes apparent after settlement and within warranty period shall be corrected by regrading, disposal of excess material, and adding additional material where required.
9. Remove rocks larger than 2 inches from upper 8 inches of backfill.
10. Remove trash, construction debris, materials, brush, and other foreign objects.

G. Class D Trench (Roadways) for PVC Sewer Line.

1. Use under asphalt, concrete, or gravel roadways or drives.
2. Backfill trench above pipe zone with granular backfill material as specified in lifts not exceeding 8 inches loose depth.
3. Compact each lift with mechanical vibrating or impact tampers.
4. Maintain surface of backfilled trench level with existing grade with granular backfill material until pavement replacement is completed or entire Project is accepted by Owner.
5. Subsequent settlement of finished surfacing during warranty period shall be considered to be a result of improper or insufficient compaction and shall be promptly repaired.

H. Type I Trench (Normal) for PVC Force Main, PVC Water Line, and Ductile Iron Pipe Trenches:

1. Use in application areas with low erosion potential.
2. Backfill trench above pipe zone with excavated trench materials.
3. In untraveled areas on private or public street or road rights-of-way, leave trench with backfill material neatly mounded not more than 6 inches above existing ground for entire width of trench.
4. In lawn or garden areas, backfill trench and maintain it level with existing adjacent grade.
5. In other locations, estimate and provide amount of backfill material required so that after normal settlement finished surface will meet existing grade.
6. Neatly windrow material over trench, and remove excess.
7. Where Type I trench is specified in areas where topsoil conditions exist, replace topsoil in top 5 inches.
8. Any excess or deficiency of backfill material which becomes apparent after settlement and within warranty period shall be corrected by regrading, disposal of excess material, and adding additional material where required.
9. Remove rocks larger than 2 inches from upper 8 inches of backfill.
10. Remove trash, construction debris, materials, brush, and other foreign objects.

I. Type II Trench (Roadways) for PVC Force Main, PVC Water Line, and Ductile Iron Pipe Trenches:

1. Use under asphalt, concrete, or gravel roadways or drives.
2. Backfill trench above pipe zone with granular backfill material as specified in lifts not exceeding 8 inches loose depth.
3. Compact each lift with mechanical vibrating or impact tampers.
4. Maintain surface of backfilled trench level with existing grade with granular backfill material until pavement replacement is completed or entire Project is accepted by Owner.
5. Subsequent settlement of finished surfacing during warranty period shall be considered to be a result of improper or insufficient compaction and shall be promptly repaired.

3.16 EXCESS EXCAVATED MATERIAL

- A. Dispose of excess excavated material off project site in an approved area.

370

3.17 PIPE COVER

- A. Place select material from excavation over pipe to provide minimum cover, as shown on Drawings or as directed by Engineer.

3.18 SETTLEMENT

- A. Correct settlement noted in backfill, fill, or in structures built over backfill or fill within warranty period.

END OF SECTION

371

BASE FOR ASPHALT PAVING**PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Materials, labor, and equipment necessary to provide natural or processed aggregate for use as a base for asphalt paving.

1.02 REFERENCES

- A. Texas State Department of Highways and Public Transportation (TSDHPT) Standard Specifications.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Crushed Limestone Base - Item 248, Type A, Grade 2 of the TSDHPT, Standard Specifications.

PART 3 EXECUTION**3.01 BACKFILLING**

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy sub-grade surfaces.
- C. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
- D. Employ a placement method that does not disturb or damage foundation dampproofing.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- G. Make grade changes gradual. Blend slope into level areas.
- H. Remove surplus backfill materials from site.
- I. Leave fill material stockpile areas completely free of excess fill materials.
- J. Provide not less than 10" thick base beneath scheduled asphalt paving areas.

3.02 TOLERANCES

- A. Top surface of Backfilling. Under paved areas plus or minus one inch from required elevations.

3.03 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.
- B. Provide for visual inspection of bearing surfaces.

3.04 PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

END OF SECTION

SECTION 02231

BASE FOR CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Materials, labor, and equipment necessary to provide natural or processed aggregate for use as a base for concrete paving.

1.02 REFERENCES

- A. Geotechnical, labor, and equipment necessary to provide natural or processed aggregate for use as a base for concrete paving.
- B. Texas State Department of Highways and Public Transportation (TSDHPT) Standards Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Scarified and Recompacted Sub-grade: Re-use existing on-site soils.

PART 3 EXECUTION

- 3.01 Exposed surface should be scarified to a depth of 6 inches and recompact.
- 3.02 All vegetation should be removed to a depth of 6 inches.
- 3.03 Prior to depositing concrete, the soil should be in a moist condition.
- 3.04 Course Sand as a leveling material shall not be used.

END OF SECTION

SECTION 02250**COMPACTION CONTROL AND TESTING****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Materials, labor, and equipment necessary to provide compaction of existing or imported soils.
- B. Areas included: building foundations, slabs, and paving.

1.02 REFERENCES

- A. Texas State Department of Highways and Public Transportation (TSDHPT) Test Method TEX-113-E
- B. TSDHPT Test Method TEX-114-E
- C. ANSI/ASTM D698

1.03 SUBMITTALS

- A. Testing Laboratory shall submit 3 copies of Moisture/Density Curves for each soil type.
- B. Testing Laboratory shall submit 3 copies of Field Density Reports for each test performed.

1.04 QUALITY CONTROL

- A. Testing Laboratory shall be allowed to secure necessary samples of proposed soil types for testing to insure conformance to specification requirements.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

- 3.01** Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Architect if soil density tests indicate inadequate compaction.
- 3.02** Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with applicable procedures.
 - A. Under structures, building slabs and steps: Proofroll subgrade. Each layer of backfill or fill material at 95 % maximum density at 2% of optimum moisture as defined in ASTM D698.

- B. Pavement Subgrade under Base Material: compact upper 6 inches to 95% maximum dry density at 2% optimum moisture as defined by TEX-114-E.
 - C. Base material under Asphalt Paving: upper 6 inches to 100% maximum dry density at 2% optimum moisture as defined by TEX-113-E.
 - D. Existing subgrade for Concrete Paving: Compact to 95% maximum dry density at 2% optimum moisture as defined by TEX-114-E.
 - E. Under lawn or unpaved areas: compact top 6 inches of subgrade and each layer of backfill or fill material to 90% maximum density at 2% of optimum moisture as defined in ASTM D698.
 - F. Under walkways, compact top 6 inches of subgrade and each layer of backfill or fill material to 95% maximum density at 2% of optimum moisture as defined in ASTM D698.
- 3.08** Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
- 3.09** Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
- 3.10** Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.
- 3.11 FIELD QUALITY CONTROL**
- A. Quality Control Testing During Construction: Allow testing services to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.
 - B. Perform field density tests in accordance with ASTM D698 and TDH TEX-113-E, as applicable.
 - C. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.
 - D. Paved Areas and Building Slab Fill: Perform at least one field density test of subgrade for every 2,000 sq. ft. of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, perform one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case fewer than three tests.
 - E. Foundation Wall Backfill: Perform at least two field density test at locations and elevations as directed.
- 3.12** If in opinion of Architect, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

SECTION 02260
FINISH GRADING

VOL 0095 PAGE 377

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide all required finish grading specified herein and/or shown on the drawings.

1.02 RELATED SECTIONS

- A. Section 02111 - Tree and Shrub Protection
- B. Section 02200 - Earthwork
- C. Section 02210 - Site Grading

1.03 QUALITY ASSURANCE

- A. Provide proper controls to assure the achievement of the intent and requirements indicated on the drawings.
- B. Employ the Engineer of Record to determine the accuracy and adequacy of finish grading efforts. Correct any deficiencies noted by the engineer.

1.04 SUBMITTALS

- A. Provide a certified copy of the finish grading survey signed by a surveyor licensed in the State of Texas indicating compliance with the requirements of the grading plan.
- B. Submit 1/2 cubic foot of proposed top soil material for Architect's approval prior to ordering or placing on site.

1.05 TOLERANCES

- A. Final Gradient Minimums shall be as follows:
 - 1. Not less than 1/2% for concrete surfaces.
 - 2. Not less than 1 1/2% for asphalt surfaces.
 - 3. Not less than 1 1/2% for grassed surfaces.

PART 2 PRODUCTS

- A. Existing Soil: With the Architects permission, portions of the existing top layers of soil which have been removed during rough grading operations may be utilized for finish grading operations. However, no existing soil comprised of large clay lumps, rocks, roots, or other non-friable material will be permitted for use in finish grading operations. No existing materials may be used for the final 4" of fine grading operations.

877

377

- B. Top Soil: Approved soil, fertile, friable, and loamy without subsoil, clay, or stones and suitable for the growth of plants and grass. It shall contain considerable amounts of decomposed vegetable matter, finely divided and readily discernible by visual inspection but in no case less than 2 percent by weight.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Construct fills as necessary to bring existing soils or rough graded areas to final grades indicated on drawings.
- B. Backslope fills shall extend a minimum of 2 feet (3 feet for fills over 6 feet high) horizontally before sloping downward at one on two backslope to natural soil. Backslope fill shall be compacted as specified for structural backfilling.
- C. Top soil shall be placed without excessive compaction to allow for permanent plant growth to occur and proper water percolation.
- D. Final completion of top soil placement shall include fine grading utilizing hand raking to remove any miscellaneous clods, rock, or debris.
- E. Top soil placement and finish grading efforts shall be cognizant of the intent and requirements indicated on the grading plan to such extent as to allow for the installation of grass and plant bed mulching without these occurrences having a detrimental effect on the proper flow and coursing of surface storm water drainage.

END OF SECTION

02270-1

SECTION 02270**SLOPE PROTECTION AND EROSION CONTROL****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide all required erosion protection devices, both permanent and temporary, as shown on the drawings and/or specified herein.

1.02 RELATED SECTIONS

- A. Section 02100 - Site Preparation
- B. Section 02200 - Earthwork

1.03 QUALITY ASSURANCE

- A. Erosion protection devices shall be constructed and installed in a manner sufficient to provide proper and complete protection of graded surfaces and natural terrain to prevent adverse erosion or destruction resultant from storm water run-off.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Temporary materials shall consist of the following:
 - 1. Silt fencing:
 - a. Steel posts 36 " long, minimum, 2" diameter.
 - b. Woven wire fabric support, galvanized material.
 - c. Silt fence fabric to be rot resistant material, mesh design, to allow water passage but limit passage of soil, silt, and other deleterious run-off materials, as approved by the Architect or Engineer.
 - 2. Rock berms:
 - a. Constructed of open-graded rock, with most of the fines removed.
 - b. Rock shall be crushed and, unless otherwise specified, shall be at least three inches in diameter and less than 1 cubic foot in volume.
- B. Permanent materials consisting of the following:
 - 1. Sod:
 - a. St. Augustine grass sod.
 - 2. Hydromulch (Spring/Summer Installation)
 - a. Bermuda
 - 3. Hydromulch (Fall/Winter Installation)
 - a. Rye

PART 3 EXECUTION**3.01 INSTALLATION - TEMPORARY MEASURES**

- A. Silt Fence:
1. Steel support posts shall be installed at a maximum spacing of 8 feet on center. Posts shall be set with a backslope toward the anticipated runoff source.
 2. Attach woven wire fabric to posts in a manner sufficient to assure continued attachment for the duration of the use of the silt fence and for proper support of the silt fabric.
 3. Place silt fence fabric over both sides of the woven wire fabric, place in 6 inch deep by 3-4 feet wide trench, and backfill over fence with rock and gravel. Securely attach silt fence material to woven wire back-up.
 4. Inspect silt fence frequently to insure continuation of installation.

3.02 INSTALLATION - PERMANENT MEASURES

- A. Sod:
1. Place St. Augustine sod for 24" to each side of and 96" beyond the end of all concentrated run-off areas, and at the terminus of all downspout splashblocks, unless otherwise directed.
- B. Hydromulch:
1. Place hydromulch grass seed in all areas where natural vegetation has been disturbed by construction and grading activities. In the event construction scheduling requires use of winter rye hydromulch Contractor shall return to the site the following spring and install permanent Bermuda hydromulch.

3.03 MAINTENANCE

- A. Contractor shall periodically inspect silt fence installation to assure continued integrity of the installation. Make any repairs necessary. Remove any silt build-up which has accumulated to a depth of 6 inches or more and dispose of in a manner which will not contribute to additional siltation.
- B. Remove silt which has reached a depth equal to one-third the height of the rock berms, or 1 foot, whichever is less, and dispose of in a manner as to not create further siltation.
- C. Contractor shall properly and sufficiently keep sod and hydromulch watered to assure root development and growth of grass. Replace any and all areas which fail to properly germinate and produce plant growth. Maintenance shall continue up to and until the time of Final Acceptance by the Owner.

3.04 CLEAN UP

- A. Remove all temporary drainage control structures as soon as the site is completely stabilized, and final inspection of the site has been performed by the Engineer of Record.

END OF SECTION

SECTION 02281**SOIL TREATMENT/TERMITE CONTROL****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide all required soil treatment and termite control specified herein.

1.02 RELATED WORK

- A. Section 02200 - Earthwork
- B. Section 02210 - Site Grading
- C. Section 02260 - Finish Grading

1.03 QUALITY ASSURANCE

- A. Provide proper controls to assure the achievement of the intent and requirements indicated.

1.04 SUBMITTALS

- A. Provide data from pest control operator indicating proposed materials and chemicals for use in spot termite control.

1.05 CERTIFICATION

- A. At the completion of termite control operations, provide a certified statement from the applicator indicating the chemicals used, their amounts, and the date of application.

PART 2 PRODUCTS

- A. Chemicals: Only those approved by the State of Texas Structural Pest Control Board and the Federal Environmental Protection Agency.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Provide termite control only in areas beneath the floor slab where the polyethylene vapor barrier has been punctured and where pipes or conduits penetrate through the vapor barrier.

END OF SECTION

SECTION 02372
DRILLED SHAFT FOUNDATIONS

PART 1 GENERAL

1.01 DESCRIPTION

This section covers requirements for the construction of circular cast-in-place reinforced concrete shafts, extending into the earth, for foundations. The foundations may be shafts with underreamed concrete footings or the foundations may be straight shafts without footings. Drawings show size and type required. Also included in this section is the disposal of excavated material.

1.02 RELATED WORK

- A Division 1 - General Requirements.
- B Division 2 - Site Work . Structural Excavation, Fill and Backfill.
- C Division 3 - Concrete.
 - 1. Concrete Reinforcement.
 - 2. Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A American Society for Testing and Materials (ASTM) (ANSI/ASTM).
 - 1. ANSI/ASTM A 36 - Standard Specifications for Structural Steel.
 - 2. ANSI/ASTM A 252 - Standard Specifications for Welded and Seamless Steel Pipe Piles.
 - 3. ASTM D 1143 - Standard Method of Testing Piles Under Axial Compressive Load.

1.04 SUBMITTALS

- A Related Work - Provide submittals as specified in related work sections.
 - 1. Division 3 - Concrete.
 - a. Concrete Reinforcement.
 - (1) Shop drawings.
 - (2) Bill of materials.
 - (3) Reinforcing steel mill certificates.

S&S 7800

- b. Cast-in-Place Concrete.
 - (1) Concrete mix design.
 - (2) Admixture data.
 - (3) Cement mill certificates.

B Drilling Record - Upon completion of the drilled shaft foundation work, submit two copies of the drilling records to the Engineer. Maintain a copy of the drilling records at the construction site. Do not construct cap, pilaster, grade beam, column or slab, as applicable, on top of drilled shaft foundation until the drilling records have been reviewed by the Engineer. Records must show the following as-built information:

1. Shaft identification mark and location.
2. Deviation from plan location and alignment.
3. Date of drilling.
4. Size of shaft.
5. Elevation of bottom of foundation.
6. Elevation of top of pier.
7. Bearing strata description.
8. Length and location of any casing left in place.
9. Length and location of any casing used and withdrawn.
10. Nature and location of any obstructions encountered.
11. Water conditions during drilling and concrete operations.

1.05 QUALIFICATIONS AND EQUIPMENT

Excavation under this section must be executed by a foundation driller experienced and equipped to perform drilled shaft foundation work as required. Use equipment and tools specially designed for drilling and shaping foundations to depth, size and section shown.

1.06 EXISTING UTILITIES

Notify the Engineer when any sewer, water, gas, electric or other utility lines are encountered during drilling operations. Protect such utility lines from damage. Suspend drilling operations until satisfactory arrangements are made with the proper authorities for removal, relocation or tapping of the line.

1.07 NOTIFICATION OF DRILLING OPERATIONS

Notify the testing laboratory at least 48 hours prior to placing any drilled shaft foundation concrete. After notification, the Contractor shall keep the Testing Laboratory informed of any changes regarding the drilling schedule.

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1.08 CHANGES IN DEPTHS OF FOOTINGS

- A Top and bottom of pier elevations are shown on the drawings for bid purposes. The bottom of footing elevations are based on the expected profile of the tan to dark tan limestone layer into which the piers are typically founded.
- B If the total installed vertical lineal footage of drilled shafts, computed for the project drilled shafts as a group for a given size, exceeds or is less than the total lineal footage computed on the basis of the top and bottom shaft elevations shown on the drawings for the shafts as a group, the contract price will be adjusted under a change order as provided in the General Conditions of the Contract. The unit prices furnished by the Contractor in the Bid Form, to be used in computing the adjustment, shall include all costs for the drilled shaft installation, including, but not necessarily limited to, the cost of drilling concrete, concrete placement and reinforcing steel.
- C Depths of shafts will be measured from bottom of shaft to the upper termination of the shafts at the grade beam, pilaster, cap or slab, as applicable. The total vertical lineal footage of shafts for a given size will be equal to the sum of the depths of all piers within the group for that size.

PART 2 PRODUCTS**2.01 CONCRETE**

Class A (3,000 psi) concrete conforming to requirements in Division 3 - Concrete, Cast-in-Place Concrete. Air entraining will not be required for concrete in drilled shaft foundations. Where concrete is placed in a temporary casing, provide concrete with a minimum slump of 5 inches and a retarder admixture to prevent arching of concrete during pulling of the casing or setting of concrete until after the casing has been pulled.

2.02 REINFORCING STEEL

Reinforcing steel shall conform to requirements of Division 3 - Concrete Reinforcement.

2.03 METAL CASING

- A Temporary Metal Casing

1. Use watertight circular steel tubes with ample wall thickness and strength to withstand handling stresses, the pressure of concrete, and the pressure of the surrounding earth and water without distortion. The outside diameter of the casing shall be at least as large as the nominal shaft diameter. Casings to be removed after placement of concrete shall be smooth and well oiled.
2. The cost of the temporary casing will be considered additional work paid by change order as provided for in the General Conditions. All temporary casing shall be approved by the Engineer prior to installation.

PART 3 EXECUTION

3.01 WEATHER CONDITIONS

Drill only when weather permits. Do not start drilling during inclement weather or when weather conditions will prevent completion of the excavation and placement of concrete within the specified time.

3.02 DRILLING

- A Drill foundations to elevations or depths shown on the drawings or to an elevation of approved bearing as directed by the Engineer or Testing Laboratory. If, at the specified depth, the foundation will not be founded in the acceptable bearing strata shown on the drawings, notify the Engineer before placing concrete. Raise or lower the bottom elevations of the foundations as directed by the Engineer or Testing Laboratory.
- B Drill foundations within the following tolerances:
 1. Drilled shaft diameter: $\frac{1}{2}$ inch, +2 inches.
 2. Maximum deviation permissible from indicated location: $\frac{1}{12}$ of shaft diameter or 3 inches, whichever is less.
 3. Top of concrete shaft elevation: +0 inch to -1 inch.
 4. Maximum deviation from true vertical alignment for vertical shafts: $\frac{1}{8}$ inch per foot of depth.
- C When the as-built foundation is not within specified tolerances, the foundation may require modifications, by adding drilled shaft foundations or other methods, to properly resist the design forces. Corrective measures must be approved by the Engineer and provided by the contractor at no additional cost.
- D Notify the Engineer of any unusual conditions encountered during drilling and underreaming operations.

- E Maintain a drilling record for each drilled shaft foundation. The drilling record shall contain the information specified in the Submittals paragraph of this section.
- F Casings.
 - 1. Use temporary steel casings wherever needed to prevent sloughing or caving of the excavation or to prevent the inflow of ground water. They shall extend sufficiently above the top elevation of the finished shaft to allow excess concrete to be placed for the anticipated slump due to the casing removal. The diameter of excavation for temporary steel casing shall be such as to create a minimum of void space outside the casing.
- G Do not allow the interval between completion of the excavation and placement of concrete to exceed 2 hours. Do not leave any excavation open overnight.
- H Fill excavations that are damaged by cave-ins or that are not within specified tolerances with select material compacted to at least the density of adjacent soil. Redrill, using temporary casing, as directed by the Engineer. Corrective work shall be provided without additional cost to the Owner.
- I Should ground water inadvertently enter the excavation, pump out the water and clean the hole at no additional cost to the contract. If casing is required to control ground water, an adjustment in the contract sum will be made under a change order as provided in the General Conditions of the Contract.

3.03 CLEANING AND INSPECTION

- A Immediately after completing an excavation, clean all loose earth and water from the sides and bottom.
- B Provide suitable access and lighting to permit inspection of the completed foundation excavation, including checking dimensions and alignment of drilled shafts. All excavations shall be inspected from the top.

3.04 REINFORCEMENT

- A Fabricate a reinforcing steel unit for each shaft consisting of longitudinal bars and lateral ties as shown on the drawings. Completely assemble and place in position as a unit. Tie vertical bars to lateral tie bars at all intersections.

- B Exercise care in placing reinforcement in the excavation. Prevent displacement of earth from excavation sides. If displacement occurs, remove reinforcing and clean the excavation.
- C Support the lower end of each vertical bar upon a brick or suitable precast concrete spacer block or suspend the reinforcing cage from the top to maintain the clear cover required at the bottom of the shaft. Provide side spacer concrete blocks wired at intervals along the reinforcing cage to ensure concentric spacing for the entire depth of the shaft.
- D Where the foundation bottom elevation is lowered from planned depth, splice vertical bars at the bottom with a minimum lap of 36 bar diameters.
- E Place each reinforcing steel unit immediately before concreting operations.

3.05 CONCRETE PLACEMENT

- A Generally, placement of concrete in drilled piers by free fall will be acceptable if the concrete is directed down the center of the shaft without hitting the sides or reinforcing. However, if concrete is not being directed down the center of the shaft, the Engineer, at his discretion, may require the use of a tremie or delivery tube. The delivery tube shall limit concrete free fall from the end of the tube to a maximum of 5 feet. Do not use an aluminum delivery tube. Make provisions for raising the tube as placement progresses. The tube or tremie may be made in sections to provide proper discharge and permit raising it as the placement progresses. Do not start placement until sufficient concrete is available to completely fill the excavation. Place concrete continuously from start to completion.
- B Where shafts are not cased, vibrate the upper 5 feet during placing operation. Where shafts are encased in temporary casing, do not vibrate the concrete until after the casing has been removed. After the casing has been removed, vibrate the top 5 feet of concrete.
- C During placement of concrete, and until concrete has set, provide protection around the top of excavation to prevent entry of soil or other foreign matter.
- D Removal of Casings.
 - 1. Temporary casings may be withdrawn using one of the following methods:
 - a. Withdraw casing after all concrete has been placed in the shaft.

- b. Withdraw casing as shaft is filled with concrete. Maintain adequate head of concrete above the bottom of the casing to balance outside soil and water pressure at all times during withdrawal.
 - 2. Avoid vibrating concrete until after casing is pulled.
 - 3. Pull casing before slump decreases below 5 inches as determined by testing. The casing may be broken free of the bottom seal by a 2-to 4-inch jerk. The casing shall then be extracted at a slow, uniform rate using a truly vertical pull.
 - 4. If any upward movement of concrete or reinforcing steel occurs during pulling, stop pulling operations immediately. Leave the casing in place, consolidate the concrete by rodding and vibrating, and cut off the top of the casing at the top elevation of the shaft.
 - 5. No extra payment will be made for casings left in place or additional concrete required to fill an oversize casing or oversize excavation.
- E When casing is left in place, fill void spaces between casing and shaft excavation with concrete or fluid grout by means of grout pipe and pump pressure as required.
- F Depositing concrete in water will not be permitted. Water accumulation in excess of 2 inches shall be pumped out prior to placement of concrete.

3.06 CONCRETE TESTING AND CONTROL

Testing and control of concrete mix design and field test cylinders shall conform to the requirements of Division 3 - Concrete, Cast-in-Place Concrete. A set of field test cylinders shall be made for every 10 drilled shaft foundations, but not more than one set per truck, and not less than one set per day.

3.07 DISPOSAL OF EXCAVATED MATERIAL

Dispose of excavated material not used as backfill around foundations in accordance with the section on Structural Excavation, Fill and Backfill.

END OF SECTION 02372

SECTION 02440

SITE IMPROVEMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, equipment, and supplies required for proper installation and completion of all work associated with specified site improvements.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 02452: Site Signage.
- C. Section 03300: Cast In Place Concrete.
- D. Section 05050: Metal Fasteners.
- E. Section 05500: Metal Fabrications.
- F. Section 09900: Painting.

1.03 QUALITY ASSURANCE

- A. Install all site improvements in strict accordance with manufacturer's recommendations and all specified criteria.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02441**UNDERGROUND SPRINKLER SYSTEMS****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide an automatic underground sprinkler system as hereinafter specified.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions
- B. Division 0
- C. Division 1
- D. Section 02010 - Subsurface Investigation
- E. Section 02011 - Geotechnical Report
- F. Section 02200 - Earthwork
- G. Section 02260 - Finish Grading
- H. Section 02480 - Landscaping; and all related subsections.

1.03 SUBMITTALS

- A. Submit descriptive data under the provisions of Section 01340.
- B. Provide a plan showing the proposed location of all lines and sprinkler heads. Additionally, provide the following:
 - 1. Manufacturer's catalog sheet showing full specifications of each type sprinkler used, i.e. discharge in GPM, minimum allowable spacing and distance of throw (coverage).
 - 2. Detailed pressure loss computations based on the consumption of the proposed sprinkler. The detailed pressure loss computations must encompass the following:
 - a. A total design pressure of not more than 50 PSI and not less than 20PSI. (Design pressure is defined as maximum pressure required to overcome all pressure losses and leave residual pressure at the sprinkler not less than the manufacturer's specified minimum pressure requirement.
 - b. Pressure loss computations must be based on acceptable table of pressure losses for the type and size pipe to be used.
 - c. As all pressure loss tables are for straight pipe only, an acceptable allowance must be made of the additional losses incurred in fittings.
 - d. Allowance must be made for the pressure drop through all valves based on the specifications of the manufacturer of each type valve.

1.04 QUALITY CONTROL

- A. The entire sprinkler system shall be guaranteed by the Contractor as to materials and workmanship, for a period of one year following date of final acceptance of the work.

- B. Should any operation difficulties in connection with the sprinkler system develop within the specified guarantee period, which in the opinion of the Owner and the Architect may be due to inferior materials and/or workmanship, said difficulties shall be immediately corrected by the Contractor to the satisfaction of the Owner and the Architect, at no additional cost.

PART II PRODUCTS

2.01 MATERIALS

- A. Abbreviations
 P.V.C. Polyvinyl Chloride
 N.S.F. National Sanitation Foundation
 P.S.I. Pounds Per Square Inch
 I.P.S. Iron Pipe Size
- B. P.V.C. Pipe: Extruded from 100% virgin unplastic Type 1, medium Impact Polyvinyl Chloride, continuously and permanently marked with the manufacturer's name, pipe size, class or schedule, type and number, established by commercial standards. All pipe is to be Class 200 as manufactured by Lasco or acceptable equal, except 1/2 inch pipe which shall be Class 315.
- C. Fittings: Unplasticized Polyvinyl Chloride with a working pressure no lower than that of the pipe. All fittings are to be as manufactured by Lasco or approved equal. Fittings shall be Schedule 40 when joining PVC to PVC or PVC to metal. Nipples shall be polyethylene.
- D. Sprinklers: Series 570HP spray heads as manufactured by Toro or approved equal.
- E. Automatic Controller: Wall mount model R418PR by Richdel or approved equal, enclosed in a housing having a hinged cover with lockable latch, 115VAC, 60 Hz. with secondary 24VAC, 60 Hz. Valve circuitry shall be protected by self-stripping thermal type circuit breaker with push button reset operable from face panel.
- F. Electrical Remote Control Valves: Toro globe type Electric Valve or approved equal. Operation shall be accomplished by means of integrally-mounted heavy duty 24VAC solenoid complying with the National Electrical Code 11 Circuit.
- G. Wire: Underwriters approved for direct underground burial on NEC Class II circuits (30 volts AC, or less), American wire gauge No. 16 with 4/64 inch vinyl insulation minimum.
- H. Valve Boxes/Hose Bibb Receptacles: Thermoplastic 12 inch x 18 inch x 24 inch meter box with green color thermoplastic locking lid. Remote control valve box: 9 inch round thermoplastic valve box.
- I. Vacuum Breakers: 3/4 inch Febco Double Check Valve or approved equal.

PART III EXECUTION

3.01 EXCAVATION

- A. The Contractor shall layout and verify all dimensions on the site prior to proceeding with work under this section.

- B. Extreme care shall be exercised in excavating and working near existing utilities.
- C. Trenches shall be dug straight and pipe shall have the continuous support of the ditch bottom and shall be laid to an even grade. Trenching excavating shall follow the layout submitted by the Contractor on his drawings.
- D. All pressure supply lines shall have a depth of 12 inches minimum.
- E. All non-pressure lines shall have a depth of 8 inches minimum.

3.02 INSTALLATION

- A. The Contractor shall, before starting the work on the sprinkler system, carefully check all finish grades to satisfy himself that he may proceed with the work.
- B. The Contractor shall coordinate his work with the work related to finish grading of the project.
- C. The Contractor shall connect to the water source as indicated on the landscape drawings.
- D. The irrigation system shall be constructed using the sprinklers, valves, piping, fittings, etc. of sizes and types as shown on the submittals supplied by the Contractor.
- E. No multiple assemblies shall be installed on plastic lines. Each assembly shall be provided with its own outlet.
- F. The Contractor shall install all assemblies in accordance with the best standard practice and to the satisfaction of the Architect.
- G. Do not lay pipe in water or mud. Keep ends of pipe securely closed when work is not in operation to prevent water or other matter from entering the lines.
- H. Clean interior of pipe thoroughly and remove all dirt or foreign matter before lowering pipe into trench and keep clean during operation by plugs or other methods. The ends of all pipe shall be reamed out full size. All offsets shall be made with fittings. All water lines shall be thoroughly flushed out before the heads are installed.
- I. Long runs of PVC pipe shall be slightly snaked in the trench to allow for contraction.
- J. Replace any pipe that is found to be defective, without additional cost to the Owner.
- K. Backfill for trenching shall be compacted to dry density equal to the adjacent undisturbed soil and shall conform to the adjacent grades without dips, sunken areas, humps, or other irregularities. Initial backfill on all lines shall be fine granular material with no foreign matter larger than 1/2 inch in size.
- L. Contractor shall be responsible for any settling of trenches from his work.
- M. Valve wire hook up shall be soldered or joined by positive mechanical connectors such as "Pentite/PT" series as manufactured by Rain Bird Sprinkler Corporation or equal, properly insulated and waterproofed.
- N. Backflow preventer as required by local regulations.

3.03 ADJUSTMENT & TESTS

- A. Upon completion of each phase of the work, the Contractor shall check and adjust the height and spray of each sprinkler head to meet the site requirements.
- B. Contractor shall completely check and adjust the entire system after the installation of landscape materials and make any necessary repairs required to complete this work.
- C. Contractor shall notify the Architect, in writing, upon completion of the work.
- D. The entire piping system shall be tested under normal working pressure for a period of 48 hours. If leaks occur, the joints shall be replaced and the tests repeated.
- E. All tests shall be completed prior to backfilling, however, sufficient backfill material may be placed in trenches between fittings to insure the stability of the line under pressure. In all cases, fittings and couplings must be open to visual inspection for the duration of the test.
- F. Tests shall be observed and approved by the Architect or his designated representative prior to backfill.

3.04 TEMPORARY REPAIRS

- A. The Owner reserves the right to make temporary repairs as necessary to keep the sprinkler system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibility under the terms of the guarantee as herein specified.

END OF SECTION

CHAIN LINK FENCES AND GATES**PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Fence framework, fabric, and accessories.
- B. Excavation for post bases.
- C. Concrete anchorage for posts and center drop for gates if required by drawings.
- D. Manual gates and related hardware.

1.02 RELATED WORK

- A. Section 03300: Cast-In-Place Concrete
- B. Section 05500: Metal Fabrications

1.03 REFERENCES

- A. ANSI/ASTM A123 - Zinc (Hot Galvanized) Coatings of Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.
- B. ANSI/ASTM B429 - Aluminum-Alloy Extruded Structural Pipe and Tube.
- C. ANSI/ASTM F567 - Installation of Chain-Link Fence.
- D. ASTM A120 - Pipe, Steel, Black and Hot-dipped Zinc-coated (Galvanized) Welded and Seamless, for Ordinary Uses.
- E. ASTM A428 - Weight of Coating on Aluminum-coated Iron or Steel Articles.
- F. ASTM A585 - Aluminum Coated Steel Barbed Wire.
- G. ASTM C94 - Ready-mixed Concrete.
- H. FS RR-F-191 - Fencing, Wire and Post, Metal.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in commercial quality chain link fencing with two years experience.
- B. Installation: ANSI/ASTM F567.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorage's, and schedule of components.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS/SUPPLIERS**

- A. Allied Fence Company.
- B. Viking Fence Company.
- C. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Framework: ASTM A120; Schedule 40 steel pipe, standard weight, one piece without joints.
- B. Fabric: FS RR-F-191 Type I - zinc-coated steel.

2.03 CONCRETE MIX

- A. Concrete: As specified in Section 03300.

2.04 COMPONENTS

- A. Line Posts: 2.38 inch diameter steel pipe.
- B. Corner and Terminal Posts: 3.5 inch steel pipe.
- C. Gate Posts: 3.5 inch diameter steel pipe.
- D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled steel pipe.
- E. Gate Frame: 1.66 inch diameter steel pipe for welded fittings and truss rod fabrication.
- F. Fabric: 2 inch diamond mesh steel wire, interwoven, 9 11 knuckle end closed.
- G. Caps: Steel or malleable iron, galvanized; sized to post dimension, set screw retained.
- H. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings: Steel.
- I. Tension Wire: 6 gage thick steel, single strand.
- J. Gate Hardware: Fork type latch with gravity drop; Center gate stop and drop rod; Mechanical keepers; two 180 degree gate hinges per leaf, and hardware for padlock.

2.05 FINISHES

- A. Galvanized: ANSI/ASTM A123; 1.8 oz/sq. ft coating.
- B. Accessories: Same finish as framing.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install framework, fabric, accessories and gates in accordance with ANSI/ASTM F567.
- B. Provide fence six (6) feet nominal height or as shown on drawings.
- C. Space line posts at intervals not exceeding 10 feet.
- D. Set terminal gate and end/corner posts plumb, in concrete footings with top of footing 6 inches below finish grade. Footing depth below finish grade: 36 inches minimum.
- E. Provide top rail through line post tops and splice with 7 inch long rail sleeves.
- F. Brace each gate and corner post back to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.
- G. Install center and bottom brace rail on corner and gate leaves.
- H. Stretch fabric between terminal posts or at intervals of 100 feet (30 m) maximum, whichever is less.
- I. Position bottom of fabric 2 inches above finished grade.
- J. Fasten fabric to top rail, line posts, braces, and bottom tension wire with wire ties maximum 15 inches on centers.
- K. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- L. Install bottom tension wire stretched taut between terminal posts.
- M. Install gates with fabric to match fence. Install three hinges per leaf, latch, catches, drop bolt foot bolts and sockets torsion spring retainer and locking clamp.
- N. Provide concrete center drop to foundation depth and drop rod retainers at center of double gate openings.

END OF SECTION

SECTION 02452**SITE SIGNAGE****PART 1 GENERAL****1.01 SCOPE**

- A. Work includes furnishing and installing all specified exterior signage as shown on drawings.

1.02 SUBMITTALS

- A. Submit descriptive information and shop drawings under provisions of Section 01340.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Sign faces shall be of galvanized steel, painted both sides, equal to that used for standard traffic control signage by Texas Department of Highways and Public Transportation.
- B. Parking Signs
 - 1. Signs shall be marked as shown on drawings. Disabled parking signs shall meet current ADA and ANSI A-117.1 accessibility codes.
 - 2. Letters shall be 2" tall, "Helvetica Medium" with 1/4 inch letter stroke.
- C. Posts shall be nominal 3" in diameter x 7' high, steel with hot dipped galvanized finish.
- D. Provide all required mounting hardware.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install signs square and plumb.
- B. Place posts in concrete embedment below grade.
- C. Mount signs where indicated on drawings.

END OF SECTION

LANDSCAPE PLANTING**PART 1 GENERAL****1.01 WORK INCLUDED**

- A. This section shall consist of digging, preparing plant holes, furnishing, transplanting, initial planting, maintenance of plantings, any replacement of trees, plants and ground cover which are damaged, diseased or otherwise in an unhealthy state during the warranty period or as directed by the Architect.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions
- B. Division 0
- C. Division 1
- D. Section 02010 - Subsurface Investigation
- E. Section 02011 - Geotechnical Report
- F. Section 02200 - Earthwork
- G. Section 02441 - Underground Sprinkler Systems

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Plant material shall be first class grade, true to name and of the size indicated. All plants shall be nursery grown unless otherwise indicated. When the Architect is furnished sufficient evidence that a specified plant cannot practically be obtained, the Architect may approve in writing the use of alternate material. Plant material having any of the following features will be rejected:
 - 1. Undue abrasions of the bark.
 - 2. Dried root system.
 - 3. Dried top wood of deciduous plants or dried foliage of evergreens.
 - 4. Prematurely opened buds or with buds stripped off.
 - 5. Diseased or insect infested plants.
 - 6. Balled and burlapped plants which have dry, loose broken and/or undersized root balls which do not conform to sizes indicated.
 - 7. Showing evidence of heating, molding or freezing.
 - 8. Plants in containers that are overgrown or root bound.
 - 9. Plants with flat or misshaped root balls.
 - 10. Plant ball encased in plastic or other impervious material.

2.02 STANDARD NOMENCLATURE

Botanical names as specified in "Standardized Plant Names" by the American Joint Committee on Horticultural Nomenclature or other referenced text including the "Manual of the Vascular Plants of Texas for Native Flora".

2.03 DELIVERY

Material shall not be delivered to the project until ordered in writing by the Architect and when so ordered, the Architect shall be notified of a proposed delivery of plant material at least 24 hours prior to its arrival at the site. The entire plant shall be properly protected from sun and air damage from the time of digging until delivery at the site. Upon arrival, the Architect shall make an inspection and shall accept for planting or heeling-in all plants complying with these specifications and any plants rejected under same shall be immediately removed from the site. Unless plants are placed in pre-dug holes and planted as specified herein, they shall be heeled-in and inspected again prior to planting. If delivered to pre-dug planting holes, balled and burlapped plants shall be planted within 1 to 6 hours depending upon the drying effect of the wind and sun. No bare rooted plants shall be placed in pre-dug holes from the delivery truck unless actual planting occurs immediately after removal from its moist packing.

2.04 RECEIPT OF PLANTS

No shipment of plant material shall be accepted; planted and/or heeled-in by the Contractor until such material has been inspected by the Architect. The Contractor shall assist the Architect in the inspection of material.

2.05 SIZE

The caliper for trees shall be taken 1 foot above original ground line and trees larger in size than indicated may be used with the approval of the Architect, but such use shall not increase the contract price. Plant measurement for height shall be measured from the ground line to the top of the canopy. Plants having a spreading or semi-spreading habit shall be measured by the average diameter of the spread. Size of special plant classes like roses, vines and ground covers, will be measured as indicated. Container-grown plants which are well established in adequate sized containers and are of equal quality and size to the specified balled plants may be accepted in lieu of balled plants; likewise balled plants of equal quality and size may be substituted for container-grown plants when permitted by the Architect. Soil shall be approximately 3/4 depth of container and contain roots of the plant throughout the soil.

2.06 MULCH

Mulch material shall consist of loose organic hardwood residue derived from plants or other granular material approved by the Architect and shall be of such nature that adequate protection is provided against sun baking and quick drying out of the soil, will not impede aeration or water penetration nor deplete the soil nitrogen. Mulch material shall be free of excess amounts of large leaves and sticks that would prevent proper dressing of the mulched surface, free of harmful chemicals and free of detrimental amounts of soil or other foreign matter that would promote early compaction, matting or deterioration of the mulch. Peat moss shall be of sphagnum origin of commercial quality.

2.07 FERTILIZER

Fertilizer shall be applied uniformly at the rate recommended for newly planted material.

2.08 WATER

Water shall be clean and free of industrial wastes and other substances harmful to the growth of plants and the areas irrigated.

2.09 STAKES AND GUYS

Stakes shall be 2 x 2 x 18 inch sound hardwood or treated pine with tapered point and chamfered tops. Guys shall be 2 strand 12 ga. galvanized steel wire with 1/2 inch diameter reinforced plastic or rubber hose trunk bushings and yellow plastic flagging.

2.10 BRACING

Bracing shall be 2 x 4 inch hardwood or metal fence posts, 6 ft. long with guys and bushings.

2.11 PESTICIDES

Pesticides shall be selected for the species planted and applied in accordance with the manufacturer's recommendations upon approval of the Architect. Wherever possible non-toxic organic pesticides shall be used.

2.12 TRUNK WRAPPING

Trunk wrapping shall be 4 inch wide commercial tree wrapping paper with asphalt core.

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS

Immediately following delivery and acceptance at the site, all plants heeled-in shall be properly maintained by the Contractor until planted. In handling plants, the utmost care shall be exercised to prevent injuries to the plants. The solidity of the ball or balled and burlapped plants shall be carefully preserved and such plants shall not be handled by the stems. Plants with exposed roots shall be protected from drying out during the time the plants are removed from the heeling-in bed and until actually planted.

3.02 PREPARATION OF PLANTING HOLES

Planting holes may be dug by hand or by mechanical means. Trimming of the sides or bottom of the hole to uniform shape will not be required. Planting holes shall have a minimum horizontal dimension of 2 times the specified diameter of the ball or balled and burlapped plants or the average root spread or bare-rooted plants.

Planting holes shall be excavated to a depth of at least 4 inches but not more than 8 inches greater than the depth of the ball or the depth of the root system of bare-rooted plants. Holes dug to excess depths shall be backfilled with topsoil and tamped to bring the holes to the specified depth. The depth of holes on slopes shall be measured at the lower side. Special sized holes shall be as shown on the plans. Where holes are dug with an auger and the sides of the holes become plastered or glazed, this plastered or glazed surface shall be scarified. Topsoil from the planting hole may be used for backfilling provided it is kept separate from subsoil and rendered loose and friable. Additional topsoil required to backfill the holes shall be furnished in the amount directed and from a source approved by the Architect.

3.03 PRUNING ROOTS

Root pruning shall be limited to the amount necessary to prune away broken or badly damaged roots.

3.04 PRUNING OF TOPS

Plants shall not be pruned before delivery to the site, except by written permission of the Architect. Pruning of plants shall conform to the best horticultural practice and shall be appropriate to the various types of plants and the special requirements of each. Deciduous shrubs and trees with heavy tops shall have about 1/3 to 1/2 of the top growth removed. Plants otherwise acceptable, but with broken or badly bruised branches, shall have branches removed with a clean cut. All cut surfaces over 1 inch in diameter shall be painted with a tree pruning compound.

3.05 PLANTING AND BACKFILLING**A. Depth of Transplanting**

In general, plants shall be installed and covered with topsoil approximately one (1) inch above the top of the root ball or container soil surface.

B. Bare Root Plants

After the soil in the bottom of the holes has been firmed and the plant placed in the proper position, loose friable topsoil (or loam) shall be worked about the roots and thoroughly settled with water as the backfill is made. Care should be taken to avoid bruising or breaking the roots. No sticks, sods, clods or other material which would tend to form large air pockets in the soil shall be included in the backfill.

C. Balled and Burlapped Plants

Plants of this type shall not be handled by the stems nor in such a manner that the soil of the ball will be loosened. A saddle around the ball should be used for lifting. The burlap shall not be removed from the ball. After the soil in the bottom of the hole has been firmed and the plant placed in the proper position, loose friable soil shall be worked about the ball until the hole is 2/3 full. The hole then shall be filled with water and the backfilling completed, working the soil and water well to prevent any air pockets.

D. Container-Grown Plants

At the time of planting container-grown plants, the root ball and plant shall be removed from the container with a minimum of damage to the root ball. If in the opinion of the Architect a sufficient amount of soil has fallen off or the ball has been broken to such an extent as to reduce the chances of the plant to grow, the plant will be rejected. Container-grown plants shall be acclimated to outside growing conditions. Container-grown plants shall be planted in the same manner as balled and burlapped plants.

E. Finishing Surface after Backfilling

A basin, 6 to 8 inches deep, shall be formed by constructing a neat levee around the planting hole. The inside measurements of the basin shall be not less than the minimum specified diameter of the planting hole, unless indicated otherwise. On slopes, the soil on the lower side shall be graded in such a manner that an adequate basin will be provided.

Material excavated from the planting holes which is unsuitable for backfilling may be used to form a basin around the plant. Excess excavated material may be scattered thinly and leveled off provided it is of such consistency and character that it can be readily scattered in an acceptable manner. In case the scattering of material will interfere with drainage, mowing or otherwise be detrimental, all such material shall be removed and disposed of as directed by the Architect.

3.06 BRACING TREES

All trees 1-1/4 inches and over in caliper shall be adequately braced immediately after the plants have settled. Unless otherwise indicated, trees 1/1/4 to 2 inches in diameter shall be braced with 1 brace of sawed lumber, 2 x 2 inches (nominal size), firmly fastened to the tree at a point 5 to 6 feet above ground level or as directed by the Architect. Fastening shall not be by nails, staples, wire or other materials that may damage the tree. Braces shall be of sufficient length to provide bracing when firmly driven into the ground. The tree trunk shall be adequately padded with a section of flexible hose at the point of attachment with a figure 8 tie. Trees 2 to 4 inches in diameter shall be braced with 3 equally spaced concentric stakes which are firmly driven into the ground. The trunk of the tree shall be adequately and securely padded with rubber at the point of attachment of the wire to prevent damage. Wire shall be number 16 gauge galvanized. Trees larger than 4 inches in diameter shall be braced in accordance with notes on plans. The Contractor shall repair braces as often as required until acceptance of the project for "Plant Establishment".

3.07 Tree Trunk Protection

For protection of the tree trunk, all trees indicated to be protected shall be neatly and securely wrapped. The tree wrapping is to begin at the base of the trunk and extend upward with a 50 percent overlap to the first major branch. Secure the tree wrapping paper at the top of wrap with soft twine or weatherproof type tape or any suitable method, approved by the Architect.

3.08 Mulching

All plants shall receive mulching to a minimum depth of 2 inches within the planting basin unless otherwise indicated. A small amount of soil shall be sprinkled on top of organic mulch to hold it in place if directed by the Architect.

3.09 Maintenance and Initial Plant Replacement

The Contractor shall water the plants as often as necessary, cut the weeds and grass around the planted area including the plant basin and bracing, prune the plants, treat the plants in accordance with approved methods of horticultural practice where insects or disease affect the plants after planting and repair or replace the bracing as may be required or as ordered by the Architect for a period of one year. Plants that die during the one year warranty period shall be removed from the project and replaced.

2007 7/20/07

3.10 Acceptability of Plants

Within one month following the initial planting and initial plant replacement, the Architect will make an inspection of the project to determine the acceptability of the plant material. At this time, an inventory of missing, dead or rejected plant material will be made and the Contractor notified that the plants on the inventory are to be replanted. Plant material for the replacement planting shall meet all the requirements specified for the original plant material and shall be planted in accordance with planting instructions listed under "Construction Methods". Working days stated in the Contract will not include the time necessary for replanting. A final inspection shall be made within 10 days after the replacement is completed.

END OF SECTION

2007



SOIL PREPARATION AND SOIL MIXES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, material, equipment and supplies necessary to complete the work hereinafter specified for soil preparation, landscape fine grading, and soil mixes.

1.02 RELATED WORK

- A. General and Supplementary Conditions
- B. Division 0
- C. Division 1
- D. Section 02010 - Subsurface Investigation
- E. Section 02011 - Geotechnical Report
- F. Section 02200 - Earthwork
- G. Section 02480 - Landscape Planting

PART 2 PRODUCTS

- A. Verify with General contractor any available stock piled on-site materials which have been approved by the Architect and are in quantities sufficient for use by this section.
- B. SOIL MIXES
 - 1. Plant beds/shrub areas: mixture of 3/4 volume fine sandy loam (pasteurized) and 1/4 volume organic compost.
 - 2. Tree plantings backfill: same as above.
 - 3. Topsoil for lawn areas: 3/4 volume pasteurized sandy loam, 1/4 humus, 1/4 organic compost or leaf mold.

PART 3 EXECUTION

- A. Prior to commencing work, verify that finish grading operations by General Contractor are complete and that landscape areas are ready to receive topsoil.
- B. Roto-till all sub soil areas at plant beds to a depth of six (6) inches.
- C. Place topsoil in a manner to achieve a uniform depth of material of not less than:
 - 1. 4 inches for lawn areas.
 - 2. 12 inches for shrub/ground cover beds.
- D. Do not install topsoil in any manner where excavated/graded site drainage patterns will be interrupted or adversely affected. Coordinate all work with the General Contractor.

- E. Finish grades at building perimeter shall be not closer than 6 inches from finish floor elevations unless otherwise directed by Architect.
- F. Provide and install all specified soil mix for shrub and tree back-filling;
- G. After installing topsoil at lawn areas, fine rake to a uniform surface appearance. Remove any and all clods, rock, and debris.
- H. Take care to minimize machine compaction of placed topsoil.

END OF SECTION

SEEDING AND GRASS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fertilizing.
- B. Seeding.
- C. Hydromulching.
- D. Maintenance.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions
- B. Division 0
- C. Division 1
- D. Section 02010 - Subsurface Investigation
- E. Section 02011 - Geotechnical Report
- F. Section 02200 - Earthwork
- G. Section 02441 - Underground Sprinkler Systems
- H. Section 02480 - Landscape Planting
- I. Section 02484 - Soil Preparation and Soil Mixes
- J. Section 02486 - Sodding
- K. Section 02490 - Trees Plants and Groundcovers

1.03 REFERENCES

- A. FS 0-F-241 - Fertilizers, Mixed, Commercial.

1.04 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perrenial Sorrel, and Brome Grass.

1.05 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.06 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.07 TESTS

- A. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

1.08 MAINTENANCE DATA

- A. Submit maintenance data for continuing Owner maintenance under provisions of Section 01730.
- B. Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer; and watering cycle recommendations.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- D. Deliver fertilizer in waterproof bags showing weight, analysis, and name of manufacturer.

1.10 COORDINATION

- A. Coordinate the work of this Section with installation of underground sprinkler system piping and watering heads.

1.11 MAINTENANCE SERVICE

- A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

PART 2 PRODUCTS**2.01 SEED MIXTURE**

- A. Seed Mixture: Common Bermuda Grass
 - 1. Fresh, Clean, New Crop
 - 2. 98% Purity and 85% Germination rate
 - 3. 1/2% by weight maximum noxious weed of total live mixture.

2.02 SOIL MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; value of minimum 5.4 and maximum 7.0.

2.03 ACCESSORIES

- A. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.
- B. Erosion Fabric: Excelsior or approved equal.
- C. Herbicides shall be used as per manufacturers instructions delivered to site in manufacturers containers.
- D. Edging: Ryerson steel or approved equal (4" HT.) 1/8".

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that prepared soil base is ready to receive the work of this Section.
- B. Beginning of installation means acceptance of existing site conditions.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.

3.03 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 2" inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen sub-grade.
- C. Remove vegetable matter and foreign non- organic material while spreading.
- D. Grade to eliminate rough, low, or soft areas, and to ensure positive drainage.
- E. Install edging at periphery of seeded areas in straight lines to consistent depth.

3.04 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.

- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed unless otherwise authorized by Architect.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.05 SEEDING

- A. Apply seed at a rate of 5 lb. per 1000 sq. ft. evenly in two intersecting directions. Rake in lightly. Do not seed area in excess of that which can be mulched on same day.
- B. Planting Season: April 30th to October 1st.
- C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D. Roll seeded area with roller not exceeding 112 lbs.

3.06 HYDROSEEDING

- A. Apply seeded slurry at a rate of 5 lb. per 1000 sq. ft. evenly in two intersecting directions, with a hydraulic seeder. Do not hydroseed area in excess of that which can be mulched on same day.
- B. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- C. Apply water with a fine spray immediately after each area has been mulched. Saturate to 2" inches of soil.

3.07 SEED PROTECTION

- A. Identify seeded areas with stakes and string around area periphery.
- B. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric. Roll fabric onto slopes without stretching or pulling.
- C. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Provide 12 inch overlap of adjacent rolls. Back-fill trench and rake smooth, level with adjacent soil.
- D. Secure outside edges and overlaps at 36 inch intervals with stakes.
- E. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- F. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.08 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- B. Neatly trim edges and hand clip where necessary.

88.11

- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove minor depressions or irregularities.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- G. Immediately re-seed areas which show bare spots.
- H. Protect seeded areas with warning signs during maintenance period.

END OF SECTION

SECTION 02486

SODDING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fertilizing.
- B. Sod installation.
- C. Maintenance.

1.02 RELATED WORK

- A. General and Supplementary Conditions
- B. Division 0
- C. Division 1
- D. Section 02010 - Subsurface Investigation
- E. Section 02011 - Geotechnical Report
- F. Section 02200 - Earthwork
- G. Section 02441 - Underground Sprinkler Systems
- H. Section 02480 - Landscape Planting
- I. Section 02484 - Soil Preparation and Soil Mixes
- J. Section 02485 - Seeding And Grass
- K. Section 02490 - Trees, Plants and Ground Cover

1.03 REFERENCES

- A. ASPA (American Sod Producers Association) - Guideline Specifications to Sodding.
- B. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.04 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perrenial Sorrel, and Brome Grass.

1.05 QUALITY ASSURANCE

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Texas.
- B. Installer: Company approved by the sod producer.

- C. Sod: Minimum age of 18 months, with root development that will support its own weight, without tearing, when suspended vertically by holding the upper two corners.
- D. Submit sod certification for grass species and location of sod source.

1.06 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.07 TESTS

- A. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for approval. Indicate, by test results, information necessary to determine suitability.

1.08 MAINTENANCE DATA

- A. Submit maintenance data for continuing Owner maintenance under provisions of Section 01730.
- B. Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer; and watering cycle recommendations.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Deliver sod on pallets. Protect exposed roots from dehydration.
- D. Do not deliver more sod than can be laid within 24 hours.

1.10 COORDINATION

- A. Coordinate the work of this Section with installation of underground sprinkler system piping and watering heads.

1.11 MAINTENANCE SERVICE

- A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

PART 2 PRODUCTS

2.01 ACCEPTABLE SOD GROWERS

- A. Locally Available Products.
- B. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Sod: ASPA Approved grade; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000sq ft.
- B. Fertilizer: FS O-F-241, Type recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil as indicated in analysis.
- C. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

2.03 ACCESSORIES

- A. Edging: Where required - iron edging with stakes.
- B. Herbicide: Organic - as necessary.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that prepared soil base is ready to receive the work of this Section.
- B. Beginning of installation means acceptance of existing site conditions.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials and undesirable plants and their roots. Do not bury foreign material beneath areas to be sodded. Remove contaminated subsoil.

3.03 PLACING TOPSOIL

- A. Spread topsoil over any areas of concentrated storm water drainage where erosion is likely.
- B. Place topsoil during dry weather and on dry unfrozen sub-grade.
- C. Remove vegetable matter and foreign non-organic material while spreading.
- D. Grade to eliminate rough, low, or soft areas, and to ensure positive drainage.
- E. Install edging at periphery of sodded areas in straight lines to consistent depth.

3.04 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.

- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.05 LAYING SOD

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod immediately on delivery to site to prevent deterioration.
- C. Lay sod tight with no open joints visible, and no over-lapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth. Place top elevation of sod 1/2 inch below adjoining edging paving curbs, etc.
- E. On slopes 6 inches per foot and steeper, lay sod perpendicular to slope and secure every row.
- F. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.
- G. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

3.06 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove minor depressions or irregularities.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- G. Immediately replace sod to areas which show deterioration or bare spots
- H. Protect sodded areas with warning signs during maintenance period.

END OF SECTION

TREES, PLANTS, AND GROUND COVER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Topsoil bedding.
- B. Trees, plants, and ground cover.
- C. Mulch and fertilizer.
- D. Maintenance.

1.02 RELATED SECTIONS

- A. General and Supplementary Conditions
- B. Division 0
- C. Division 1
- D. Section 02010 - Subsurface Investigation
- E. Section 02011 - Geotechnical Report
- F. Section 02200 - Earthwork
- G. Section 02441 - Underground Sprinkler Systems
- H. Section 02480 - Landscaping.
- I. Section 02484 - Soil Preparation and Soil Mixes
- J. Section 02485 - Seeding and Grass
- K. Section 02486 - Sodding

1.03 ALLOWANCES

- A. Refer to Section 01021 - Cash Allowances for the Cash Allowance sum applicable to this Section of work.
- B. This allowance includes purchase and delivery of trees, plants, and ground cover. Installation is included in this Section and is part of the Contract Sum.

1.04 REFERENCES

- A. ANSI Z60.1 - Nursery Stock.
- B. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.05 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.
- B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit instructions for continuing Owner maintenance under provisions of Section 01730.
- B. Include cutting and trimming methods; types, application frequency, and recommended coverage of fertilizer; and recommended watering cycles.

1.07 QUALITY ASSURANCE

- A. Nursery: Company specializing in growing and cultivating the plants specified in this Section with minimum three years experience.
- B. Installer: Company specializing in installing and planting the plants specified in this Section with minimum three years experience.

1.08 REGULATORY REQUIREMENTS

- A. Comply with regulatory requirements for fertilizer and herbicide composition.
- B. Plant Materials: free of disease or hazardous insects.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- D. Protect plants until planted.
- E. Deliver plant life materials immediately prior to placement. Keep plants moist.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F or above 90 degrees F.
- B. Do not install plants when wind velocity exceeds 30 mph.

1.11 SEQUENCING AND SCHEDULING

- A. Coordinate work under provisions of Section 01040.
- B. Coordinate the work of this Section with installation of underground irrigation system, utilities, piping and watering heads.

1.12 WARRANTY

- A. Provide a warranty on work of this Section for a minimum one year including one continuous growing season. Commence warranty on date identified in the Certificate of Substantial Completion.
- B. Warranty: Include coverage of plants from death or unhealthy conditions.
- C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

1.13 MAINTENANCE SERVICE

- A. Maintenance Services: Performed by installer.
- B. Maintain plant life for three months after Date of Substantial Completion.
- C. Maintenance to include:
 - 1. Cultivation and weeding plant beds and tree pits.
 - 2. Application of herbicides for weed control in accordance with manufacturer's instructions. Remedy damage resulting from use of herbicides.
 - 3. Application of pesticides in accordance with manufacturer's instructions. Remedy damage from use of pesticides.
 - 4. Irrigating sufficient to saturate root system.
 - 5. Trimming and pruning, including removal of clippings and dead or broken branches, and treatment of pruned areas or other wounds.
 - 6. Disease control.
 - 7. Maintaining wrapping, guys, turnbuckles, and stakes. [Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.]

PART 2 PRODUCTS**2.01 NURSERIES**

- A. Name of grower to be provided by General Contractor.

2.02 TREES, PLANTS, AND GROUND COVER

- A. Trees, Plants, and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

2.03 SOIL MATERIALS

- A. Topsoil: As specified elsewhere.

2.04 SOIL AMENDMENT MATERIALS

- A. Fertilizer: FS O-F-241, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil.
- B. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.
- C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of plants.

2.05 MULCH MATERIALS

- A. Mulching Material: decomposed cedar chips species wood free of growth or germination inhibiting ingredients.

2.06 ACCESSORIES

- A. Wrapping Materials: Burlap.
- B. Stakes: Softwood lumber, pointed end.
- C. Cable, Wire, Eye Bolts, and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind pressure and resultant movement of plant life.
- D. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that prepared subsoil and plant beds are ready to receive work of this Section.
- B. Verify that required underground utilities are available, in proper location, and ready for use.
- C. Beginning to installation means acceptance of existing conditions.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted subsoil.
- D. Dig pits and beds 6 inches larger than plant root system.

3.03 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 4 inches over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen sub-grade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low, or soft areas, and to ensure positive drainage.
- E. Install topsoil mixture in pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

3.04 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 2 inches topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

3.05 PLANTING

- A. Place plants for best appearance.
- B. Set plants vertical.
- C. Remove non-biodegradable root containers.
- D. Set plants in pits or beds, partly filled with prepared topsoil mixture.
- E. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant materials in vertical position.
- F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.06 INSTALLATION OF ACCESSORIES

- A. Place decorative cover and membrane, where indicated on Drawings.

3.07 PLANT SUPPORT

- A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:

Tree Caliper Tree Support Method

inch 1 stake with one tie

- 2 inches 2 stakes with two ties

- 4 inches 3 guy wires [with eye bolts and turnbuckles]

Over 4 inches 4 guy wires [with eye bolts and turnbuckles]

3.08 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01410.
- B. Plants will be rejected when ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

END OF SECTION

SECTION 02500

PAVING AND SURFACING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, equipment, and supplies required for complete installation of specified paving and site surfacing.

1.02 RELATED WORK

- A. General conditions and Division 01.
- B. Section 02010: Subsurface Investigation
- C. Section 02100: Site Preparation.
- D. Section 02110: Clearing.
- E. Section 02111: Tree and Shrub Protection.
- F. Section 02200: Earthwork.
- G. Section 02210: Site Grading.
- H. Section 02213: Rough Grading.
- I. Section 02230: Base for Asphaltic Paving.
- J. Section 02231: Base for Concrete Paving.
- K. Section 02250: Compaction Control and Testing.
- L. Section 02260: Finish Grading.
- M. Section 02270: Slope Protection and Erosion Control.
- N. Section 02513: Asphaltic Concrete Paving.
- O. Section 02515: Concrete Paving.
- P. Section 02528: Concrete Curbs.
- Q. Section 02585: Concrete Walks - Broom Finish.

1.03 REQUIREMENTS

- A. Contractor shall install site paving and surfacing in careful compliance with requirements of site grading plan(s) and details.
- B. Prior to commencement of any paving and surfacing work, Contractor shall employ the Engineer of Record, preparer of site grading plan, to verify that grading requirements for rough grading have been achieved and that proper finished grades can be properly achieved.
- C. Do not proceed with work of this Section until obtaining written verification from Engineer of Record that rough grading requirements have been satisfactorily met.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02513

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Asphaltic concrete paving.

1.02 RELATED WORK

- A. Section 02210 - Site Grading.
- B. Section 02213 - Rough Grading for paving.
- C. Section 02230 - Base for asphaltic paving.
- D. Section 09910 - (Pavement markings.) Exterior painting.

1.03 REFERENCES

- A. The Asphalt Institute - Manual MS-4 - The Asphalt Handbook.
- B. The Asphalt Institute - Manual MS-13 - Asphalt Surface Treatments and Asphalt Penetration Macadam.
- C. ASTM D946 - Asphalt Cement for Use in Pavement Construction.
- D. TDHPT - Specifications for Asphaltic Paving.

1.04 SYSTEM PERFORMANCE

- A. Paving: Designed for parking.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with The Asphalt Institute, and State of Texas Highway Standards.
- B. Mixing Plant: Conform to State of Texas standards.
- C. Obtain materials from same source throughout.

1.06 TESTS

- A. Testing and analysis of asphaltic mix will be performed under provisions of Section 01410.

- B. Submit proposed mix design of each class of mix for review prior to commencement of work.

1.07 SUBMITTALS

- A. Submit product data under provisions of Section 01340.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt when base surface temperature is less than 40 degrees F.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Primer: Homogeneous medium curing liquid asphalt.
- B. Tack Coat.
- C. Asphalt Concrete: Item 340, Hot Mix Asphaltic Concrete Pavement (Class A), Type D. Standard Specifications of the Texas Highway Department. Thickness as shown on drawings.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify compacted subgrade granular base soil is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Apply primer over substrate at uniform rate of 1/2 gal/sq. yd.
- B. Apply primer in accordance with manufacturer's instructions.
- C. Use clean sand to blot excess primer.
- D. Apply primer to contact surfaces of curbs.

3.03 PLACING ASPHALT PAVEMENT

- A. Place binder course within 24 hours of priming base surfaces.
- B. Place each course to compacted thickness identified in schedule at end of Section.
- C. Place topping course within two hours of placing and compacting binder course.

- D. Compact pavement by rolling with vibratory and flat roller. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- E. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.
- F. Pneumatic tire rolling may be pre-formed after mat has cooled below 175 degrees F.

3.04 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.
- B. Compacted Scheduled Thickness: Within 1/4 inch of design thickness.
- C. Variation from True Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01410.

3.06 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury for two days.

3.07 SCHEDULE

- A. Refer Drawings.

END OF SECTION

SECTION 02515

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Concrete paving and drives.
- B. Reinforcement.
- C. Surface finish.
- D. Curing.

1.02 RELATED WORK

- A. Section 02210 - Site Grading.
- B. Section 02213 - Rough Grading.
- C. Section 02220 - Structural Excavation and Backfilling..
- D. Section 02231 - Base For Concrete Paving.
- E. Section 02250 - Compaction Control and Testing.
- F. Section 02528 - Concrete Curbs.
- G. Section 02585 - Concrete Walks - Broom Finish.
- H. Section 03100 - Concrete Formwork.
- I. Section 03200 - Concrete Reinforcing.
- J. Section 03300 - Cast-In-Place Concrete.
- K. Section 07900 - Sealants.
- L. Section 09910 - Exterior Painting.

1.03 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- C. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

- D. ASTM C33 - Concrete Aggregates.
- E. ASTM C94 - Ready Mixed Concrete.
- F. ASTM C150 - Portland Cement.
- G. ASTM C260 - Air-Entraining Admixtures for Concrete.
- H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- I. ASTM C494 - Chemical Admixtures for Concrete.
- J. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain materials from same source throughout.

1.05 TESTS

- A. Testing and analysis will be performed under provisions of Section 01410.
- B. Submit proposed mix design of each class of concrete to architect firm for review prior to commencement of work.
- C. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.
- D. Tests of cement and aggregates will be performed to ensure conformance with requirements stated herein.
- E. Three concrete test cylinders will be taken for every 75 or less cu yd. of each class of concrete placed each day.
- F. One additional test cylinder will be taken during cold weather and be cured on site under same conditions as concrete it represents.
- G. One slump test will be taken for each set of test cylinders taken.

1.06 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Include data on joint filler, admixtures, curing compounds and control joints.
- C. Submit manufacturer's instructions under provisions of Section 01340.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150 Normal-Type I Air Entraining Air Entraining-Type IIA Air Entraining-Type IIIA Sulfate Resistant-Type V Portland type, gray color.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and not detrimental to concrete.

2.02 FORM MATERIALS

- A. Conform to ACI 301.
- B. Wood Steel form material, profiled to suit conditions.

2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615; 60 ksi deformed billet steel bars.
- B. Tie Wire: Annealed steel, minimum 16 gage.
- C. Dowels: ASTM A615; 40 ksi (276 mPa) yield grade, plain steel, un-coated finish.

2.04 ACCESSORIES

- A. Preformed Control Joints: "Shep-Load" load transfer units as manufactured by Shepler Equipment Co.

2.05 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical Admixture: ASTM C494, Type A - water reducing.

2.06 CONCRETE MIX

- A. Mix concrete in accordance with ASTM C94.
- B. Provide concrete of the following characteristics:
 - Compressive Strength at 28 days: 3500 psi
- C. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
- D. Use set-retarding admixtures during hot weather only when approved by Architect/Engineer.
- E. Add air entraining agent to concrete mix for concrete work subject to freeze/thaw cycling or exposed to exterior.

2.07 CONCRETE PAVING

- A. Sub-grade Preparation: Base material and concrete paving shall be installed per the requirements of the Geotechnical Engineer. Refer Section 02011.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify compacted sub-grade and granular base is ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

3.03 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint fillers vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 REINFORCEMENT

- A. Place reinforcement at mid-height of slabs-on-grade.
- B. Interrupt reinforcement at control contraction expansion joints.
- C. Place reinforcement to achieve slab and curb alignment as detailed.
- D. Provide doweled joints at interruptions of concrete with one end of dowel set in capped sleeve to allow longitudinal movement.

3.05 FORMED JOINTS

- A. Place load transfer joints at 25 foot intervals to correct elevation and profile. Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1 inch for sealant placement by Section 07900.
- C. Provide scored saw joints at 12 foot 6 inch intervals.

3.06 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Hot Weather Placement: ACI 301.
- C. Cold Weather Placement: ACI 301.
- D. Ensure reinforcement, inserts, embedded parts, formed joints and load transfer joints are not disturbed during concrete placement.
- E. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- F. Place concrete to pattern indicated on the drawings.

3.07 FINISHING

- A. Concrete Paving: Light broom.
- B. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.08 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01410.
- B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.09 PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, and mechanical injury.

END OF SECTION

SECTION 02528

CONCRETE CURBS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Strip concrete curbs.

1.02 RELATED WORK

- A. Section 02500: Paving and Surfacing.
- B. Section 02513: Asphaltic Concrete Paving.
- C. Section 02514: Concrete Paving.
- D. Section 02585: Concrete Walks - Broom Finish.
- E. Section 03050: Concrete Procedures.
- F. Section 03100: Concrete Formwork.
- G. Section 03200: Concrete Reinforcement.
- H. Section 03310: Structural Concrete.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete reinforcing shall be as detailed on drawings.
- B. Expansion joints shall be pre-molded, bituminous.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate work with paving installation.
- B. Construct curb work in accordance with requirements detailed on drawings.
- C. Reinforcing steel shall be supported on steel or plastic chairs spaced not to exceed 48" o.c. each way, set to support steel at mid point of cross-sectional depth. D. Curb surface shall be thoroughly worked with a wood float.

- D. Place expansion joints at 40 foot intervals.
- E. Place scored control joints at 20 foot intervals.

END OF SECTION

SECTION 02577
PAVEMENT MARKING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide and install all pavement markings as shown on drawings and/or specified hereinafter.

1.02 RELATED WORK

- A. Section 02452 - Site Signage
- B. Section 02500 - Paving and Surfacing.
- C. Section 09900 - Painting.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit samples under provisions of Section 01340.
- C. Transport materials under provisions of Section 01610.
- D. Store materials under provisions of Section 01620.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Painted pavement markings: refer Sections 09900 and 09910.
- B. Substitutions: under provisions of Section 01630.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Inspect surfaces designated to receive pavement markings to verify they are ready to receive work specified in this Section.
- B. Beginning of work indicates acceptance of substrate.

3.02 LAYOUT

- A. Carefully measure all areas requiring installation of pavement markings to assure correlation with requirements of drawings.
- B. Report any dimensional deviations to Architect for his review and instruction.
- C. Lay out and mark all areas to receive pavement markings. use chalk line for temporary markings. Check lay out to assure uniform and neat installation.

3.03 INSTALLATION

- A. Install all pavement markings in accordance with the requirements of the drawings.
- B. Install all pavement marking products in a neat and workmanlike manner.
- C. Avoid over-spray of painted markings.
- D. Install all products in accordance with manufacturer's instructions.

3.04 CLEAN UP

- A. Remove all debris related to this work from jobsite. Dispose of materials properly.
- B. Remove all over-spray and staining of surfaces caused by work of this Section.

3.05 SCHEDULE

- A. Fire lane painting as required by the local Fire Marshall.
- B. Refer plans for all other pavement markings.

END OF SECTION

SECTION 02585

CONCRETE WALKS - BROOM FINISH

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide concrete walks as described herein and where shown on the drawings, complete and in place.

1.02 RELATED WORK

- A. Section 02500 - Paving and Surfacing.
- B. Section 02528 - Concrete Curbs.
- C. Section 03050 - Concrete Procedures.
- D. Section 03100 - Concrete Formwork.
- E. Section 03200 - Concrete Reinforcement.
- F. Section 03350 - Cast-In-Place Concrete.
- G. Section 03345 - Concrete Finishing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete Materials: 3,000 psi, regular weight, 1 1/2" to #4 aggregate.
- B. Expansion Joints: 1 x 4 redwood.
- C. Reinforcing: See drawings.

PART 3 EXECUTION

3.01 FORMWORK

- A. Forms for concrete walks shall extend the full depth of the concrete. Forms shall be true to line and properly braced to prevent bow or springing.
- B. Join forms neatly and tightly. Remove forms after concrete has had time to set sufficiently to prevent damage or spilling.

3.01 INSTALLATION

- A. Base Course: Provide 2 inches of sand wetted and tamped over the compacted subgrade.
- B. Concrete: Deposit concrete in thickness as indicated on the drawings.
- C. Reinforcement: Insure proper placement of reinforcement as described in Section 03200. Insure reinforcement laps at least one section of mesh at joints. Break reinforcement at all expansion joints.
- D. Joints:
 - 1. General: Join sidewalks neatly with expansion joints to landing, curbs and structures.
 - 2. Walks: Provide grooved control joints at a minimum of 4 feet intervals or as shown on drawings.
 - 3. Provide expansion joints at 24 feet intervals, or as shown on drawings. The Architect should approve placement of expansion joints prior to pouring.
- E. Finish: Provide a light broom finish for all walks.
- F. Curing and Protection: Keep walk slabs wet until set sufficiently to prevent injury to the surface. Cover with 2 inches of sand or wet thoroughly twice daily for five days. On completion of the job, clean the walk surfaces and wash off.

3.03 PROTECTION

- A. Protect walks after pouring from damage by other construction work. Replace damaged sections by complete removal between expansion joints and re-pouring. Patchwork of cracked or damaged sections will not be accepted.

END OF SECTION

DOMESTIC WATER SYSTEM

PART 1. GENERAL

1.1 SUMMARY

- A. Furnish and install pressure pipe, fittings, valves, and appurtenances of the sizes and classes indicated for potable water service.

1.2 RELATED SECTIONS

- A. Section 02225 - Trench Excavation, Backfill, and Compacting.

1.3 REFERENCES

- A. American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado 80235.
 - 1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 - 2. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
 - 3. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
 - 4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds.
 - 5. AWWA C500 - Gate Valves for Water and Sewerage Systems.
 - 6. AWWA C502 - Dry Barrel Fire Hydrants.
 - 7. AWWA C509 - Resilient-Seated Gate Valves for Water and Sewerage Systems.
 - 8. AWWA C510 - Standard for Double Check Valve Backflow-Prevention Assembly.
 - 9. AWWA C511 - Standard for Pressure-Reducing Principle Backflow-Prevention Assembly.
 - 10. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - 11. AWWA C651 - Standard for Disinfecting Water Mains.
 - 12. AWWA C900 - Standard for Poly(Vinyl Chloride)(PVC) Pressure Pipe, 4 Inch through 12 Inch, for Water Distribution.
 - 13. AWWA C905 - Standard for Poly(Vinyl Chloride)(PVC) Water Transmission Pipe, Nominal Diameters 14 Inch through 36 Inch.

- B. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
1. ASTM A126 - Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 2. ASTM B61 - Specification for Steam of Valve Bronze Castings.
 3. ASTM D1784 - Specification for Rigid Poly(Vinyl Chloride)(PVC) Compounds and Chlorinated Poly(Vinyl Chloride)(CPVC) Compounds.
 4. ASTM D2241 - Specification for Rigid Poly(Vinyl Chloride)(PVC) Pressure Rated Pipe (SDR-Series).
 5. ASTM D3139 - Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 6. ASTM F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data:
1. Pipe materials and manufacturers.
 2. Manufacturer's standard installation instructions.
- C. Certificate of Compliance: Submit attesting that materials provided are in compliance with referenced standards.
- D. Disinfection Reports:
1. Type and quantity of disinfectant used.
 2. Date and time of start and completion of disinfectant injection.
 3. Test locations.
 4. Initial, 24-hour, and 48-hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 5. Date and time of start and completion of flushing.
 6. Disinfectant residual after flushing in ppm for each outlet tested.
- E. Bacteriological Reports:
1. Date issued, project name, and testing laboratory name, address, and telephone number.
 2. Time and date of water sample collection.
 3. Name of person collecting samples.
 4. Test locations.
 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 6. Coliform bacteria test results for each outlet tested.
 7. Certification that water conforms, or fails to conform, to bacterial standards of the City of Austin.

1.5 QUALITY ASSURANCE

- A. Ductile Iron Pipe:
 - 1. Inspect at the point of manufacture in accordance with the manufacturer's standard methods.
 - 2. Provide certificate of tests and test procedures.
- B. Polyvinyl Chloride Pipe:
 - 1. Stamp with the NSF seal of approval.
 - 2. Test in accordance with ASTM D2241.

PART 2. MATERIALS

2.1 DUCTILE IRON PIPE, FITTINGS, AND JOINTS

- A. Pipe: Conform to the following requirements:
 - 1. AWWA C151/ANSI A21.51.
 - 2. AWWA C150/ANSI A21.50.
- B. Joints:
 - 1. Pipe: Bell and spigot ends, push on compression type joints for single O-ring gasket.
 - 2. Fittings and specials: Mechanical joints. Provide joint materials, including glands, rubber gaskets, and high strength corrosion resistant alloy tee head bolts with hexagonal nuts.
 - 3. Conform to the requirements of AWWA C111/ANSI A21.11.
- C. Inside Lining:
 - 1. Cement mortar, protected with bituminous seal coat.
 - 2. Apply to pipe and fittings.
 - 3. Conform to AWWA C104/ANSI A21.4.
- D. Outside Coating:
 - 1. Bituminous, approximately 1 mil thick.
 - 2. Apply to pipe and fittings.
 - 3. Conform to AWWA C151/ANSI A21.51.

2.2 PVC PIPE, FITTINGS, AND JOINTS

- A. Pipe: Conform to the following requirements:
 - 1. ASTM D1784 Type I, Grade 1.
 - 2. AWWA C900 for pipe 4 inches through 12 inches.
 - 3. AWWA C905 for pipe 14 inches through 36 inches.
- B. Permanently mark at 5-foot intervals with the following information:
 - 1. Nominal size.
 - 2. Material code designation.
 - 3. Manufacturer's name or trademark and production record code.
 - 4. ASTM or AWWA certification.

5. SDR designation.

C. Joints:

1. Buried Pipe: Gasketed slip joint with integral bell for buried water piping.
2. Comply with ASTM D3139.

D. Fittings:

1. Fittings 4 Inches and Larger: Cast iron or ductile iron mechanical joint.
2. Fittings Smaller Than 4 Inches: PVC.

E. Gaskets:

1. As recommended by pipe manufacturer for outside diameter of pipe.
2. Comply with ASTM F477.

2.3 GATE VALVES

A. Acceptable Manufacturers:

1. Clow; Product F-6100.
2. Waterouse; Product Series 500.
3. American Darling; Product CRS-80.

B. Gate Valves:

1. Double disc parallel seat type in accordance with AWWA C509.
2. Mechanical joint with non-ring stems and two inch square operating nut.
3. Open by turning to the left or counter clockwise.

C. Gate Valve Body and Bonnet:

1. Cast iron.
2. Conform to ASTM A126, Class B.
3. "O" ring type seals and smooth unobstructed waterway when in fully open position.

2.4 VALVE BOXES

- A. See appropriate City Standards on Drawings.

2.5 TAPPING SLEEVES AND VALVES

A. Acceptable Manufacturers:

1. Mueller; Product H-615.
2. Or equal.

- B. Resilient seat or resilient wedge with a flange on one side for connection to the tapping sleeve.

2.6 WATER SERVICE METERS AND APPURTENANCES

- A. Meter:
 - 1. As required by City Standards.
- B. Concrete Meter Box: See City Standards.
- C. Polyethylene Tubing
 - 1. High density polyethylene.
 - 2. Minimum Pressure Rating: 200 psi
 - 3. Meet applicable ASTM standards.
- D. Corporation Stops
 - 1. Acceptable Manufacturers:
 - a. Ford Meter Box Company, Inc; Type F1000.
 - b. Or equal.
 - 2. Brass with pack joint outlet for PE tubing.
- E. Saddles
 - 1. Brass double strap.
 - 2. Acceptable Manufacturers:
 - a. Ford Meter Box Company, Inc.; Model S70.
 - b. Or equal.
- F. Meter Setter
 - 1. Ford Meter Box Company, Inc.; Model VB1727WR.
 - a. Or equal.
- G. Meter Valve
 - 1. Acceptable Manufacturers:
 - a. Ford Meter Box Company, Inc.; Model BA43-332W.
 - b. Or equal.
 - 2. Angled or straight depending on bury.
 - 3. Provide 3/4-inch pack joint, end coupling joint, and lock wings.
- H. Lead free solder.

2.7 WATER FOR HYDROSTATIC TESTING OF PRESSURE LINES

- A. Furnish water from the nearest hydrant or other suitable source for testing purposes.

2.8 CONCRETE FOR THRUST BLOCKING AND ENCASEMENT

- A. Concrete for Thrust Blocking and Encasement: Minimum compressive strength of 2,500 psi at 28 days.

PART 3. EXECUTION

441

96001
02/17/94

3.1 PREPARATION OF TRENCH

- A. Refer to Section 02225.
- B. Bell Holes.
 1. Excavate bell holes at each joint to permit proper assembly and inspection of entire joint.
 2. Bell holes shall be of sufficient depth to preclude direct bearing of bell on bottom of trench.

3.2 RELATION TO SEWER LINE

- A. Laying water main follow City requirements. Maintain 10-foot horizontal separation and 18-inch vertical separation in crossing.

3.3 INSTALLATION

- A. Install pipe, fittings, and valves in accordance with manufacturer's written instructions.
- B. Install blow-off assemblies and fire hydrants with nozzle facing street.
- C. Thrust Blocking:
 1. Take care not to over excavate in the areas where thrust blocks are to be poured.
 2. Remove all water from the excavation.
 3. Construct suitable forms to obtain shapes that will provide full bearing surfaces against undisturbed earth, as indicated.
 4. Install 2,500 psi concrete thrust blocks at all bends, wyes, or other thrust points on pressure piping.
 5. Block to bear against undisturbed soil and shall be of size and with bearing area illustrated by the details on the Drawings.
 6. Pour thrust blocking against undisturbed earth.
 7. Cure thrust blocks a minimum of 5 days before conducting hydrostatic and air tests.

3.4 HYDROSTATIC AND LEAK TESTING OF PRESSURE LINES

- A. Upon completion of installation, thoroughly clean new pipe.
 1. Flush with water to remove dirt, stones, pieces of wood, etc., which may have entered pipe during construction.
 2. Flush pipelines at a minimum rate of 2.5 feet per second for a duration suitable to Engineer.

- B. Upon completion of installation, pressure test water pipelines:
 - 1. Conduct test in presence of Engineer and Owner.
 - 2. Refer to City of Austin testing procedure.
- C. Provide water into pipeline for testing and flushing, including necessary:
 - 1. Pumps, gages (increment at 10 psi or less), and meters.
 - 2. Plugs and caps.
 - 3. Temporary blowoff piping to discharge water.
 - 4. Reaction blocking to prevent pipe movement during testing.
- D. Water source for the pump suction shall be potable water from the Owner's distribution system; vessel used must be approved by the Engineer.
- E. Adequate steps shall be taken to prevent contamination of the Owner's system by the Contractor's actions.
- F. After pipelines or isolated sections of pipelines have been filled with water, increase the pressure to test pressure by means of a pump.
- G. Open interior valves, including fire hydrants and other appurtenances, open during tests.
- H. After the specified test pressure has been applied, the entire pipeline shall be checked in the presence of the Engineer giving particular attention to that part of the pipeline and those appurtenances that are exposed.
- I. If leaks are apparent, the Contractor shall, at his expense, perform whatever work and/or replace whatever material is required to remedy the defect and stop the leaks.
- J. If no leaks were apparent or after corrective work has been completed, the pipelines shall be subjected to a leakage test at the pressure specified with a meter inserted in the test pump discharge line.
- K. The maximum leakage per hour for ductile iron, PVC, and concrete pipe shall be as calculated from the following formula:

All rubber gasket or O-ring joints (iron, PVC, and concrete)

No pipe installation will be accepted if the leakage exceeds 25 gallons/24 hours/mile of pipe/inch nominal pipe diameter.

L. If any test of pipe laid discloses leakage greater than the allowable leakage as calculated from the above formula, locate the leak or leaks and perform whatever work and/or replace whatever material is required in order to remedy the defect and stop the leak.

M. Corrective work must be approved by Engineer.

3.5 DISINFECTION

A. Sterilize pipeline connected to and forming a part of the water supply after pipe has been flushed and passed hydrostatic test, in accordance with the requirements of:

1. AWWA C651.
2. Local municipality.

B. Sterilization:

1. Fill piping with 50 parts per million of chlorine.
2. Hold in contact for not less than 24 hours.

C. Final tests shall show a minimum residual chlorine content of 25 PPM in all parts of the system.

D. Furnish certificates of satisfactory bacteriological test.

E. Thoroughly flush out chlorine solution prior to placing new sections in service.

F. Perform chlorine residual tests after flushing to assure that residual is not in excess of 1 PPM at any point in system.

END OF SECTION

SECTION 02720
STORM DRAINAGE

VOL 0095
PAGE 445

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Pipe and Culverts.
- B. Pipe Joint Material.
- C. Inlets and Junction Boxes.
- D. Foundation Drain Pipe.

1.2 RELATED SECTIONS

- A. Section 02225 - Trench Excavation and Backfill.
- B. Section 03300 - Cast-in-Place Concrete.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials, 444 North Capitol Street, N.W., Suite 225, Washington, DC 20001.
 - 1. AASHTO M36 - Corrugated Steel Pipe, Metallic Coated, for Sewers and Drains.
 - 2. AASHTO M176 - Porous Concrete Pipe.
 - 3. AASHTO M218 - Sheet Steel, Zinc-Coated (Galvanized) for Corrugated Steel Pipe.
 - 4. AASHTO M245 - Polymer Precoated Corrugated Steel Pipe.
 - 5. AASHTO M246 - Steel Sheet, Polymer Precoated for Corrugated Steel Pipe.
- B. American Concrete Institute, 22400 W. Seven Mile Road, Detroit, Michigan 48219.
 - 1. ACI 301 - Specification for Structural Concrete for Buildings.

445

96001
02/17/97

- C. American Society for Testing and Materials, 1961 Race Street, Philadelphia, Pennsylvania 19103.
1. ASTM C14 - Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 2. ASTM C76 - Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 3. ASTM C412 - Specification for Concrete Drain Tile.
 4. ASTM C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 5. ASTM C444 - Specification for Preformed Concrete Pipe.
 6. ASTM C478 - Specification for Precast Reinforced and Nonreinforced Masonry.
 7. ASTM C700 - Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 8. ASTM D1785 - PVC Plastic Pipe, Schedules 40, 80, and 120.
 9. ASTM D3034 - Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

PART 2. PRODUCTS

2.1 PIPE AND CULVERTS

- A. Corrugated Steel Pipe and Culverts: Provide as specified on the drawings.
1. Flared end sections for corrugated steel pipe:
 - a. In compliance with latest AASHTO specifications.
 - b. Galvanized to AASHTO standards.
 - c. Install as per AASHTO and manufacturer's recommendation.
- B. Flared End Sections for Corrugated Steel Pipe:
1. In compliance with latest AASHTO specifications.
 2. Polymer coated to AASHTO Standards.
 3. Install per AASHTO and manufacturer's recommendations.
- C. Reinforced Concrete Pipe:
1. Class III or as shown on Drawings.
 2. Conform to ASTM C76.
 3. Joints shall conform to ASTM C443.

2.2 PIPE JOINT MATERIAL

- A. Band Couplers:
1. Manufacturers:
 - a. LUV band, with 2 annular corrugations, by Caldwell Culvert; or equal.
 - b. Smooth Cor band, with 2 annular corrugations by Caldwell Culvert; or equal.
 2. Minimum gage in accordance with AASHTO M36.
 3. Gaskets: Ram Neck.

• 446

- B. Reinforcing End Collars:
 - 1. 12-gage.
 - 2. 6 inches wide.
 - 3. Annular corrugations same as pipe.

2.3 COATINGS FOR PIPE AND CULVERTS

- A. Polymer:
 - 1. AASHTO M218, M245, and M246.
 - 2. Thickness: 10 mils, both sides.
 - 3. Equal to Dow Chemical Trenchcoat protective film as furnished by Caldwell Culvert Company, North Little Rock, Arkansas.

2.4 MATERIALS FOR CAST-IN-PLACE CONCRETE

- A. Conform to Section 03300.
- B. Design mix to attain minimum 3,000 psi compressive strength at 28 days.

2.5 PRE-CAST CONCRETE STRUCTURES

- A. Conform to local standards.
- B. Conform to ASTM C478.

2.6 METAL GRATES, COVERS, AND FRAMES (CAST IRON GRATES, COVERS, AND FRAMES SUBJECT TO VEHICLE TRAFFIC)

- A. All frame, covers, grates, and other castings shall be heavy-duty cast iron and shall be non-rocking, machine surfaces bearing surfaces.
- B. Furnish frames with anchors for attachment to concrete work.
- C. Furnish covers with pry holes or flush type drop handles and non-slip surfaces.
- D. Cast iron castings to be size and type shown on Drawings.

PART 3. EXECUTION

3.1 INSTALLATION OF PIPE AND CULVERTS

- A. Lay sections on properly compacted granular bedding (4-inch minimum) to lines and grades shown on Drawings.
- B. Backfill with approved imported granular materials as specified in Section 02225.
- C. Band Couplers:
 - 1. Install band couplers in accordance with manufacturer's recommendations and AASHTO guidelines.
 - 2. Use Ram Neck gasket material in end corrugation of each pipe end.
- D. Reinforcing End Collars:
 - 1. Install reinforcing end collar where pipe terminates without protective end treatment, such as headwall, inlet box, or grouted rip rap.
- E. Storm drains shall have a minimum cover of 24 inches.
- F. Pipes (storm, sanitary, water) that cross each other with less than 1-1/2-foot clearance must have a concrete encased intersection.

3.2 INSTALLATION OF INLETS AND JUNCTION BOXES

- A. Conform to city standard construction details.
- B. Construction methods to conform to Section 03300.
- C. Construct concrete drainage structures with exposed concrete surfaces rubbed to smooth finish and with metal frames for grates and covers securely anchored in place.
- D. Structures may be cast-in-place or pre-cast.
- E. Frame castings to be securely held in place to proper line and grade to make an integral part of the complete structure.
- F. Construct catch basin, weirs, headwalls and similar structures of reinforced concrete unless otherwise indicated; pre-cast concrete units as approved.
 - 1. Provide concrete foundations for manholes and other structures.
 - 2. Concrete structures shall be reinforced.
 - 3. All concrete construction shall receive a smooth finish in accordance with ACI 301 on all surfaces exposed to exterior or interior of structure; rough formed for all unexposed construction.
 - 4. Moist cure concrete for a minimum of seven days after placing.

- G. Where manholes occur in pavement, set tops of frames and covers flush with finish surface. Elsewhere, set tops 3 inches above finish surface, unless otherwise indicated.
- H. Backfill at structures and compact in accordance with Section 02225.

END OF SECTION

449

96001
02/17/97

- 5 -

02720

SECTION 02730

SEWAGE COLLECTION SYSTEM

PART 1. GENERAL

1.1 SUMMARY

- A. Provide sewage collection system.
- B. Perform pressure and leakage testing of piping.

1.2 RELATED SECTIONS

- A. Section 02225 - Trench Excavation, Backfill, and Compacting.
- B. Section 03300 - Cast-in-Place Concrete.
- C. City of Austin Specification 510.

1.3 SHOP DRAWINGS

- A. Submit specific selection of pipe material and joint type for each pipeline in accordance with Section 01300.

1.4 STANDARDS, SPECIFICATIONS, AND CODES

- A. Building drainage (including floor drains) and vent systems shall conform to Uniform Plumbing Code.

PART 2. PRODUCTS

2.1 GENERAL

- A. Unless otherwise specified or shown on Drawings, pipe used for wastewater conveyance shall conform to ASTM D3034, SDR-35 PVC pipe.
- B. Like items of material provided hereunder shall be the end products of one manufacturer.
- C. To assure uniformity and compatibility of piping components in piping systems, fittings and couplings shall be furnished by the same manufacturer.

450

2.2 PIPE ENDS FOR BURIED PIPING

- A. Use push-on joint pipe ends for buried pipe.
- B. Within limitations noted above, pipe materials and joints do not necessarily have to be the same for all lines in a specific service, except that materials and joints for any particular building, or between any two buildings, or for any particular buried line, shall be the same.
- C. No change in material or joint selection will be permitted after submittal of shop drawings and their final review by Engineer.

PART 3. EXECUTION

3.1 PIPE PREPARATION AND HANDLING

- A. Each pipe and fitting shall be carefully inspected before exposed pipe or fitting is installed or buried pipe or fitting is lowered into trench.
- B. Clean ends of pipe thoroughly.
- C. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
- D. Use proper implements, tools, and facilities for the safe and proper protection of the pipe.
- E. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe.
- F. Do not drop or dump pipe into trenches under any circumstances.

3.2 PREPARATION OF TRENCH - LINE AND GRADE

- A. Do not deviate more than 1/2 inch from line or 1/2 inch from grade. Measure for grade at the pipe invert, not at the top of the pipe, because of permissible variation in pipe wall thickness.
- B. Grade the bottom of the trench by hand to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for pipe base when specified or indicated.
- C. Remove hard spots that would prevent a uniform thickness of bedding.
- D. Before laying each section of the pipe, check the grade with a straightedge and correct any irregularities found.

- E. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

3.3 BELL (JOINT) HOLES

- A. At the location of each joint, dig bell (joint) holes of ample dimensions in the bottom of the trench and at the sides where necessary to permit easy visual inspection of the entire joint.

3.4 REMOVAL OF WATER

- A. Provide and maintain ample means and devices at all times to remove and dispose of all water entering the trench during the process of pipe laying.
- B. The trench shall be kept dry until the pipe laying and jointing are completed.
- C. Removal of water shall be in conformance with specifications in Section 02225.

3.5 PREVENT TRENCH WATER AND ANIMALS FROM ENTERING PIPE

- A. When pipe laying is not in progress, including noon hours, open ends of pipe shall be closed; and no trench water, animals, or foreign material shall be permitted to enter the pipe.

3.6 PIPE COVER

- A. Minimum pipe cover shall be 2-1/2 feet unless otherwise indicated.

3.7 LAYING BURIED PIPE

- A. All buried pipe shall be prepared as specified and shall be laid on the prepared base and bedded to ensure uniform bearing.
- B. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable.
- C. Joints shall be made as herein specified for the respective types.
- D. Take all precautions necessary to prevent uplift and floating of the pipe prior to backfilling.

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3.8 TESTING - GENERAL

- A. Conduct pressure and leakage tests on all newly installed pipelines.
- B. Furnish all necessary equipment and material and make all taps in the pipe, as required.
- C. The Engineer will monitor the tests.

3.9 TESTING NEW PIPE WHICH CONNECTS TO EXISTING PIPE

- A. New pipelines which are to be connected to existing pipelines shall be tested by isolating the new pipe with grooved end pipe caps, spectacle blinds, or blind flanges.

3.10 GRAVITY SEWERS - ALIGNMENT

- A. Before final acceptance of the Work, the Engineer will test all lines for light.
- B. Furnish such men and lanterns as Engineer may require for this purpose.
- C. Should any line deviate more than 1/2 inch from a straight line between manholes, the line may be rejected by Engineer.
- D. Contractor shall bear full cost of removing and replacing lines rejected by Engineer.

3.11 GRAVITY SEWERS LEAK TEST

- A. All sewers shall pass leakage tests as specified.
- B. Leakage test must be performed in the presence of Owner's representative.

C. Leakage Test by Low Pressure Air Loss:

1. Plug pipe outlets with suitable test plugs.
2. Brace each plug securely.
3. Pipe air supply to pipeline to be tested so that air supply may be shut off, pressure observed, and air pressure released from the pipe without entering the manhole.
4. A valved branch should be left in the supply line past the shut-off valve terminating in a 1/4-inch female pipe thread for installation of the Owner's test gage.
5. Add air slowly to portion of pipe under test until test gage reads at least 4 psig but less than 5 psig.
6. Shut air supply valve and allow at least 2 minutes for internal pressure to stabilize.
7. Determine time in seconds for pressure to fall 1 psig so that pressure at the end of time of the test is at least 2.5 psig.
8. Compare observed time with minimum allowable times in the Test Chart for Air Testing at the end of this Section for pass/fail determination.
9. Where ground water level is above the crown of the pipe being tested, test pressure should be increased by 0.4333 psi for each foot the ground water level is above the invert.
10. Do not enter manhole while the line is pressurized.

3.12 MANDREL TEST

- A. Perform deflection (reduction in vertical inside diameter) tests between successive manholes on PVC gravity sewer pipe at least 30 days after installation.
- B. Perform tests utilizing a sharp edge Mandrel.
- C. Deflection shall not exceed 5 percent.
- D. Mandrel dimensions based on 5 percent deflection shall be as follows:
 1. 6-inch diameter pipe: 5.70-inch Mandrel OD.
 2. 8-inch diameter pipe: 7.60-inch Mandrel OD.
 3. 10-inch diameter pipe: 9.50-inch Mandrel OD.
 4. 12-inch diameter pipe: 11.40-inch Mandrel OD.

3.13 TEST RECORDS

- A. Records shall be made of each piping system installation during the test. These records shall include:
 1. Date of test.
 2. Description and identification of piping tested.
 3. Test fluid.
 4. Test pressure.
 5. Remarks, to include such items as:
 - a. Leaks (type, location).
 - b. Repairs made on leaks.

6. Certification by Contractor and written approval by Engineer.

3.14 INTERIM CLEANING

- A. Care shall be exercised during fabrication to prevent the accumulation of weld rod, weld spatter, pipe cuttings and filings, gravel, cleaning rags, etc. within piping sections.
- B. All piping shall be examined to assure removal of these and other foreign objects prior to assembly.
- C. Shop cleaning may employ any conventional commercial cleaning method if it does not corrode, deform, swell, or otherwise alter the physical properties of the material being cleaned.

3.15 EXTERIOR PROTECTION FOR BURIED OR SUBMERGED PIPING ACCESSORIES

- A. All buried, submerged, or embedded mechanical joint fittings and valves shall be wrapped with 8 mil polywrap.

455

TEST CHART FOR AIR TESTING SEWERS

LEAKAGE TESTING OF SEWERS BY LOW PRESSURE AIR LOSS--
TIME PRESSURE DROP METHOD

Minimum time in seconds for 1 psig drop (3.5 psig to 2.5 psig)

Distance Between Manholes	Nominal Pipe Diameter							
	6	8	10	12	15	18	21	
24								
100	40	70	100	155	245	350	480	625
150	60	105	165	235	365	500	595	680
200	80	140	220	315	425	510	595	680
250	100	176	270	340	425	510	595	680
300	120	215	283	340	425	510	595	680
350	140	226	283	340	425	510	595	680
400	160	226	283	340	425	510	595	680
450	170	226	283	340	425	510	595	680
500				340	425	510	595	680
550						510	595	680
600							595	680

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 WORK INCLUDED

This section defines requirements for design, construction, erection and removal of concrete formwork.

1.02 RELATED WORK

Coordinate the requirements of this section with all other sections of Division 3 - Concrete.

1.03 REFERENCE STANDARD

American Concrete Institute; ACI 347, "Recommended Practice for Concrete Formwork."

1.04 SUBMITTALS

A Product Data and Samples

1. Form-coating Materials. Submit trade or brand names of manufacturer and complete description of products.

PART 2 PRODUCTS

2.01 FORM MATERIAL

A Smooth Forms.

1. Construct formwork with plywood; tempered, concrete-form hard-board; dressed lumber faced with plywood or fiberboard lining; metal; plastic; or metal-framed plywood-faced panel material acceptable to the Engineer to provide continuous, straight smooth surfaces. Form material shall be free of raised grain, torn surfaces, worn edges, patches, dents or other defects. Furnish material in largest practical sizes to minimize the number of joints and, when shown on the drawings, conform to the joint system shown. Form material shall have sufficient strength and thickness to withstand the pressure of newly placed concrete without bow or deflection.

2. Smooth forms shall be used on all formed concrete surfaces specified to have a smooth form finish or rubbed finish in the Concrete Finishing section.

B Rough Forms.

1. Construct forms of dressed or undressed lumber free of knots, splits, or other defects; plywood; metal; or other material acceptable to the Engineer. Material shall have sufficient strength and thickness to withstand the pressure of newly placed concrete without bow or deflection.
2. Rough forms may be used on all formed concrete surfaces specified as "surfaces requiring no finish" in the Concrete Finishing section.

2.02 FORM ACCESSORIES

A Form Ties.

1. Use commercially manufactured ties, hangers, and other accessories for embedding in concrete. Use of wire which is not commercially fabricated as form accessories is not permitted.
2. Ties specified to be removed from the face of the concrete shall be provided with cones on the outer ends of each tie with a minimum diameter of $\frac{1}{2}$ inch and length as specified for minimum embedment of tie or fastener ends.
3. When the formed concrete face will be exposed to view in the completed structure remove ends or end fasteners of form ties so that the embedded portion is at least $\frac{3}{4}$ inch or twice the minimum dimension of the tie from formed concrete faces. When the formed concrete face will not be permanently exposed to view in the completed structure, form ties may be cut flush with formed surfaces.

- B Form Coating -** Use commercial formulation of form oil or form-release agent having proven record of satisfactory performance. Coating must not bond with, stain, or adversely affect concrete surfaces. It must not impair subsequent treatment of concrete surfaces, including bonding agents, curing compounds and membrane waterproofing.

- C Chamfer Strips -** Provide in corners of forms to produce beveled edges at specified locations. Size of chamfer is $\frac{3}{4}$ inch unless shown otherwise.

2.03 DESIGN OF FORMWORK

- A Form Design - The design and engineering of all concrete formwork, including all shoring, bracing and reshoring, shall be the responsibility of the Contractor. Design formwork for loads, lateral pressure, and allowable stresses as described in ACI 347. Allow for design consideration, wind loads, allowable stresses and other applicable requirements of controlling local building codes. Camber formwork to compensate for anticipated deflection during placement of concrete when required to maintain specified tolerances. Design formwork to be readily removed without impact, shock, or damage to concrete surfaces and adjacent materials.
- B Earth Cuts for Forms - For grade beams cast monolithically with slabs on grade, use earth cuts for forming the unexposed side of the grade beam.
- C Slip Forming - Not permitted.

PART 3 EXECUTION**3.01 FORMWORK CONSTRUCTION**

- A General.
 - 1. Construct and maintain formwork, complying with ACI 347 and these specifications, so that it will maintain correct sizes of members, shape, alignment, elevation and position during concrete placement and until concrete has gained sufficient strength. Provide for openings, offsets, sinkages, keyways, recesses, moldings, anchorages and inserts, as required.
 - 2. Construct forms for easy removal without damage to concrete surfaces.
 - 3. Formwork shall be sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
 - 4. Chamfer strips shall be placed in forms to bevel all edges and corners permanently exposed to view, except the top edges of walls and slabs which are shown to be tooled. Edges of formed joints and interior corners shall not be beveled unless shown or specified otherwise. Equipment bases shall have formed beveled edges for all vertical and horizontal corners. Unless otherwise noted, bevels shall be 3/4 inch wide.
 - 5. If runways are required for moving equipment, provide for support of runways with struts or legs resting directly on the formwork or structural member. Do not allow runways or supports to rest on reinforcing steel.

- B Forms for Surfaces Exposed to View.**
1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Form ties shall be uniformly spaced and aligned in horizontal and vertical rows.
 2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
 3. Form molding shapes, recesses and projections with smooth-finish materials and install in forms with sealed joints to prevent displacement.
 4. Form exposed corners of beams and columns to produce square, smooth, solid, unbroken lines. Provide all exterior exposed corners with 3/4-inch chamfer.
 5. Arrange facing material in an orderly and symmetrical fashion. Keep the number of seams to a practical minimum. Support facing material adequately to prevent deflection in excess of allowable tolerances.
 6. For flush surfaces exposed to view in the completed structure, overlap previously placed, hardened concrete with form sheathing by approximately 1 inch. Hold forms against hardened concrete to maintain true surfaces, preventing offsets or loss of mortar.
- C Edge Forms and Screed Strips for Slabs - Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finish slab surface. Provide and secure units to support types of screeds required.**
- D Beams on Grade.**
1. **Perimeter Beams.**
 - a. **Exterior Face.** Provide a form for the height of the exterior face of the beam to be exposed to view. Face of beam that will not be exposed to view may be earth formed.
 - b. **Interior Face.** May be earth formed or formed.
 2. **Beams Under Slabs.** Place against earth cuts.

3.02 TOLERANCES

- A Construct formwork so that concrete surfaces will conform to tolerance limits as shown in ACI 347.**
- B Establish sufficient control points and bench marks as references for tolerance checks. Maintain these references in undisturbed condition until final completion and acceptance of the project.**

3.03 ADJUSTMENTS OF FORMWORK

- A Use wedges or jacks to provide positive adjustment of shores and struts. Wedges used for final adjustment of forms should be fastened in position after final inspection and before concrete placement.
- B Securely brace forms against lateral deflections. Prepare to compensate for settling during concrete placement.
- C For wall openings, construct wood forms that facilitate any necessary loosening to counteract swelling of forms.

3.04 PREPARATION OF FORM SURFACES

- A Before placing concrete, clean surfaces of forms and embedded materials. Remove accumulated mortar, grout, rust and other foreign matter.
- B Coat forms for exposed or painted concrete surfaces with form oil or form-release agent before placing reinforcement. Cover form surfaces with coating material used in strict accordance with the manufacturer's printed instructions. Do not allow excess coating material to accumulate in forms or to contact hardened concrete against which fresh concrete will be placed. Remove coating material from reinforcement before placing concrete.

3.05 REMOVAL OF FORMS

- A Forms on vertical surfaces, when repair of surface defects or finishing is required before concrete is aged, may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations.
- B Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging. Loosen wood forms for wall openings as soon as this can be accomplished without damage to concrete. Formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete may be removed after 12 hours provided that concrete has hardened sufficiently to resist damage from removal operations and provided the removal of these forms will not disturb members supporting the weight of the concrete.
- C All forms and shoring used to support weight of concrete or any construction loads shall remain in place until concrete has reached the minimum strength specified for removal of forms and shoring. In no case shall forms be removed in less than 4 days.

3.06 REMOVAL STRENGTH

- A Control Tests - Suitable strength control tests will be used as evidence that concrete has attained specified strength for removal of formwork or shoring supporting weight of concrete in beams, slabs, and other structural members.
1. Field-Cured Test Cylinders. When field-cured test cylinders reach the specified removal strength, formwork or shoring may be removed from the respective concrete placements. Strength data from field-cured test cylinders shall be furnished by the Contractor.
 2. Laboratory-Cured Test Cylinders. When concrete has been cured as specified for cast-in-place concrete for the same time period required by laboratory-cured cylinders to reach specified strength, the formwork or shoring may be removed from respective concrete placements. Determine the length of time that the concrete placement has been cured by totaling the number of days or fraction of days, not necessarily consecutive, during which the air temperature surrounding the concrete is above 50 F and the concrete has been damp or thoroughly sealed against evaporation and loss of moisture.
- B Compressive Strengths - The minimum concrete compressive strengths for removal of all formwork supporting the weight of concrete shall be 75 percent of the specified minimum 28-day strength of the class of concrete involved.

3.07 FORM REUSE

Do not reuse forms that are worn or damaged beyond repair. Thoroughly clean and recoat forms before reuse. For wood and plywood forms to be used for exposed smooth finish, sand or otherwise dress concrete contact surface to original condition or provide form liner facing material. For metal forms, straighten, remove dents and clean to return to original condition.

END OF SECTION 03100

SECTION 03200**CONCRETE REINFORCEMENT****PART 1 GENERAL****1.01 SCOPE**

This section specifies requirements for all concrete reinforcement except prestressing tendons. Also included is grouting of reinforcement dowel bars.

1.02 RELATED WORK

- A Division 2 - Site Work. Drilled Shaft Foundations.
- B Division 3 - Concrete. Coordinate the requirements of this section with all other sections of Division 3 - Concrete.

1.03 REFERENCE STANDARDS

- A American Society for Testing and Materials (ANSI/ASTM).
 - 1. ANSI/ASTM A 36 - Standard Specification for Structural Steel.
 - 2. ANSI/ASTM A 83 - Standard Specification for Cold-Drawn Steel Wire for Concrete Reinforcement.
 - 3. ANSI/ASTM A 185 - Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement.
 - 4. ANSI/ASTM A 497 - Standard Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - 5. ANSI/ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 6. ANSI/ASTM A 675 - Standard Specification for Steel Bars and Bar Size Shapes, Carbon, Hot-Rolled Special Quality, Subject to Mechanical Property Requirements.
- B American Concrete Institute (ACI).
 - 1. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.
 - 2. ACI 318-77 - Building Code Requirements for Reinforced Concrete.
- C Concrete Reinforcing Steel Institute (CRSI) - CRSI Manual of Standard Practice.

- D American Welding Society (AWS) - AWS D12.1 - Reinforcing Steel Welding Code.

1.04 SUBMITTALS

A Certificates.

1. Submit the manufacturer's certificates giving the properties of steel proposed for use. List the manufacturer's test number and heat number, chemical analysis, yield point, tensile strength and percent elongation. Also identify on the certificates the proposed location of the steel in the work.
2. When reinforcing bars of foreign manufacture are proposed for use, the material shall be tested for conformance to ANSI/ASTM requirements by a certified independent testing laboratory located in the United States. Certification from any other source is not acceptable. Furnish copies of the test reports to the Engineer for review. Do not begin fabrication of reinforcement until the material has been approved. The cost of testing shall be borne by the supplier.

- B Bill of Materials - Submit bills of materials to be reviewed with shop drawings.

C Shop Drawings.

1. Submit shop drawings according to the General Conditions and Division 1, General Requirements. Show reinforcement fabrication, bar placement location, splices, spacing and bar designation, bar type, length, size, bending, number of bars, location of bars to accommodate post-tensioning tendons, bar support type, and other pertinent information, including dimensions. Information must correspond directly to data listed on the bill of materials.
2. Provide sufficient detail to permit placement of reinforcement without use of design drawings. Reproduction of design drawings for use as shop drawings will not be allowed. Do not begin fabrication of reinforcing steel until after shop drawings have been reviewed by the Engineer.
3. Detail shop drawings in accordance with ACI 315.

D Manufacturer's Technical Literature.

1. Mechanical Bar Splices. If mechanical bar splices proposed for use are different than those specified, submit manufacturer's technical literature, including specifications and installation instructions, to the Engineer for review. Show the type of mechanical splice proposed for use on the shop drawings.
2. Epoxy Grout. Submit manufacturer's technical literature on the epoxy grout proposed for anchoring reinforcing dowels to hardened

concrete. Information shall include manufacturer's recommended application procedures.

1.05 HANDLING AND STORAGE

Store steel reinforcement above the ground on platforms, skids or other supports. Protect reinforcing, as far as practicable, from mechanical injury, surface deterioration and rusting caused by exposure to the weather.

1.06 NOTIFICATION

Notify the Testing Laboratory at least 48 hours before concrete placement so that reinforcement may be inspected and errors corrected without delaying the work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A Deformed Bars - Use deformed bars conforming to ANSI/ASTM A 615 including Supplementary Requirements SI, grade as shown on drawings, for all bars except column spirals and those shown on drawings to be smooth bars. All reinforcing steel shall be Grade 60.
- B Smooth Bars - Use smooth bars conforming to ANSI/ASTM A 36, ANSI/ASTM A 615, Grade 60, or ANSI/ASTM A 675, Grade 70 for all bars shown on the drawings to be smooth bars.
- C Marking - Clearly mark all bars with waterproof tags showing the number of bars, size, mark, length and yield strength. Mark steel with the same designation as the member in which it occurs. Key marks to the concrete placement number as designated on the concrete placement sequence shop drawings.
- D Welded Wire Fabric.
 - 1. Welded Smooth Wire Fabric. Conform to ANSI/ASTM A 185.
 - 2. Welded Deformed Wire Fabric. Conform to ANSI/ASTM A 497.
 - 3. Provide wire size, spacing and type as shown. Where type is not shown on the drawings use welded smooth wire fabric.
 - 4. Furnish welded wire fabric in flat sheets only.

2.02 TIE WIRE

Use 18-gage annealed steel for tie wire.

2.03 BAR SUPPORTS

Provide sufficient numbers of supports of strength required to carry reinforcement. Bar supports and accessories shall be of the sizes required to provide concrete cover as specified. Bar supports and other metal accessories shall conform to the requirements of CRSI Manual of Standard Practice. Use the following type legs for the surfaces listed:

- A Concealed - Plain steel wire or any other type listed under B. below.
- B Exposed - Galvanized, plastic-coated, solid plastic, or stainless steel.
- C Slabs on grade - Chairs with sheet metal bases.

2.04 EPOXY GROUT

Epoxy grout shall be a high-strength rigid epoxy adhesive manufactured for the purpose of anchoring dowels into hardened concrete. Acceptable products are:

- A Horizontal or Overhead Dowels - Sika's "SIKADUR Hi-Mod Gel No. 390", or equal.
- B Vertical Dowels - Sika's "SIKADUR Hi-Mod No. 370" Hilti "HITC-100 Adhesive", Hilti "High Strength Epoxy, or equal.

2.05 FABRICATION

- A Bending - Fabricate bars to the shapes shown on the drawings by cold bending. Bends shall conform to the minimum bend diameters specified in ACI 318. Do not straighten or rebend bars without specific approval.
- B Splices - Locate splices as shown on the drawings. Where it is necessary to splice reinforcement at locations other than shown on the drawings, the splices shall be approved by the Engineer. Use a minimum number of splices located at points of minimum stress. Stagger splices in adjacent bars. Length of lap splices shall be in accordance with ACI 318 unless shown otherwise. The ends of bars at mechanical splices shall be prepared in accordance with the splice manufacturer's requirements.
- C Construction Joints - Reinforcing shall be continuous through construction joints.
- D Fabrication Tolerances - Bars must conform to the following fabrication tolerances:

MeasurementTolerance
in Inches

Sheared length	± 1
Depth of truss bars to 8-inch depth	$+0, -\frac{1}{4}$
Depth of truss bars over 8-inch depth	$+0, -\frac{1}{2}$
Stirrups, ties and spirals	$\pm \frac{1}{4}$
All other bends	± 1

PART 3 EXECUTION**3.01 CLEANING**

Clean reinforcement of all scale, loose or flaky rust or other foreign material, including oil, mud or coating that will reduce the bond to concrete.

3.02 PLACEMENT

A Placement Tolerances - Place reinforcement within the following tolerances.

PlacementTolerance
in Inches

Concrete cover to formed surfaces	$\pm \frac{1}{4}$
Minimum spacing between bars	$\pm \frac{1}{4}$
Top bars in slabs and beams to 8-inch depth	$\pm \frac{1}{4}$
Top bars in slabs and beams between 8 and 24-inch depth	$\pm \frac{1}{2}$
Top bars in slabs and beams more than 24 inches in depth	± 1
Crosswise of members spaced evenly within	± 2
Lengthwise of members	± 2

B Interferences - If reinforcing interferes with the location of other reinforcing steel, conduits or embedded items, bars may be moved within specified tolerances or one bar diameter, whichever is greater. If greater movement of bars is required to avoid interference, notify the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without approval of the Engineer.

- C Concrete Cover - Except as otherwise shown, provide a clear cover measured from reinforcement to the face of the concrete as listed.

<u>Surfaces</u>	<u>Minimum Cover in Inches</u>
Interior not exposed to weather	
Slabs, joists and walls	3/4
Beams, girders and columns	1½
<u>Surfaces</u>	<u>Minimum Cover in Inches</u>
Exterior not in contact with earth or water	
Slabs and walls, No. 5 and smaller bars	1
Slabs and walls, No. 6 through No. 11 bars, formed surfaces	1½
Beams, girders and columns	2
Exterior formed surfaces in contact with earth or fresh water	
Slabs and walls, No. 5 and smaller bars	1½
Slabs and walls, No. 6 through No. 11 bars	2
Beams, girders and columns	2½
Exposed to salt water or salt spray	
Slabs and walls	2
Beams, girders and columns	3
Footings	
Top and sides	2
Bottom	3
All surfaces cast against and permanently exposed to earth	3
Increase minimum cover under the following conditions:	
Cover of top bars for slabs without wearing surface designed to carry vehicular traffic	½
When using No. 14 through No. 18 bars	½

- D** Placement in Forms - Use spacers, chairs, wire ties and other accessory items necessary to properly assemble, space and support reinforcing. Provide accessories of sufficient number, size and strength to adequately prevent deflection or displacement of reinforcement due to construction loads or concrete placement. Use appropriate accessories to position and support bolts, anchors and other embedded items. Tie reinforcing bars at each intersection and to accessories. Blocking reinforcement with concrete or masonry is prohibited.
- E** Placement for Concrete on Ground - Support reinforcement on precast concrete blocks spaced at approximately 3 feet on centers each way. Use a minimum of one block for each 9 square feet. Tie blocks to at least one reinforcing bar using tie wires embedded in the block.
- F** Splices.
1. Do not splice bars, except at locations shown on the drawings or the reviewed shop drawings, without approval of the Engineer.
 2. Lap Splices. Tie securely with wire to prevent displacement of splices during placement of concrete.
- G** Construction Joints - Unless otherwise detailed on the drawings, place reinforcing continuous through construction joints.
- H** Welded Wire Fabric - Install wire fabric in the longest lengths practicable. Lap adjoining pieces at least one full mesh plus 2 inches or 6 inches, whichever is larger, and lace splices with wire. Do not make end laps midway between supporting beams, or directly over beams. Offset end laps in adjacent widths to prevent continuous laps.
- I** Field Bending - Shape reinforcing bent during construction operations to conform to the drawings. Bars shall be cold-bent; do not heat bars. Closely inspect the reinforcing for breaks. If reinforcing is damaged, replace, Cadweld or otherwise repair as directed by the Engineer. Do not bend reinforcement after it is embedded in concrete.
- J** Field Cutting - Reinforcing bars cut on the job shall be cut by shearing or sawing. Do not cut bars with a cutting torch unless approved by the Engineer.
- K** Welding - Welding of reinforcing bars is prohibited except where shown on the drawings or directed by the Engineer. Welding shown on the drawings or directed by the Engineer shall be performed by certified welders and shall conform to the requirements of AWS D12.1, Reinforcing Steel Welding Code.

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3.03 GROUTING OF REINFORCING BARS

Use specified epoxy grout for anchoring reinforcing steel to existing concrete. Drill hole in existing concrete that is $\frac{1}{4}$ -inch to $\frac{1}{2}$ -inch larger than the diameter of the reinforcing bar. Immediately prior to installation of the reinforcing bar, blow the hole clean of all debris using compressed air. Partially fill the hole with epoxy. Use enough epoxy so that when the bar is inserted, the epoxy grout will completely fill the hole around the dowel. Dip the end of the reinforcing bar in epoxy and install into the partially filled hole. Follow manufacturer's instructions in use of epoxy.

END OF SECTION 03200

03200

470

Section 03200-8

SECTION 03250**CONCRETE JOINTS AND EMBEDDED ITEMS****PART 1 GENERAL****1.1 WORK INCLUDED**

This section specifies requirements for all concrete joints and embedded items for all cast-in-place concrete except paving.

1.2 RELATED WORK

Coordinate work of this section with all other sections to obtain a proper installation. Review all drawings and specifications for additional requirements for joints and embedded items.

1.3 REFERENCE STANDARDS

- A American Society for Testing and Materials (ANSI/ASTM).
 - 1. ANSI/ASTM A 120 - Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.
 - 2. ANSI/ASTM C 881 - Standard specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - 3. ANSI/ASTM D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - 4. ANSI/ASTM D 1190 - Standard Specification for Concrete Joint Sealer, Hot-Poured Elastic Type.
 - 5. ANSI/ASTM D 1751 - Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 6. ANSI/ASTM D 1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
 - 7. ANSI/ASTM D 1850 - Standard Specification for Concrete Joint Sealer, Cold-Application Type.

8. ANSI/ASTM D 2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

B Federal Specifications.

1. TT-S-00227E - Sealing Compound Elastomeric Type, Multi-Component (for Caulking, Sealing and Glazing in Buildings and Other Structures).
2. TT-S-00230C - Sealing Compound Elastomeric Type, Single Component (for Caulking, Sealing and Glazing in Buildings and Other Structures).

C U.S. Army Corps of Engineers (CRD) - CRD-C572. Corps of Engineers Specifications for Polyvinyl Chloride Waterstops.

D American Concrete Institute (ACI) - ACI 503.2. Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive.

1.4 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions and Division 1 - General Requirements. Submit the following items:

A Shop Drawings.

1. Shop drawings shall show proposed layout of construction joints in concrete work. Contractor shall coordinate the details of all construction joints with the reinforcing steel fabricator. Construction joint layout shall be determined prior to or concurrent with preparation of reinforcing steel shop drawings.
2. Shop drawings shall show size and location of all embedded items in the concrete such as pipe sleeves (horizontal and vertical), steel angles and plates, waterstops, reveals, etc. Contractor shall review architectural, structural, mechanical and electrical drawings and specifications for items required to be cast into the concrete and locate them on the shop drawings.

B Product Data.

1. When substitutions are proposed by the Contractor for acceptable brands of materials specified herein, submit brochures and samples of proposed substitutions to the Engineer for approval before delivery to the project.

2. Submit manufacturer's technical literature on product brands, proposed for use by the Contractor, to the Engineer for review. The submittal shall include the manufacturer's installation and/or application instruction. Submittals shall be made on the following products:
 - (a) Joint sealing compound and primer.
 - (b) Bonding agent.

PART 2 PRODUCTS

2.1 EXPANSION JOINT FILLER

- Preformed bituminous type conforming to ANSI/ASTM D 994 or cane fiber asphalt-impregnated type conforming to ANSI/ASTM D 1751. Provide 3/4-inch-thick filler unless otherwise shown.

2.2 JOINT SEALING COMPOUNDS

Single- or multi-component cold-applied elastomeric type joint sealants conforming to Federal Specification TT-S-00227E for a multi-component sealant or Federal Specification TT-S-00230C for a single-component sealant. Sealant shall be Class A, Type I or II as required by the project application. Sealant shall be gray in color. Provide joint primer according to manufacturer's recommendation.

2.3 CONCRETE BONDING AGENT

Shall permanently bond fresh wet concrete to cured concrete and shall conform to ANSI/ASTM C 881, Type II. Grade and class shall be as required for the project application. A field service representative of the manufacturer shall be available during initial application to instruct the Contractor in the proper use of the product when so requested by the Engineer or the Contractor.

2.4 BOND BREAKER

30-pound asphalt saturated felt.

2.5 SLEEVES

ANSI/ASTM A 120, standard weight galvanized pipe.

2.6 WATERSTOPS

Waterstops shall be preformed plastic waterstop conforming to the requirements of Federal Specifications SS-S-00210, "Sealing Compound, Preformed Plastic for Expansion Joints," Type I or Type II. Waterstop shall be equal to Synko-Flex waterstop as manufactured by Synko-Flex Products Company.

2.7 MISCELLANEOUS EMBEDDED METAL ITEMS

Miscellaneous embedded metal items shall conform to the requirements of the section of the specifications to which they apply.

PART 3 EXECUTION**3.1 PLACEMENT OF EMBEDDED ITEMS**

- A Place embedded items to least impair strength of the structure. Obtain approval of locations for embedded items not shown on the structural drawings before placement of concrete. Should locations of embedded items be detrimental to the strength of the structure, notify the Engineer and relocate items as directed by the Engineer.
- B Do not cut or reposition reinforcing steel to facilitate installation of inserts, conduit, sleeves, anchor bolts, mechanical openings and similar items without prior approval of the Engineer, except that reinforcing bars may be moved on bar diameter or within tolerances specified in the Concrete Reinforcement section without approval of the Engineer.

3.2 CONSTRUCTION JOINTS

- A Make construction joints only at locations shown on the contract drawings, the reviewed shop drawings or as directed or approved by the Engineer. Any additional construction joints or relocation of construction joints shown on the drawings, proposed by the Contractor, must be submitted to the Engineer for review.

- B Joints shall be located to least impair strength of the structure. In general, locate joints near the middle of spans of slabs, beams and girders. However, if a beam intersects a girder at the joint, offset joints in girders a distance equal to twice the width of the beam. Locate joints in walls and columns at the underside of floors, slabs, beams or girders and at tops of footings or floor slabs. Place beams, girders, column capitals and drop panels monolithic with slabs. Place brackets and haunches monolithic with walls and columns.
- C All joints shall be perpendicular to main reinforcement. Continue all reinforcing steel and WVF across construction joints. Unless otherwise shown, provide longitudinal keys at least 1½ inches deep by one third of the wall thickness, centered in the wall, in all joints in walls and slabs and between walls and slabs or footings.
- D Construction joints in slabs on ground shall have a groove in the top of the slab, at the joint, as detailed.
- E Prepare joints by roughening the concrete surface in a manner which will expose aggregate uniformly. Remove laitance, loosened particles of aggregate, damaged concrete at surface, and other substances which may prevent complete adhesion. Prior to placing concrete, coat the joint surface with a mixture of neat cement grout.
- F In lieu of the above method for securing bond between new and set concrete, the following optional method may be used. Use a bonding agent applied to roughened and cleaned surfaces of set concrete in strict accordance with manufacturer's recommendations and these specifications with respect to preparation of surfaces and applications of bond agent.
- G Provide waterstops at joint locations as shown on the drawings.

3.3 EXPANSION JOINTS

- A Do not extend reinforcement or other embedded metal items that are continuously bonded to concrete through any expansion joints, unless otherwise detailed on the drawings.

- B Position expansion joint filler material accurately. Support against displacement during concrete placement and vibration. Place filler the full depth of the member less an allowance to form a groove for sealant as detailed.

3.4 DOWELS

Where indicated on drawings, install dowels at right angles to construction joints and expansion joints. Align dowels accurately with finished surface. Rigidly hold in place and support during concrete placement. Unless otherwise shown on the drawings, apply oil or grease to one end of all dowels through expansion joints.

3.5 ISOLATION JOINTS

- A Do not extend reinforcement or other embedded metal items through any isolation joints.
- B Position expansion joint filler material accurately. Support against displacement during concrete placement and vibration. Place filler the full depth of the member less an allowance to form a groove for sealant as detailed.

3.6 CONTRACTION JOINTS

- A Make top grooves for contraction joints in slabs on grade as detailed and seal as specified. Grooves may be made with forms or may be sawed.
- B If contraction joints are sawed, properly time cutting with concrete set. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses have developed sufficiently to induce cracking.

3.7 WATERSTOPS

- A Install in locations shown.
- B Each piece of waterstop must be of maximum practicable length for a minimal number of end joints.

- C Make joints at intersections and at ends of pieces in a manner most appropriate to the material being used and in accordance with manufacturer's recommendations. Joints must develop effective watertightness fully equal to that of continuous waterstop material, must permanently develop not less than 50 percent of mechanical strength of parent section, and must permanently retain flexibility. Whenever possible, the manufacturer's thermostatic splicing tool shall be used.

3.8 SEALING JOINTS

- A Thoroughly clean and prime joints to be sealed before applying sealant. Joints to be sealed are identified on the drawings.
- B Apply sealants in accordance with manufacturer's recommendations.
- C Sealant shall be applied when the ambient temperature is between 40 F and 90° F, unless recommended otherwise by the sealant manufacturer.
- D During pouring operations, exercise care to prevent sealant from spilling onto surfaces adjacent to grooves.

3.09 SETTING ANCHOR BOLTS

- A Set anchor bolts for structural steel as specified in Division 5 - Metals according to this section.
- B Install equipment anchor bolts as required by the equipment manufacturer.
- C Provide accurately made templates for positioning anchor bolts.

3.10 OTHER EMBEDDED ITEMS

- A It is the Contractor's responsibility to coordinate the requirements for embedded items and to ensure that embedded items are properly placed.
- B Accurately position and support embedded items against displacement during concrete placement.
- C Voids in sleeves, inserts, anchors, etc., shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

- D Steel items, except reinforcing, shall be galvanized unless specified or shown otherwise.
- E Conduits, pipes and inserts of aluminum shall not be embedded in structural concrete unless effectively coated or covered to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.
- F Except when plans for conduits and pipes are approved by the Engineer, conduits and pipes embedded within a slab, wall or beam (other than those merely passing through) shall satisfy the following:
 - 1. They shall not be larger in outside dimension than $\frac{1}{3}$ the overall thickness of the slab, wall or beam in which they are embedded.
 - 2. They shall not be spaced closer than three diameters or widths on center.
 - 3. They shall not significantly impair the strength of the member.

END OF SECTION

SECTION 03300**CAST-IN-PLACE CONCRETE****PART 1 GENERAL****1.01 WORK INCLUDED**

- A This section specifies requirements for normal-weight structural concrete and lightweight structural concrete.
- B Finishing of concrete surface, including patching of surface defects and sealing of concrete slabs, are specified in the "Concrete Finishing" section.
- C Specially prepared concretes, such as post-tensioned, precast architectural or other types, are specified in other sections of this division. All requirements of this section apply to those except as may be otherwise specified in such sections.

1.02 RELATED WORK

- A Division 2 - Site Work. Drilled Shaft Foundations.
- B Coordinate the requirements of this section with all other sections of the Division 3 - Concrete.

1.03 REFERENCE STANDARDS

- A American Society for Testing and Materials (ASTM).
 - 1. ASTM C 31 - Standard Method of Making and Curing Concrete Test Specimens in the Field.
 - 2. ASTM C 33 - Standard Specifications for Concrete Aggregates.
 - 3. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 4. ASTM C 42 - Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - 5. ASTM C 94 - Standard Specifications for Ready-Mixed Concrete.
 - 6. ASTM C 127 - Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - 7. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

8. ASTM C 138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
9. ASTM C 143 - Standard Test Method for Slump of Portland Cement Concrete.
10. ASTM C 150 - Standard Specifications for Portland Cement.
11. ASTM C 171 - Standard Specifications for Sheet Materials for Curing Concrete.
12. ASTM C 172 - Standard Method of Sampling Fresh Concrete.
13. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
14. ASTM C 192 - Standard Method of Making and Curing Concrete Test Specimens in the Laboratory.
15. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
16. ASTM C 309 - Standard Specification for Liquid Membrane -Forming Compounds for Curing Concrete.
17. ASTM C 330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
18. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
19. ASTM C 535 - Standard Test Method for Resistance to Degradation of Large-size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
20. ASTM C 595 - Standard Specification for Blended Hydraulic Cements.
21. ASTM 618 - Standard Specifications for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

B American Concrete Institute (ACI).

1. ACI 318 - Building Code Requirements for Reinforced Concrete.
2. ACI 211.1 - Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete.
3. ACI 211.2 Recommended Practice for Selecting Proportions for Lightweight Structural Concrete.
4. ACI 214 - Recommended Practice for Evaluation of Strength Test Results of Concrete.
5. ACI 303R - Guide to Cast-in-Place Architectural Concrete Practice.
6. ACI 304 - Recommended Practice for Measuring, Mixing and Placing Concrete.
7. ACI 304.2R - Placing Concrete by Pumping Methods.
8. ACI 305R - Hot Weather Concreting.
9. ACI 306R - Cold Weather Concreting.
10. ACI 309 - Recommended Practice for Consolidation of Concrete.
11. ACI 223 - Recommended Practice for the Use of Shrinkage - Compensating Concrete.

12. ACI 350R - Concrete Sanitary Engineering Structures.

- C Mixer Manufacturer's Bureau of the Associated General Contractors of America.

1.04 SUBMITTALS

- A Mill Certificates - Required for all bulk cement.
- B Design Mixes - Submit test data on proposed design mixes for each type of concrete in the project including each strength class and any variations in either fly ash source and quantity, admixture, aggregate source or maximum coarse aggregate size.
1. Test results shall include type and brand of cement used; mix design proportions; brand, type and amount of each admixture; brand and amount of fly ash; slump; amount of entrained air; aggregate sources, gradations, specific gravity and coarse aggregate dry rodded unit weight; total water (including moisture in aggregate); water/cement ratio; and compressive strength results for 7 and 28 days.
 2. Review and acceptance of the mix design does not relieve the contractor of his responsibility to provide concrete of the quality and strength required by the specifications.
- C Fly Ash - Submit the following information along with the concrete mix design:
1. The fly ash producer's documentation of quality control procedures and compliance with this specification.
 2. Complete chemical analyses of the fly ash taken at a minimum of quarterly intervals for the preceding year.
 3. Complete physical analyses of the fly ash taken at a minimum of monthly intervals for the preceding year.
 4. History of source usage in concrete, applications and recommended usage.
- D Admixtures - Acceptable brands of admixtures are listed herein. If proposed products are different from those listed, submit manufacturer's technical information, including the following information, for approval.
1. Air-Entraining Admixture. Give requirements to control percent of air content under all conditions, including temperature variations and presence of other admixtures.
 2. Chemical Admixtures. Give requirements for quantities and types to be used under various temperatures and job conditions to produce a uniform, workable concrete mix. Submit evidence of compatibility with other admixtures proposed for use in the design mix.

3. Submit evidence that the admixtures proposed for use with cement containing fly ash are compatible with the fly ash.
 4. Submit evidence that the admixtures proposed for use with concrete containing a superplasticizer are compatible with the superplasticizer.
- E High-Range Water Reducer (Superplasticizer) - If a superplasticizer is proposed for use on the project, submit proposed plan for measuring and adding superplasticizer to the concrete mix. Submit manufacturer's technical information on the superplasticizer proposed for use. Identify the portions of the project on which superplasticizer is proposed for use.
- F Limestone Aggregate - Submit test data confirming that the limestone aggregate proposed for use on this project conforms to these specifications.
- G Curing Method - Submit the proposed curing method for all concrete. If the use of a membrane-forming compound is proposed, submit manufacturer's technical information for approval, including evidence that the compound is satisfactory for the intended application. A written guarantee will be required.
- H Hot and Cold Weather Concreting - Submit, when applicable, proposed plan for hot and cold weather concreting. Conform to recommendations of the American Concrete Institute as described in ACI 305R for hot weather and ACI 306R for cold weather concreting. Review and acceptance of the proposed procedure will not relieve the Contractor of responsibility for the quality of the finished product.

1.05 STORAGE OF MATERIALS

- A Cement - Store cement in weathertight buildings, bins or silos to provide protection from dampness and contamination and to minimize warehouse set.
- B Aggregate - Arrange and use aggregate stockpiles to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding 3 feet in thickness. Complete each layer before the next is started. Do not use frozen or partially frozen aggregates. Do not stockpile coarse aggregate in a cone.
- C Fine Aggregate - Before using, allow fine aggregate to drain until a uniform moisture content is reached.

121

- D Admixtures - Store admixtures to avoid contamination, evaporation or damage. For those used in the form of suspensions or nonstable solutions, provide suitable agitating equipment to assure uniform distribution of ingredients. Protect liquid admixtures from freezing and other temperature changes which would adversely affect their characteristics.
- E Lightweight Aggregates - Uniformly predampen lightweight aggregates as necessary to prevent excessive variations in moisture content. Allow predampened aggregates to remain in stockpiles, under continuous fog spray, for a minimum of 24 hours before use. Provide adequate drainage in stockpile areas to eliminate excess water and accumulation of contaminated fines.

1.06 CODE REQUIREMENTS

All concrete construction shall conform to the "Building Code Requirements for Reinforced Concrete", ACI 318.

1.07 QUALITY ASSURANCE

Provide the necessary controls during evaluation of materials, mix designs, production and delivery of concrete, placement, compaction, finishing and curing necessary to assure that the work will be accomplished in such a manner as to produce the work in accordance with the contract documents.

PART 2 PRODUCTS

2.01 MATERIALS

- A Cement.
 1. Cement. Gray Portland cement conforming to ASTM C 150, Type I or ASTM C 595, Type IP. Type III may be used when specifically authorized.
 2. Use the same brand of cement used in the concrete mix design. Only one brand of each type will be permitted in any one structure unless otherwise specified.
- B Admixtures - Use the following admixtures as required or permitted. The use of calcium chloride will not be permitted. The products must conform to the referenced standards.
 1. Air-Entraining Admixtures. Conform to ASTM C 260, liquid vinsol resin compound compatible with chemical admix used. Acceptable products are Master Builders' MB AE 90, Grace Concrete Products

"Darex AEA," Euclid Chemical Company "AEA-92," or approved equal.

2. Chemical Water Reducing Admixtures.
 - a. Conform to ASTM C 494, Type A, D or E.
 - b. For Portland cement concrete, use a polymer type, non-staining, chloride free admixture. Acceptable products are Master Builders' "Polyheed", Grace Concrete Products "WRDA," Euclid Chemical Company "Accelguard 80", or approved equal.
3. High-Range Water Reducer (Superplasticizer). Conform to ASTM C 494 Type F. Acceptable products are: Master Builders' "Rheobuild"; Euclid Chemical Company "Eucon 37 or Eucon 537"; Grace Concrete Products "Daracem 100"; or "WRDA19"; or approved equal.

C Mixing Water - Use fresh, clean potable water.

D Aggregates - Use coarse aggregate from only one source and fine aggregate from only one source for exposed concrete in a single structure.

1. Coarse aggregate for normal weight concrete shall consist of limestone aggregate or washed river gravel. Aggregate shall conform to the requirements of ASTM C 33 with the following additional requirements:
 - a. Crushed limestone aggregate shall consist of clean, hard, strong and durable particles free of chemicals, coatings of silt or clay, or other fine materials that may affect hydration and bond of the cement paste. The select crushed limestone shall be high-calcium limestone (minimum 65 percent CaCO_3) with maximum Los Angeles Abrasion loss of 38 percent; when tested in accordance with ASTM C 131 or ASTM C 535 maximum soundness (magnesium sulfate-5 cycles) loss of 5 percent; and with maximum absorption of 2-1/2 percent.
 - b. Grading limits of coarse aggregate for all members 6 inches or less in least dimension shall be 1/5 least dimension to No. 4. Grading limits for concrete fill, seal slab and bonded concrete topping in clarifiers shall be 3/8 inch to No. 8. Grading limits for all other normal weight concrete shall be 1-1/2 inches to No. 4.
2. Use natural sand complying with ASTM C 33 for fine aggregate in normal weight and lightweight concrete.
3. Coarse aggregate for lightweight concrete shall conform to ASTM C 330, meeting physical properties of "Ranger-Featherlite" with a minimum Fsp of 6.0. Grading limits are 3/4 inch to No. 4. Use Featherlite or approved equal.
4. Pea Gravel Aggregate. Conform to the requirements of the Concrete Finishing section.

- E Membrane-Forming Curing Compound - ASTM C 309, commercial curing compound which will not permanently discolor concrete. Curing compound must be compatible with all other specified floor coatings or coverings.
- F Sheet Material for Curing Concrete - ASTM C 171, waterproof paper, polyethylene film or white burlap-polyethylene sheeting.
- G Nonshrink Grout - Non-shrink grout shall be a pre-blended, factory packaged material manufactured under rigid quality control specifically for use in transferring heavy loads. The non-shrink grout shall contain a non-metallic natural aggregate and shall be non-shrinking and non-corrosive with a minimum 28 day compressive strength of 5,000 psi at 28 days.
- H Calcium Chloride - Not permitted in any form.
- I Fly Ash.
 - 1. Fly ash shall conform to all requirements of ASTM C 618 including Table 1A and Table 2A.
 - 2. Fly ash shall be produced from coal from a single known and consistent source.

2.02 PROPORTIONING

- A Objective - Select proportions of ingredients to produce a concrete having proper placeability, durability, strength, appearance and other specified properties. Minimum cement content shall conform to these specifications. Proportion ingredients to produce a homogeneous mixture which will work readily into corners and angles of forms and around reinforcement by methods of placing and consolidation employed on the project, but without permitting materials to segregate or allowing excess free water to collect on the surface.
- B Mix Design - The Contractor shall employ, at his expense, a commercial testing laboratory, acceptable to the Owner and Architect, to prepare and test mix designs for each type of concrete as specified herein. The mix design and test results shall be submitted to the Engineer for review.

- C Strength.
- 1. Strength must conform to values for the class of concrete specified for each portion of the project. Requirements are based on 28-day compressive strength.
 - 2. In addition to conforming to specified strength, lightweight concrete must be within specified unit weight limits. The maximum air-dry unit weight is 110 pounds per cubic foot. Determine the air-dry unit weight on 6" x 12" test cylinders after 7 days standard moist curing followed by 21 days drying at 70 F to 76 F and 45 to 55 percent relative humidity. Use wet unit weight of fresh concrete together with air determination tests for the basis of control in the field.
- D Cement - Use gray Portland cement.
- E Entrained Air - Air-entrain all concrete unless otherwise specified. Concrete for drilled piers does not require air-entrainment. Air content as determined in accordance with ASTM C 173 shall be as follows:

<u>Concrete Type</u>	<u>Maximum Aggregate Size in Inches</u>	<u>Total Air Content % by Volume</u>
Normal Weight		
"	3/8	6-10
"	1/2	5-9
"	3/4	5-7
"	1	5-7
"	1-1/2	4-6
"	2	2.5-5.5
"	3	1.5-4.5
Lightweight Concrete	3/8" or less	5-9
"	greater than 3/8"	4-8

- F Fly Ash - Weight of fly ash shall not exceed 25% of the total weight of fly ash plus cement.
- G Slump - Slump as determined in accordance with ASTM C 143 shall be as follows:

<u>Concrete Type</u>	<u>Minimum</u>	<u>Maximum</u>
Portland Cement Concrete	1"	6" for drilled shafts
	1"	4" for slabs, beams, walls and columns

<u>Concrete Type</u>	<u>Minimum</u>	<u>Maximum</u>
Concrete to be dosed with superplasticizer, before dosing	1"	3"
Lightweight concrete after dosing with superplasticizer	4"	7"
Normal weight concrete after dosing with superplasticizer	4"	9"

- H The specified slump shall apply at the time when concrete is discharged at the job site.
- I Slump tests shall be used to monitor uniformity and consistency of concrete delivered to the job site. They shall not, however, be used as a basis for mix design. Under no circumstances shall the water-cement ratios for concrete exceed those specified below.
- J Water Cement Ratio -The maximum permissible water-cement ratio for Class A concrete is 0.56. The water-cement for Class C and Class F concrete is 0.50. The free water in the aggregate shall be included in all water-cement ratio computations.
- K Admixtures - Proportion admixtures according to the manufacturer's recommendations. Use of an accelerator is permitted when the air temperature is less than 40 F. Use of retarder is permitted when the temperature of placed concrete exceeds 65 F.
- L High-range Water Reducers (Superplasticizer) - The Contractor may, at his option, use a superplasticizer to improve the workability of the concrete. The superplasticizer must be used in strict accordance with the requirements and recommendations of the product manufacturer. The superplasticizer must be added to the concrete mix at the batch plant.
- M Concrete Classification.

1. Classification:

<u>Class</u> <u>Normal-Weight</u>	<u>Minimum 28-Day</u> <u>Compressive Strength (psi)</u>	<u>Minimum Cement Content</u> <u>Pounds per Cubic Yard</u>
A	3000	470
C	4000	564

**Class
Lightweight****Minimum 28-Day
Compressive Strength (psi)****Minimum Cement Content
Pounds per Cubic Yard****F****4000****611**

2. If the required strength is not secured with the minimum cement content as specified, add cement or provide other aggregates as necessary.
3. Maximum size aggregate for normal weight concrete shall be 1-1/2 inches.

N Concrete Class Location in Structure - Use the specified classes of concrete in the following locations:

1. Class A - Drilled piers
2. Class C - Grade beams, pilasters and slab-on-grade.
3. Class F - Concrete topping slab on composite metal deck.

O Selecting Ingredient Proportions for Normal Weight Concrete - If the relationship between strength and the water-cement ratio has been determined previously for materials specified for normal weight concrete, the ratio may be used. Otherwise, proportioning of concrete mix design shall be in accordance with ACI 301.

P Proportioning of Ingredients for Lightweight Concrete - Determine the proper cement factor using the following procedures:

1. Follow the same general procedure as for normal-weight concrete.
2. Determine proportions of ingredients and conduct tests in accordance with basic relationships and procedures outlined in ACI 211.2, "Recommended Practice for Selecting Proportions for Structural Lightweight Concrete."
3. Determine the minimum cement factor by using the value from the curve that corresponds to a minimum strength 15 percent greater than the specified strength. However, do not exceed the maximum water cement ratio specified.

2.03 MIXING NORMAL WEIGHT CONCRETE

A Ready-Mixed Concrete - Mix and transport ready-mixed concrete according to ASTM C 94 and ACI 304. In addition to normal batch plant procedures as outlined in ASTM C 94, provisions must be made at the batch plant for the following items:

1. Arrangement. Provide separate bins or compartments for different sized aggregates and for bulk cement. Compartments of ample size

constructed so that materials will be kept separate under all working conditions are required.

2. **Weighing of Materials.** Aggregates may be weighed in separate weigh batchers with individual scales. Weigh bulk cement on a separate scale in a separate weigh batcher. Observe the following limits of accuracy when weighing or measuring materials:

<u>Materials</u>	<u>Percent Accuracy</u>
Cement	1
Water	1
Aggregates	2
Admixture	3

3. **Water Meter or Batcher.** Provide a suitable measuring device capable of measuring mixing water within the specified accuracy for each batch. Note the number of gallons of water as batched on printed batching tickets.
4. **Moisture Control.** Provide a moisture meter to assure the amount of free water in fine aggregates within 0.3 of a percent. Compensate for varying moisture contents of fine aggregates and change batch weights of materials if necessary before batching.
5. **Scales.** Provide adequate facilities for accurate measurement and control of each material entering each batch of concrete. Accuracy of weighing equipment must conform to applicable requirements of ASTM and NRCA for such equipment. Computerized plants which automatically correct for weighout variations must do so within the truck being loaded. Correction in the next batch which may be in another transporter is not acceptable.
6. **Recorders or Printers.** Provide recorders/printers to produce tickets. Each ticket will provide a printed record of weights for cement as batched and for separate aggregates as batched individually. Use the type of indicator that returns to zero punch or to zero after a batch is discharged. Clearly indicate by stamped letters or numerals the difference between aggregates and cement as batched. Show the time of day stamped or printed at intervals of not more than 6 minutes. Deliver recorded ticket copies with concrete. The Testing Laboratory will be provided with one copy. Maintain a copy of batch weight recording charts for each day of casting as a part of the job records.

7. Protection. Protect weighing, indicating, recording or printing, and control equipment against exposure to dust and weather.

B Transit Mix Truck Requirements.

1. Clean each transit mix truck drum and reverse drum rotation before the truck proceeds under the batching plant.
2. Keep the water tank valve on each transit truck locked at all times that the truck is in use. Any addition of water must be directed by the Engineer. Added water must be incorporated by additional mixing of at least 35 revolutions, or 5 minutes, whichever comes first, at maximum mixing speed.
3. Equip each transit-mix truck with a continuous, nonreversible, revolution counter showing the number of revolutions at mixing speeds.
4. Each truck shall have a number permanently affixed in a conspicuous location.

C Admixtures.

1. Charge air-entraining and chemical admixtures into the mixer as a solution using an automatic dispenser or similar metering device. Measure admixture to an accuracy within ± 3 percent. Do not use admixtures in powdered form.
2. Two or more admixtures may be used in the same concrete, provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other. Inject the admixtures separately during the batching sequence.
3. Add retarding admixtures as soon as practicable after the addition of cement.
4. High-range water reducers (superplasticizers) shall be added at the batch plant.

D Temperature Control.

1. When the mean temperature falls below 40 F, keep the as-mixed temperature above 55 F to maintain concrete above the minimum placing temperature.
2. If water or aggregate has been heated, combined water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 100 F.

3. In hot weather, cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature. If necessary, substitute well-crushed ice for all or part of the mixing water.
4. Hot weather and cold weather concreting plans shall be submitted to the Engineer for review as specified in Part 1, Submittals.

2.04 MIXING LIGHTWEIGHT CONCRETE

- A Determining Absorption of Aggregates - Mixing procedures vary according to total absorption by weight of lightweight aggregates. Determine total absorption by weight before predampening in accordance with ASTM C 127.
- B Ten Percent or Less Absorption - Follow the same requirements as for mixing normal weight concrete when preparing concrete made with low-absorptive, lightweight aggregates having 10 percent or less total absorption by weight. To be low-absorptive, the aggregates must have less than 2 percent additional absorption in the first hour after mixing.
- C More Than 10 Percent Absorption - For all concrete made with lightweight aggregates having more than 10 percent total absorption by weight, batch and mix as follows:
 1. Place approximately 80 percent of mixing water in the mixer. Add the air-entraining admixture and all aggregates if predampened. Mix for a minimum of 30 seconds or 5 to 10 revolutions of a truck mixer. When aggregates have not been predampened, mix aggregates and water for a minimum of 1 minute and 30 seconds or 15 to 30 revolutions of a truck mixer. Then add the air-entraining admixture and mix for an additional 30 seconds.
 2. Then in the following sequence, add specified or permitted admixtures, other than air-entraining agent, all cement and the mixing water previously withheld.
 3. Complete the mixing using procedures for normal weight concrete.

PART 3 EXECUTION**3.01 GENERAL**

- A Concreting Under Water - Will not be permitted.
- B Conveying Equipment - Select equipment of size and design to ensure continuous flow of concrete at the delivery end. Conform to the following equipment and operations requirements:
 - 1. Provide truck mixers, agitators and nonagitating units and manner of operation conforming to requirements of ASTM C 94.
 - 2. Use belt conveyors configured horizontally or at a slope which causes no segregation or loss. Use an approved arrangement at the discharge end to prevent separation. Discharge long runs without separation into a hopper.
 - 3. Provide metal or metal-lined chutes. Arrange for slopes not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting slope requirements may be used if concrete is discharged into a hopper before distribution.
 - 4. Pumping of concrete will be permitted upon the Engineer's approval of the equipment and procedure proposed by the Contractor. Contractor shall conform to the recommendations outlined in ACE 304.2R, "Placing Concrete by Pumping Methods." Use of aluminum or aluminum alloy pipe for conveying concrete will not be permitted.
- C Protection from Adverse Weather - Unless adequate protection is provided or approval is obtained, do not place concrete during rain, sleet, snow or freezing weather. Do not permit rainwater to increase mixing water or to damage the surface finish. If rainfall occurs after placing operations begin, provide adequate covering to protect the work.
- D Hot and Cold Weather Procedures.
 - 1. Hot Weather. Comply with the requirements of ACI 305R.
 - a. Definition. Any combination of high air temperature, low relative humidity, and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in abnormal properties.
 - b. General. The effects of hot weather are most critical during periods of rising temperature, falling relative humidity, or both.

Precautionary measures required on a calm, humid day will be less strict than those required on a dry, windy day, even if air temperature is identical.

- c. **Mix Temperature.** The temperature of the concrete mixture without set-retarding admixture (ASTM C 494, Type D) shall not exceed 90 F. With a retarding admixture, the temperature may not exceed 100 F. Provide and follow special recommendations from the admixture supplier for dosages appropriate for mix temperatures from 85 F to 100 F. When a pad or mat thickness is 3 feet or more, the foregoing temperatures of mixes shall be reduced by 10 F. Mix temperature will be measured at time of placement. Mix temperature may be lowered by cooling the ingredients, cooling the mixer drum by fog spray, using chilled water or ice in whole or part for the added water, or arranging the delivery sequence so that the time of transport and placement does not generate the temperatures specified. Concrete mixtures which exceed the temperatures specified above shall be rejected.
 - d. **Slab Construction.** When the forecast for the rate of evaporation, as determined by Figure 2.1.5 of ACI 305R, indicates a loss of 0.2 pounds per square foot per hour, hot weather concrete precautions will be put into effect in advance of the casting. It will be the Contractor's responsibility to be able to rapidly install plastic crack-preventive measures if the actual climatic conditions exceed the forecast and indicated moisture loss is expected to be at the rate of 0.2 pounds per square foot or more. Among the approved section methods of control are fog spray, covering the polyethylene sheeting or application of monomolecular films.
2. **Cold Weather.** Comply with the requirements of ACI 306R.
- a. **Definition.** Cold weather is defined as a period when, for more than 2 successive days, the mean daily temperature is below 40 F.
 - b. **General.** Unless provisions are made in advance, concrete shall not be placed when cold weather conditions are expected. In the event that a freeze does arrive, it will be the Contractor's responsibility to protect the concrete cast from freezing in accordance with the recommended procedures of ACI 306R.

3.02 PREPARATION

Prior to placing concrete, verify that forms are clean and wet or release agent applied and that reinforcing, pipes, conduit, sleeves, thimbles, hangers, anchors, expansion joint materials, flashing and other work required to be cast in concrete have been properly installed. Check other trades to ascertain that their work is in place. Verify that surfaces against which concrete will be placed, such as earth or hardened concrete, have been prepared as specified.

3.03 CONCRETE

- A Delivery Schedule - Mix concrete only in quantities for immediate use. Discard concrete which has set. Retempering of set concrete is not permitted. Completely discharge concrete at the site within 1 hour and 30 minutes after adding cement to aggregate. In hot weather, reduce this time to one hour or less to prevent stiffening of concrete before it is placed.
- B Adjusting Slump - If concrete arrives at the project with slump below that specified, water may be added only with prior approval of the Engineer. Indiscriminate addition of water to increase slump is prohibited. Do not under any circumstances exceed either the maximum specified permissible water-cement ratio or maximum slump. Any addition of water above the maximum water-cement ratio shall be cause for rejection. Concrete arriving at the site with a slump greater than 1 inch above maximum specified allowable slump shall be rejected. Allowing truck to turn until slump is within specified allowable limits is not permitted under any circumstances. If mixes continually arrive on the site with slump of 2 inches or less at the maximum allowable water-cement ratio, use a water reducing admixture or superplasticizer in the concrete mix. Alternatively, sample the aggregates and determine if grading has become finer. If this condition exists, change the mix proportions to accommodate the change but keep the water-cement ratio constant. Any mix adjustments required to obtain specified slump must be approved and directed by the Engineer.
- C Consistency - If concrete arrives with cement balls, balls shall be removed. Excessive balling is grounds for rejection of the truck. Trucks carrying balled concrete shall have their numbers taken. If the same truck arrives at the site carrying balled concrete three times, it will be rejected and not allowed to return to the site until it is opened up for inspection,

cleanliness and damage noted, repairs made, and a final inspection for approval is made by the Engineer.

3.04 CONVEYING

Handle concrete from mixer to placement as quickly as practicable while providing concrete of required quality in the placement area. Use methods which prevent loss of ingredients and segregation.

3.05 PLACING

A Procedure.

1. Deposit concrete continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams or cold joints or planes of weakness within the section. If the section cannot be placed continuously, place construction joints as specified or as approved.
2. Proceed with placement at a rate such that concrete which is being integrated with fresh concrete is still plastic. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
3. Remove temporary spreaders from forms when the spreader is no longer useful. Temporary spreaders may remain embedded in concrete only if made of galvanized metal or concrete, and if prior approval has been obtained.
4. Do not start placing of concrete in supported elements until concrete previously placed in columns and walls is no longer plastic.
5. Deposit concrete as nearly as practicable to its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to a procedure which will cause segregation.
 - a. When concrete cannot be placed by free fall without hitting the sides of formwork or reinforcing, place concrete through a delivery tube which limits concrete free fall from the end of the delivery tube to a maximum of 5 feet.
 - b. Do not use an aluminum delivery tube. If necessary, make provisions for raising the tube as placement progresses.
6. Where surface mortar is to be the basis of a finish, especially those designated to be painted, work coarse aggregate back from forms with a suitable tool to bring the full surface of mortar against the form. Prevent formation of excessive surface voids.

7. Consolidation. Consolidate concrete by vibration, spading, rodding or forking so that the concrete is thoroughly compacted and worked around reinforcement, around embedded items and into corners of forms. Use internal vibrators which are either shaft type or motor-in-head with 180-cycle power sources. Motor-in-head 60-cycle vibrators may not be used. With shaft-type vibrators, use a motor large enough to drive the selected head to its maximum efficiency as measured by frequency, amplitude and centrifugal force. Use vibrators to not more than rated placement capacities as indicated in ACE 309. Insert vibrators into concrete at distances no greater than twice the radius of action as shown in Column 7 of Table 5.1.4, ACI 309. Compact the concrete to a dense mass eliminating air and other planes of weakness. Do not use vibrators to transport concrete within the form. Plunge the vibrator rapidly into the concrete lift penetrating the lift below. Thereafter, manipulate the vibrator in an up-and-down motion and gradually withdraw it from the concrete. Do not under vibrate the concrete. Maintain a spare vibrator on the site during concrete placement operations. Periodically check the line-in voltage of shaft vibrators to verify that proper power is being received. For flat work, the use of vibrating screeds is encouraged.
8. If forms become displaced in any way during placing of concrete, immediately stop the operation and do not resume placing until forms have been rebraced and brought back to required lines and levels.
9. Concrete placing procedures and equipment shall not dislodge reinforcing steel or other embedded items in concrete structure.

3.05 REPAIRING SURFACE DEFECTS

Conform to the requirements of the Concrete Finishing Section.

3.06 CURING PROCEDURES

- A Objective - Protect freshly deposited concrete from premature drying and excessively hot or cold temperatures. Maintain a minimal moisture loss and a relatively constant temperature during the time necessary for hydration of cement and proper hardening of concrete.

- B Initial Curing** - Immediately after the finishing operation, begin initial curing. Keep concrete continuously moist at least overnight. Use one of the following materials or methods for initial curing:
1. Ponding or continuous sprinkling.
 2. Absorptive mat or fabric kept continuously wet.
 3. Sand or other covering kept continuously wet.
 4. Continuous steam bath (not exceeding 150 F at the surface of concrete).
 5. Vapor mist bath.
 6. Membrane-forming curing compound applied according to the manufacturer's recommendations.
- C Restrictions on Use of Curing Compounds** - Do not use a curing compound on surfaces that are to be rubbed or that are to receive additional concrete, mortar, topping, terrazzo or other cementitious finishing materials. Do not use for curing slabs under resilient floors or built-up roofing, surfaces to be waterproofed, sealed, hardened or painted unless the application is approved in advance.
- D Final Curing** - Immediately following the initial curing and before concrete has dried, provide additional curing by one of the following materials or methods:
1. Continuing the method used in initial curing.
 2. Waterproof paper, polyethylene film or white burlap-polyethylene sheeting.
 3. Other moisture-retaining coverings as approved.
- E Duration of Curing** - Continue final curing until the cumulative number of days or fractions of days during which the ambient temperature is above 50 F has totaled 7. Prevent rapid drying at the end of the curing period.
- F Formed Surfaces** - Steel forms heated by the sun and wood forms in contact with concrete during final curing period shall be kept wet. If forms are to be removed during the curing period, employ one of above curing materials or methods immediately. Continue such curing for the remainder of the curing period.

- G Temperature.**
1. **Cold Weather.** When the mean daily temperature of the atmosphere is less than 40 F, maintain the ambient temperature of concrete between 50 and 70 F for the required curing period. When necessary, make arrangements for heating, covering, insulating or housing concrete work in advance of placement to maintain the required temperature and moisture conditions. Prevent injury due to concentration of heat. When combustion heaters are necessary in an enclosed or protected area where concrete slabs are being placed, vent the heaters.
 2. **Hot Weather.** When necessary, make arrangements for installation of windbreaks, shading, fog spraying, sprinkling, ponding or wet covering of light color in advance of placement. Take such protective measures as quickly as concrete hardening and finishing operations will allow.
 3. **Temperature Changes.** Control changes in temperature of concrete at a rate as uniform as possible. Do not permit a temperature change to exceed 5 F in any one hour or 50 F in any 24-hour period.
- H Protection from Mechanical Injury -** During the curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock and excessive vibration. Protect finished concrete surfaces from damage caused by construction equipment, materials or methods and by rain or running water. Do not load self-supporting structures in any way that overstresses concrete.

3.07 TESTING AND CONTROL

Required Services - The commercial testing laboratory will be required to perform the required testing specified in Division 1, General Requirements.

3.08 TESTING AND CONTROL FURNISHED BY THE CONTRACTOR

- A** In addition to the initial mix design, the Contractor will be required to employ, at his expense, a commercial testing laboratory, acceptable to the Owner, to prepare and test the design mix for each class of concrete for which the material source has been changed.

- B The Contractor shall notify the commercial testing laboratory twenty-four hours prior to placing concrete.

3.09 TESTING OF DEFICIENT CONCRETE IN PLACE

- A The strength of the concrete will be considered potentially deficient if the averages of three consecutive strength test results fail to equal or exceed the specified or if any individual strength test result falls below the specified strength by more than 450 psi. Core tests, structural analysis or load tests may be required as directed by the Engineer.
- B Core Tests.
1. Cores at least 2 inches in diameter shall be obtained and tested in accordance with "Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete" (ASTM C 42). The cores shall be air dried (temperature 60 to 80 F, relative humidity less than 60 percent) for 7 days before test and shall be tested dry.
 2. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores shall be determined by the Engineer so as to least impair the strength of the structure. If, before testing, one or more of the cores show evidence of having been damaged subsequent to or during removal from the structure, it shall be replaced.
 3. Concrete in the area represented by a core test will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength and if no single core is less than 75 percent of the specified strength.
 4. Core holes shall be patched as specified to Repair of Surface Defects.
- C Structural Analysis - If core holes are inconclusive or impractical to obtain, the Engineer may perform additional structural analysis at the Contractor's expense to try to confirm the safety of the structure.
- D Load Test - If core holes and structural analysis do not confirm the safety of the structure, load tests may be required and their results evaluated in accordance with Chapter 2 of "Building Code Requirements for Reinforced Concrete" (ACI 318).

- VOL 0095 PAGE 500
- E Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by the Engineer to determine relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. However, such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection of the structure's safety.
 - F Concrete work judged inadequate by core tests, structural analysis or by results of a load test shall be replaced at the Contractor's expense.
 - G The Contractor shall pay all costs incurred in providing the additional testing and/or analysis required, whether such testing and/or analysis demonstrates adequate strength or not. All costs due to delays in additional testing and/or structural analysis will be paid by the Contractor. Replacement of any members deemed questionable or inadequate by the Engineer shall be at the Contractor's expense.

END OF SECTION 03300

SECTION 03345

CONCRETE FINISHING

PART 1: GENERAL

1.1 WORK INCLUDED

- A This section specifies requirements for:
1. The repairing of surface defects.
 2. Finishing of concrete surfaces including both formed and unformed.
 3. Sealing of concrete surfaces.

1.2 RELATED WORK

Coordinate the requirements of this section with all other sections of Division 3 - Concrete.

PART 2: PRODUCTS

No products are specified as part of this specification section.

PART 3: EXECUTION

3.1 REPAIRING SURFACE DEFECTS

- A Defective Areas - Repair defective areas immediately after the removal of forms.
1. Remove honeycombed and other defective concrete down to sound concrete. To prevent absorption of water from patching mortar, dampen the defective area and a strip 6 inches wide surrounding the area to be patched. Prepare bonding grout by mixing approximately one part cement to one part fine sand passing a No. 30 mesh sieve. Mix to a consistency of thick cream, and brush thoroughly into the surface. A latex bonding agent may be used in lieu of the bonding grout. The bonding agent must be used in

conformance with the manufacturer's recommendations and instructions.

2. Make patching mortar of the same materials and of approximately the same proportions as concrete, except omit coarse aggregate. Prepare mortar with no more than one part cement to 2-1/2 parts sand by damp loose volume. Substitute white Portland cement for part of the gray Portland cement on exposed concrete in order to produce a color matching the color of surrounding concrete. Determine color by making a trial patch.
 3. Use no more mixing water than necessary for handling and placing. Mix patching mortar in advance and allow to stand. Mix frequently with a trowel until it has reached the stiffest consistency that will permit placing. Do not add water.
 4. After surface water has evaporated from the area to be patched, thoroughly brush a coat of bond grout into the surface. When bond grout begins to lose its water sheen, apply the premixed patching mortar. Thoroughly consolidate the mortar into place and strike off to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, leave undisturbed for at least one hour before final finishing. Keep the patched area damp for 7 days. Do not use metal tools in finishing patches in a formed wall which will be exposed.
- B Tie Holes - Patch the holes immediately after removal of forms. After cleaning and thoroughly dampening the tie hole, fill solid with patching mortar.
- C Proprietary Materials - If permitted or required, proprietary compounds for adhesion or as patching ingredients may be used, in lieu of or in addition to, the foregoing patching procedures. Use such compounds according to the manufacturer's recommendations.

3.2 FINISHING OF FORMED SURFACES

- A Surfaces Requiring Finish - A finish is not required on surfaces concealed from view by earth, water, ceilings, etc. in the completed structure.
- B Smooth Form Finish.
1. Use plywood or fiberboard linings or forms in as large sheets as practicable and with smooth, even edges and close joints.

2. Patch tie holes and defects. Rub fins and join marks with wooden blocks to leave a smooth, unmarred finished surface.
 3. Use a smooth form finish on all formed surfaces exposed to view in the completed structure.
- D Related Unformed Surfaces - Tops of piers, beams, pilasters and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed. Float unformed surfaces to a texture reasonably consistent with that of the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

3.3 FINISHING SLABS AND SIMILAR FLAT SURFACES

- A Shaping to Contour - Use strike-off templates or approved compacting-type screeds riding on screed strips or edge forms to bring concrete surface to the proper contour. See the section on Concrete Formwork for edge forms and screeds.
- B Consolidation - Thoroughly consolidate concrete in slabs and use internal vibration in beams and girders of framed slabs and along bulkheads of slabs on grade. Concrete to be consolidated must be as dry as practicable. Do not permit manipulation of surfaces prior to finishing operations.
- C Tolerances for Finished Surfaces - Tolerances are checked by placing a straightedge of specified length anywhere on the slab. The gap between slab and straightedge must not exceed the tolerance listed for the specified class.

<u>Class</u>	<u>Straightedge Length in Feet</u>	<u>Tolerance in Inches</u>
A	10	1/8
B	10	1/4
C	2	1/4

1. Tolerance on all floor slabs shall be Class A.

D Floated Finish.

1. After concrete has been placed, struck off, consolidated and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared, or when the mix has stiffened sufficiently to permit proper operation of a power-driven float. Consolidate the surface with power-driven floats. Use hand floating with wood or cork-faced floats in locations inaccessible to a power-driven machine and on small, isolated slabs.
2. Recheck tolerance of the surface after initial floating with a 10-foot straightedge applied at not less than two different angles. Cut down high spots and fill low spots to Class B tolerance. Immediately refloat slab to uniform, smooth, granular texture.
3. Provide a floated finish for the following:
 - a. Pit floors and trench floors.
 - b. Sidewalks.

E Troweled Finish.

1. To obtain a troweled finish, a floated finish as previously specified must be applied. After power floating, use a power trowel to produce a smooth surface which is relatively free of defects but which may still contain some trowel marks. Do additional trowelings by hand after the surface has hardened sufficiently. Do final troweling when a ringing sound is produced as the trowel is moved over the surface. Thoroughly consolidate the surface by hand troweling operations.
2. Produce a finished surface free of trowel marks, uniform in texture and appearance and conforming to Class A tolerance. On surfaces intended to support floor coverings, remove defects which might show through covering by grinding.
3. Provide a troweled finish for the following:
 - a. Inside floors intended as walking surfaces.
 - b. Floors which will receive floor covering.

END OF SECTION

SECTION 04050

MASONRY PROCEDURES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide all required labor, materials, equipment, and supplies necessary for installation of all specified masonry work.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 04100 - Mortar.
- C. Section 04103 - Mortar Coloring Materials.
- D. Section 04150 - Masonry Accessories.
- E. Section 04160 - Joint Reinforcement
- F. Section 04170 - Anchors and Tie Systems
- G. Section 04180 - Masonry Control Joints
- H. Section 04220 - Concrete Unit Masonry

1.03 COLD WEATHER PROCEDURES

- A. Cold Weather Requirements:
 - 1. Cold weather, as referred to in this Section, is four hours below 40 ° F in a 24 hour period.
 - 2. Do not lay masonry when temperature is below 40 ° F unless authorized by Architect.
 - 3. Keep materials free of ice and snow.
 - 4. Heat water and sand 140 ° F maximum if temperature is below 40 ° F.
 - 5. Temperature of mortar shall be between 70 and 120 ° F when used.
 - 6. Heat hollow masonry units to 40 ° F. when temperature is below 18 ° F and solid masonry to 40 ° F when temperature is below 0 ° F.
 - 7. Do not lay masonry on frozen materials. Cover work at end of each work day with tarpaulins if temperature is 25 to 40 ° F. If temperature is below 25 ° F, protect with heaters.
 - 8. Maintain temperature around masonry to 40 ° F minimum for 48 hours if Type I, 24 hours if Type III, or longer if required.

1.04 HOT WEATHER PROCEDURES**A. Weather Requirements:**

1. Hot weather, as referred to in this Section, is six hours above 95 ° F in a 24 hour period.
2. Keep masonry units moist to avoid absorption of water from mortar prematurely.
3. Mix no more mortar than can be placed in a 30 minute time lapse.
4. Do not over water mortar. Discard mixed mortar which is over 45 minutes old from time of mixing to time of placement.
5. Maintain aggregate (sand) in a moist condition prior to mixing.

1.05 COORDINATION:

- A. Coordinate work with other trades.
- B. Make cuts proper size to accommodate work of other trades.
- C. Verify rough-in dimensions for items to be built into walls.

1.06 GENERAL EXECUTION

- A. Step back unfinished work for joining with new work. Use toothing only with Architect's approval.
- B. Do not tool until mortar has taken initial set.
- C. Reinforcing shall be free of material that may destroy bond.
- D. Anchor top and side edges of non-bearing partitions to structural member with sturdy ties at 4 feet on center maximum.
- E. Protect masonry with cover during rainy weather.
- F. Use mortar within two hours of initial mixing. Discard mortar that has begun to set.
- G. Install rigid insulation carefully to insure that neither mortar daubs nor horizontal reinforcing cause open joints in insulation.

1.07 CLEANING

- A. Point holes in joints Fill and tool properly.
- B. Leave masonry clean, free of mortar daubs, and with tight mortar joints.
- C. Rinse masonry surface with water immediately after cleaning.
- D. Remove and replace defective material at Architect's direction and at not cost to Owner.
- E. Clean up masonry debris and remove from site.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 04100

MORTAR

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar and grout for masonry.

1.02 RELATED WORK

- A. Section 04050: Masonry Procedures.
- B. Section 04150: Masonry Accessories.

1.03 REFERENCES

- A. ASTM C5 - Quicklime for Structural Purposes.
- B. ASTM C91 - Masonry Cement.
- C. ASTM C144 - Aggregate for Masonry Mortar.
- D. ASTM C150 - Portland Cement.
- E. ASTM C207 - Hydrated Lime for Masonry Purposes.
- F. ASTM C270 - Mortar for Unit Masonry.
- G. ASTM C404 - Aggregates for Masonry Grout.
- H. ASTM C476 - Grout for Masonry.
- I. ASTM C595 - Blended Hydraulic Cement.
- J. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Include design mix, indicate proportion or Property method used, required environmental conditions, and admixture limitations.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.

- B. Store and protect products under provisions of Section 01620.
- C. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperatures to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C150, Type I, gray color.
- B. Masonry Cement: ASTM C98, Type M.
- C. Mortar Aggregate: ASTM C144, standard masonry type.
- D. Hydrated Lime: ASTM C207, Type S.
- E. Quicklime: ASTM C5, non-hydraulic type.
- F. Grout Aggregate: ASTM C404.
- G. Water: Clean and potable.

2.02 MORTAR COLOR

- A. Mortar Color: White.
- B. Refer Section 04103 for mortar coloring criteria as applicable (if used).

2.03 MORTAR MIXES

- A. Mortar for Non-load Bearing Walls and Partitions: ASTM C270, Type M using the Property Method.
- B. Mortar for Reinforced Masonry: ASTM C270, Type M using the Property Method.
- C. Pointing Mortar: ASTM C270, Type N, with maximum 2 percent ammonium stearate or calcium stearate per cement weight.

2.04 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
- B. Do not use anti-freeze compounds to lower the freezing point of mortar.
- C. If water is lost by evaporation, re-temper only within two hours of mixing.

- D. Use mortar within two hours after mixing at temperatures of 80 degrees F or two-and-one-half hours at temperatures under 50 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install mortar in accordance with ASTM C780.

END OF SECTION

SECTION 04103**MORTAR COLORING MATERIALS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Mortar coloring additives.

1.02 RELATED WORK

- A. Section 04050: Masonry Procedures.
- B. Section 04100: Mortar.

1.03 REFERENCES

- A. ASTM C5 - Quicklime for Structural Purposes.
- B. ASTM C91 - Masonry Cement.
- C. ASTM C144 - Aggregate for Masonry Mortar.
- D. ASTM C150 - Portland Cement.
- E. ASTM C207 - Hydrated Lime for Masonry Purposes.
- F. ASTM C270 - Mortar for Unit Masonry.
- G. ASTM C404 - Aggregates for Masonry Grout.
- H. ASTM C476 - Grout for Masonry.
- I. BIA - Brick Institute of America: Recommendations for mortar coloration.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Include design mix, indicate Proportion or Property method used, required environmental conditions, and admixture limitations.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperatures to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Color additive: White Portland Cement and Lime.
- B. Substitutions: Under provisions of Section 01630.

2.02 MIXING

- A. Thoroughly mix mortar color ingredients in quantities needed for immediate use in accordance with ASTM C270. Refer Section 04100; 2.04 Mortar Mixing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mix color additives as necessary to achieve proper final color.
- B. Integrate initial mix with masonry materials as required for providing sample panel.
- C. Keep accurate record of mixing proportions in order to achieve uniform coloration for entire project.
- D. Remove and replace any colored mortar which is not uniform to color achieved and approved with sample panel.

END OF SECTION

SECTION 04150
MASONRY ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all necessary labor, materials, equipment, and supplies necessary for complete installation of all specified masonry accessories.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 04050 - Masonry Procedures.
- C. Section 04160 - Joint Reinforcement
- D. Section 04170 - Anchors and Tie Systems
- E. Section 04180 - Masonry Control Joints

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 04160

JOINT REINFORCEMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Pre-manufactured galvanized metal joint reinforcement for concrete masonry unit construction.

1.02 RELATED SECTIONS

- A. Section 04050 - Masonry Procedures.
- B. Section 04150 - Masonry Accessories.
- C. Section 04170 - Anchors and Tie Systems
- D. Section 04180 - Masonry Control Joints
- E. Section 04220 - Concrete Unit Masonry

PART 2 PRODUCTS

2.0 MANUFACTURERS

- A. DUR-O-WAL, INC.
- B. AA Wire Products Company.
- C. Carter-Waters Corporation.
- D. Substitutions: Under provisions of 01630.

2.02 MATERIALS

- A. Design: Truss Type; 4 inch and 6 inch widths.
- B. Rod Size: A gauge.
- C. Finish: Hot Dipped Galvanized.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Place joint reinforcing horizontally in joints at a vertical spacing of 16" inches.

END OF SECTION

SECTION 04170

ANCHORS AND TIE SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Finish and install all anchor and tie materials specified herein.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 04050 - Masonry Procedures.
- C. Section 04100 - Mortar.
- D. Section 04160 - Joint Reinforcement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Dur-O-Wal, Inc.
- B. AA Wire Products Company.
- C. Carter-Waters Corporation.
- D. Substitutions: Under provisions of 01630.

2.02 MATERIALS - COLUMN ANCHORS - For Masonry to Steel Columns

- A. Design: Dur-O-Wall #709 (welded to steel columns) with #730 triangle ties of length to suit application.

2.03 MATERIALS - TIES - For Masonry Veneer to Metal Studs

- A. Design: Dur-O-Wall #213
- B. Size: As manufactured.
- C. Finish: Hot-dipped Galvanized.

PART 3 EXECUTION

3.01 INSTALLATION - COLUMN ANCHORS

- A. Weld anchor rods to steel columns in a pattern to allow for placement of triangle ties at 16" o.c. vertically.

3.02 INSTALLATION - TIES

- A. Place masonry ties vertically in joints at a spacing of not more than 16 inches vertically and 32 inches horizontally.
- B. Secure ties to structural back up with 2 hot dipped galvanized screws to metal studs to manufacturer's recommendations.
- C. Do not attach ties to any unsupported spans of sheathing.

END OF SECTION

VOL 0095 PAGE 517

SECTION 04180
MASONRY CONTROL JOINTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Finish and install all specified masonry control joints.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 04050 - Masonry Procedures.
- C. Section 04200 - Unit Masonry.
- D. Section 07900 - Sealants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Foam Backer Rod
- B. Sealant (Refer Section 07900)

2.02 MANUFACTURERS

- A. Sonneborn
- B. Substitutions: Under provisions of Section 01630.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Place control joints at locations as follows:
 - 1. As shown and/or detailed on drawings.
- B. Install control joints in a neat and continuous fashion.

END OF SECTION

SECTION 04200**UNIT MASONRY****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Furnish all labor, materials, equipment and supplies necessary to complete all specified unit masonry work.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 04050 - Masonry Procedures.
- C. Section 04100 - Mortar.
- D. Section 04150 - Masonry Accessories.
- E. Section 04160 - Joint Reinforcement.
- F. Section 04170 - Anchors and Ties.
- G. Section 04180 - Masonry Control Joints
- H. Section 04220 - Concrete Unit Masonry

1.03 REFERENCES

- A. ANSI/ASTM C55 - Concrete Building Brick.
- B. ANSI/ASTM C56 - Structural Clay Non-Load Bearing Tile.
- C. ANSI/ASTM C73 - Calcium Silicate Face Brick (Sand-Lime Brick).
- D. ANSI/ASTM C126 - Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
- E. ANSI/ASTM C212 - Structural Clay Facing Tile.
- F. ANSI/ASTM C216 - Facing Brick (Solid Masonry Units Made from Clay or Shale).
- G. ANSI/ASTM C652 - Hollow Brick (Hollow Masonry Units Made from Clay or Shale).
- H. ASTM C27 - Fireclay and High-Aluminum Refractory Brick.
- I. ASTM C62 - Building Brick (Solid Masonry Units Made From Clay or Shale).

- J. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.
- K. ASTM C129 - Non-Load Bearing Concrete Masonry Units.
- L. ASTM C145 - Solid Load Bearing Concrete Masonry Units.
- M. ASTM C744 - Prefaced Concrete and Calcium Silicate Masonry Units.
- N. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.
- O. UL - Underwriters' Laboratories.

1.04 QUALIFICATIONS

- A. Installer: Company specializing in performing the work of this Section with minimum five years experience.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 04220

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete masonry units.
- B. Reinforcement, anchorage, and accessories.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 04160: Joint Reinforcement.
- B. Any and all inserts, anchors, frames, fasteners, etc. required for the proper installation of materials, equipment, and devices furnished by other trades.

1.03 RELATED SECTIONS

- A. Section 04050: Masonry Procedures.
- B. Section 04100 - Mortar.
- C. Section 04150: Masonry Accessories.
- D. Section 04160: Joint Reinforcement.
- E. Section 04170: Anchors and Ties.
- F. Section 04180: Masonry Control Joints.
- G. Section 04200 - Unit Masonry.

1.04 REFERENCES

- A. ANSI/ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.
- B. ANSI/ASTM C652 - Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
- C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM C129 - Non-Load Bearing Concrete Masonry Units.
- E. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.05 SUBMITTALS

- A. Submit product data and samples under provisions of Section 01340.
- B. Submit four samples of each masonry unit type to illustrate color, texture, and extremes of color range.

1.06 QUALIFICATIONS

- A. Installer: Company specializing in performing the work of this Section with minimum four years experience.

1.07 MOCK-UP

- A. Provide mock-up of masonry units under provisions of Section 01350.
- B. Erect masonry units to 2 x 4 feet panel size, include specified mortar and accessories.
- C. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Refer requirements of Section 04050.

PART 2 PRODUCTS**2.01 MANUFACTURERS - CONCRETE MASONRY UNITS**

- A. Featherlite.
- B. Substitutions: Under provisions of Section 01630.

2.02 CONCRETE MASONRY UNITS

- A. **"Rock Face"** concrete masonry units as manufactured by Featherlite Building Products Corp. Colors to be **Limestone** and **Saddle Tan**. Refer Drawings.
- B. **"Burnished"** concrete masonry units as manufactured by Featherlite Building Products Corp. Color to be **Saddle Tan**. Refer Drawings.
- C. Sizes of masonry units to be: both 4" and 8" nominal thickness as shown on drawings, 8" nominal height, 16" nominal length. (8" CMU at mechanical screen wall).
- D. Provide corner units as may be required to achieve criteria indicated on exterior elevations and details.

2.03 ANCHORAGE AND REINFORCEMENT

- A. Horizontal joint reinforcement as specified in Section 04160.
- B. Anchors and ties as specified in Section 04170.

2.04 ACCESSORIES

- A. Weep Holes: Cotton wick.
- B. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.

2.05 CAST STONE

- A. Provide cast stone units as indicated on the drawings.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.

3.04 PLACING AND BONDING

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar as Work progresses.

- D. Do not allow excess mortar to fill air cavity.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job-site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
- I. Refer structural drawings for vertical reinforcement and cell fill requirements.
- J. Install control joints where indicated. Refer Section 04180. Masonry Control Joints.

3.05 WEEPS AND VENTS

- A. Install weep holes in veneer at 48 inches on center horizontally, above through-wall flashing.

3.06 REINFORCEMENT AND ANCHORAGES

- A. Install horizontal joint reinforcement 16 inches oc vertically.
- B. Lap joint reinforcement ends minimum 6 inches.
- C. Secure anchor and ties to stud framed back-up and embed into masonry units at a maximum 16 inches oc vertically and 32 inches oc horizontally. Place at maximum 6 inches oc each way around perimeter of openings, within 12 inches of openings.

3.07 LINTELS

- A. Install loose steel lintels over window openings, door openings, and porch/entry openings.
- B. Maintain minimum 4 inch bearing on each side of opening.
- C. Leave 1" gap in mortar joint at each end of lintels to allow for horizontal expansion.

3.08 CONTROL JOINTS

- A. Install control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- B. Size control joint in accordance with Section 07900 for sealant performance.
- C. Place control joints where indicated on drawings.

3.09 BUILT-IN WORK

- A. As work progresses, build in items furnished by other Sections.

- B. Build in items plumb and level.
- C. Do not build in organic materials subject to deterioration.

3.10 TOLERANCES

- A. Maximum Variation From Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
- C. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet.
- D. Maximum Variation From Plumb: 1/4 inch per story non-cumulative.
- E. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.11 CUTTING AND FITTING

- A. Cut and fit for pipes, conduit, sleeves, grounds, etc. Coordinate with other Sections of work to provide correct size, shape, and location.
- B. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING

- A. Clean work under provisions of Section 01710.
- B. Remove excess mortar and mortar smears.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

3.13 WATERPROOFING

- A. After cleaning is complete, allow CMU to dry thoroughly. Apply a clear penetrating water base sealer, such as PrimaPel H2O, or approved equal.

3.14 PROTECTION OF FINISHED WORK

- A. Protect finished installation.

END OF SECTION

SECTION 05050

METAL FASTENERS

PART 1 GENERAL

1.01 Work performed under this section shall include the attachment or connection of steel based materials to other steel based materials.

1.02 REFERENCES

- A. AISC - Manual of Steel Construction
- B. AWS - Structural Welding Code.

1.03 SHOP DRAWINGS

- A. All connections between steel based materials shall be detailed in accordance with AISC Structural Steel Detailing Manual.
- B. Connections shall be designed to resist all loads as indicated on plans.
- C. No fabrication shall be started until submitted shop drawings have been approved by Engineer or Record.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 05120**STRUCTURAL STEEL****PART 1 GENERAL****1.01 WORK INCLUDED**

This section specifies materials, fabrication and erection of structural steel items including connections, bracing, leveling plates, bolts and other items as required for completion of structural steel work. Items of structural steel covered by these specifications shall consist of, but not be limited to, those items listed in Item 2.1 of AISC, "Code of Standard Practice for Steel Buildings and Bridges".

1.02 RELATED WORK

- A Division 3 - Concrete.
 - 1. Nonshrink Grout.
- B Division 5 - Metals. Coordinate the requirements of this section with all other sections of Division 5 - Metals.

1.03 REFERENCE STANDARDS

- A American Institute of Steel Construction (AISC).
 - 1. Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - 2. Code of Standard Practice for Steel Buildings and Bridges.
- B American Welding Society (AWS). D1.1 - Structural Welding Code - Steel.
- C American Society for Testing and Materials (ASTM).
 - 1. ASTM A 1 - Standard Specification for Carbon Steel Tee Rails.
 - 2. ASTM A 2 - Standard Specification for Steel Girder Rails of Plain, Grooved, and Guard Types.
 - 3. ASTM A 6 - Standard Specifications for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
 - 4. ASTM A 36 - Standard Specification for Structural Steel.

5. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
6. ASTM A 108 - Standard Specification for Steel Bars, Carbon, Cold-Finished Standard Quality.
7. ASTM A 123 - Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip.
8. ASTM A 143 - Standard Recommended Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement.
9. ASTM A 153 - Standard Specification for Electro-deposited Coatings of Zinc on Steel.
10. ASTM A 242 - Standard Specification for High-Strength, Low-Alloy Structural Steel.
11. ASTM A 307 - Standard Specification for Carbon Steel Externally Threaded Standard Fasteners.
12. ASTM A 325 - Standard Specification for High-Strength Bolts for Structural Steel Joints.
13. ASTM A 384 - Standard Recommended Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
14. ASTM A 385 - Standard Recommended Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
15. ASTM A 441 - Standard Specification for High-Strength, Low-Alloy Structural Manganese Vanadium Steel.
16. ASTM A 449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
17. ASTM A 490 - Standard Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.
18. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
19. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
20. ASTM A 514 - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
21. ASTM A 529 - Standard Specification for Structural Steel with 42,000 psi (290 MPa) Minimum Yield Point ($\frac{1}{2}$ in (12.7 mm) Maximum Thickness).
22. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts.
23. ASTM A 568 - Standard Specification for Steel, Carbon and High-Strength, Low-Alloy Hot-Rolled Sheet, Hot-Rolled Strip and Cold-Rolled Sheet, General Requirements.
24. ASTM A 570 - Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.

25. ASTM A 572 - Standard Specification for High-Strength, Low-Alloy Columbium-Vanadium Steels of Structural Quality.
26. ASTM A 588 - Standard Specification for High-Strength, Low-Alloy Structural Steel with 50,000 psi Minimum Yield Point to 4 in Thick.
27. ASTM A 606 - Standard Specification for Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy, with Improved Corrosion Resistance.
28. ASTM A 607 - Standard Specification for Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy Columbium and/or Vanadium.
29. ASTM A 618 - Standard Specification for Hot-Formed Welded and Seamless High-Strength, Low-Alloy Structural Tubing.
30. ASTM B 454 - Standard Specification for Mechanically Deposited Coatings of Cadmium and Zinc on Ferrous Metals.

D Steel Structures Painting Council (SSPC).

1. SSPC-SP3 - No. 3 Power Tool Cleaning.
2. SSPC-SP6 - No. 6 Commercial Blast Cleaning.
3. SSPC-SP10 - No. 10 Near White Metal Blast Cleaning.
4. SSPC-PS7.01 - One-Coat Shop Paint System No. 7.01 with Red or Brown Primer.
5. SSPC-Paint 13 - No. 13 Red or Brown One-Coat Shop Paint.
6. SSPC-PA1 - No. 1 Shop, Field and Maintenance Painting.

E Research Council on Riveted and Bolted Structural Joints (RCRBSJ). Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.

F American National Standards Institute (ANSI).

1. ANSI B18.22.1 - Plain Washer.
2. ANSI B18.23.1 - Beveled Washer.

1.04 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions and Division 1, General Requirements. Submit the following items for review by the Engineer.

A Shop Drawings.

1. Shop drawings must include all structural steel items, connections, bolt setting and erection diagrams. Show holes, cuts, reinforcing and other details required to prepare each item for erection and to receive other work. Show location, types and sizes of welds and fastenings and welding process. Indicate type of material for each item. Also indicate whether material will be foreign or domestically manufactured. Give manufacturer and brand of paint for shop coat.

2. The fabricator and the detailer shall ensure proper bolt spacing and clearance to allow the use of the tension control bolt manufacturer's installation tools without interference.
3. Provide sufficient detail to permit steel erection without use of design drawings. Reproduction of design drawings for use as shop drawings will not be allowed.
4. Do not begin fabrication of structural steel until after shop drawings have been reviewed by the Engineer.

B Certificates.

1. Submit four copies of the certified mill report from the steel supplier. Reports must provide heat or melt number, mill analysis and test results for structural steel. If reports are not submitted or if the material cannot be positively identified and directly related to the reports, steel quality tests will be required at no cost to the Owner.
2. When foreign manufactured steel is proposed for use, the material shall be tested for conformance to ASTM requirements by a certified independent testing laboratory located in the United States. Certification from any other source is not acceptable. Furnish copies of the test reports to the Engineer for review. Do not begin fabrication until the material has been approved. The cost of testing shall be borne by the supplier.

C Welding Procedure. Submit written description as required to illustrate each welding procedure for welds that are not prequalified per AWS Structural Welding Code - Steel.

D Welding Certificate. Submit certificates to qualify all welders who will be performing structural steel welds on the project.

1.05 PRODUCT DATA

Submit the manufacturer's technical information on the tension control bolts proposed for use. Provide the Owner with the manufacturer's certification that the material meets the requirements of this specification.

1.06 SUBSTITUTIONS

Substitution of rolled sections, details or products is not permitted without prior approval of the Engineer. If items shown are not readily obtainable, permission to substitute for the specified item may be requested by the Contractor. Substitutions may be allowed by the Engineer on items of equal or superior properties which conform to design criteria.

1.07 INSPECTION AND TESTING

- A The materials and workmanship covered in this specification may be subject to inspection by the Engineer or testing laboratory. The testing laboratory will be employed and paid by the Contractor as specified in Division 1 -General Requirements. Inspection may be performed in the mill, shop or field as deemed necessary. Inspection in no way relieves Contractor from his responsibility to furnish satisfactory materials. Right is reserved to reject material at any time before final acceptance if material and workmanship do not conform to drawings and specifications.
- B The Contractor will be required to repair or replace, at no additional cost to the Owner, all welds found to be defective in accordance with the acceptability requirements of AWS D1.1, Structural Welding Code - Steel. All required repairs or replacement of welds shall conform to the requirements of AWS D1.1, Structural Welding Code - Steel.
- C The Contractor shall notify the testing laboratory a minimum of 48 hours prior to any shop or field welding operations.

1.08 DELIVERY AND STORAGE

Schedule material delivery so that items may be erected promptly after arrival. If materials must be stored at the project site, they shall be stored above ground on platforms, skids or other supports. Material stored at the site shall be kept free of dirt, mud, grease or oil. Protect stored material from corrosion.

PART 2 PRODUCTS**2.01 MATERIALS**

- A Structural Steel.
 - 1. Structural shapes, plates and bars shall conform to the requirements ASTM A-572, $F_y = 50$ Ksi minimum. The use of dual grade A-36/A-572, with $F_y = 50$ Ksi minimum, is also acceptable.
 - 2. Clip angles, stiffeners, plates and other detail items must conform to standard of the main member to which the items are attached unless specifically excepted.
- B Steel Tubing. Conform to ASTM A-500, Grade B, $F_y = 46$ Ksi.
- C Bolts. Conform to the following standards unless indicated otherwise.
 - 1. High-strength bolts shall be a tension-control bolt with torque off spline complete with hardened washers and mating nuts. Bolts,

nuts, and washers shall conform to the requirements of ASTM A 325. Acceptable bolts are the LeJeune bolt as supplied by the LeJeune Bolt Company, Lohr Bolts or equal approved by the Engineer. The bolt and installation tool manufacturer shall make available, at no cost and upon 72 hours' notification of the Engineer or Contractor, the services of a qualified, full-time employee to aid in ensuring proper use of the bolts under job conditions.

2. Anchor Bolts with Suitable Nuts. ASTM A 307, Grade A, galvanized. Provide over-sized washers with all anchor bolts.
 3. Washers for use with ASTM A 307 machine bolts and anchor bolts:
 - a. Plain Washer. ANSI B18.22.1, galvanized.
 - b. Beveled Washer. ANSI B18.23.1, galvanized.
 4. Threaded Rods. ASTM A 36, galvanized.
- D Welding Electrodes. Equivalent to AWS Low Hydrogen E 70 Series suitable for the welding process used. For weathering steel, select electrodes according to the steel manufacturer's recommendations, so that deposited weld metal has corrosion resistance and coloring characteristics similar to base metal.
- E Galvanized Repair Coatings. Acceptable products are:
1. Carboline Carbo Zinc No. 11.
 2. Galv-Weld Products Galv-Weld Alloy.
 3. Koppers Organic Zinc Coating.
 4. Or equal.
- F Paint for Shop Coat. Conform to the requirements for SSPC Paint 13.

2.02 FABRICATION

- A Do not begin fabrication of structural steel until after shop drawings have been reviewed and accepted by the Engineer. Fabricate according to reviewed shop drawings, reference standards and these specifications unless shown otherwise. This specification shall govern when it is a conflict with the referenced standards.
- B Connections.
1. Shop connections shall be bolted or welded, as shown on the drawings.
 2. Field connections shall be bolted or welded, as shown on the drawings.
 3. Column base plates shall be shop welded to the columns.
- C Drill, punch, cut and tap steel as required for anchorage, connection, or accommodating the work of other trades as shown, specified, or

otherwise directed by the Engineer. All holes, slots, etc., and required reinforcing shall be shown on shop drawings. If any such holes, slots, etc., are not shown on drawings, they shall be immediately brought to the attention of the Engineer and members shall be reinforced if, and as directed by, the Engineer. Items with burn holes are considered defective and must be removed and replaced.

- D Column base plates shall be milled in accordance with the requirements of AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
- E Contact bearing surfaces, other than column base plates, noted as "finished" on the drawings shall conform to the requirements of AISC Code of Standard Practice for Steel Buildings and Bridges, Section 6, Item 6.2.2.
- F All members shall have a piece mark. Piece marks shown on the steel members delivered to the job site shall correspond to piece marks shown on the shop details and erection diagrams.

2.03 WELDING

- A Perform welding in accordance with the AWS D1.1, Structural Welding Code - Steel. Use procedures such as preheat or interpass temperature as recommended by AWS.
- B Welding processes shall be limited to one or a combination of the following:
 - 1. Manual shielded-arc.
 - 2. Submerged arc.
 - 3. Gas metal-arc.
 - 4. Flux cored arc.
 - 5. Electroslag.
 - 6. Electrogas.
- C All shop and field welding must be performed by qualified welders who hold current welding certificates.
- D Surfaces to be welded must be free of loose scale, slag, rust, grease, paint and other foreign material. Mill scale which withstands vigorous wire brushing may remain.
- E Joint surfaces must be free of fins and tears caused by shearing. Wherever practicable, prepare edges by gas cutting using a mechanically guided torch.

- F Protect electrodes from exposure to moisture and coating.
- G If shop welding is done by automatic, submerged arc process, verify that physical properties of deposited weld metal will be similar to properties of the base metal.
- H No welding shall be done when the temperature of the base metal is below 32° F.
- I The cover bead or finish pass must have a smooth, uniform surface with reinforcement of 1/16 to 1/8 inch. Surface voids, cracks in finish weldments, or undercutting of base metal at the fusion line is not acceptable.
- J In all lapped or "tee" splices or other joints using intermittent fillet welds, the edges of faying surfaces shall be continuously seal welded in addition to the required strength weld.
- K After welding, all slag shall be removed to permit visual inspection by the testing laboratory.

2.04 GALVANIZING

- A Galvanize structural steel items as shown or specified with hot-dipped zinc coating after fabrication. Conform to applicable provisions of ASTM A 123, ASTM A 153, ASTM A 384 and ASTM A 385.
- B The Contractor shall safeguard against warpage and distortion during hot-dip galvanizing as specified in ASTM A 384. Any member or assembly that is warped or distorted must be straightened. Any member or assembly that cannot be straightened must be replaced at no additional cost to the Owner.

2.05 SHOP PAINTING

- A Shop paint all structural steel except as follows:
 - 1. Surfaces to be galvanized.
 - 2. Surfaces to be welded.
 - 3. Contact surfaces of high-strength friction-type bolted connections.
 - 4. Top surface of crane rails.
 - 5. Surfaces to receive sprayed fireproofing.
 - 6. Steel to be encased in concrete.

- B Steel work to be shop painted shall receive a one-coat shop paint system in accordance with SSPC Paint System PS 7.01.

PART 3 EXECUTION

3.01 ERECTION

- A Erect structural steel according to referenced standards, reviewed shop drawings and these specifications. This specification shall govern when it is in conflict with referenced standards. Contractor shall strictly adhere to the applicable requirements of OSHA, local codes or any regulatory agency or body having jurisdiction over the project.
- B The Contractor shall be fully responsible for furnishing and installing any temporary braces, ties, or shoring necessary to hold secure and safe all erected portions of the structure, under the action of wind and erection loads imposed thereon until construction is completed.
- C Furnish templates for setting anchor bolts in concrete.
- D Give careful attention to leveling and plumbing of structural steel at all stages of construction.
- E Support column base plates on steel wedges or shims with no portion of a wedge or shim within 1 inch of base plate edge. Apply non-shrink grout under base plates according to manufacturer's recommendations.
- F Driftpins may be used only to bring parts together if used carefully so as not to distort or damage metal.
- G Connections shall be welded or bolted as shown or specified. Welding shall conform to requirements as previously specified in this section. Install high-strength tension control bolts in accordance with the requirements of the RCRBSJ referenced standard and the manufacturer's recommendations.
- H Use of a gas cutting torch for correcting fabrication errors in the field will not be permitted on major members. On minor members not under stress, corrections may be allowed upon approval of the Engineer.

3.02

COATING REPAIRS AND FIELD PAINTING

Thoroughly clean field welds, abrasions, and damaged or defective areas of shop primed or galvanized surfaces. After the surface is prepared, apply a matching heavy coat of shop paint or galvanizing repair coat.

END OF SECTION 05120

SECTION 05210**STEEL JOISTS****PART 1 GENERAL****1.01 SCOPE**

This section describes requirements for furnishing and installing open web steel joists, including all necessary accessories for a complete installation of joists.

1.02 RELATED WORK

- A Division 5 - Metals.
 - 1. Structural Steel.
 - 2. Miscellaneous Metals.
 - 3. Steel Roof Deck.

1.03 REFERENCE STANDARDS

- A The term "standard specifications" as used herein refers to the applicable standard of the Steel Joist Institute (SJI) and the American Institute of Steel Construction (AISC) listed below:
 - 1. Standard Specifications for Open Web Steel Joists, H-Series (SJI/AISC).
 - 2. Standard Specifications for Longspan Steel Joists, LH-Series, and Deep Longspan Steel Joists, DLH-Series (SJI/AISC).
 - 3. Recommended Code of Standard Practice for Steel Joists (SJI).
- B American Welding Society (AWS). Structural Welding Code.
- C American Society for Testing and Materials (ANSI/ASTM).
 - 1. ANSI/ASTM A 307 - Standard Specification for Carbon Steel Externally Threaded Standard Fasteners.
 - 2. ANSI/ASTM A 325 - Standard Specification for High-Strength Bolts for Structural Steel Joists.
- D Steel Structures Painting Council (SSPC). SSPC 15 - No. 15, Steel Joist Shop Paint.

1.04 SUBMITTALS

- A Shop Drawings. Furnish detailed drawings and lists showing the mark, number, type, location and spacing of all joists. Show bridging type, mark

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and method of attachment to joists and end anchorages. Show type of paint and all accessories and details as required for a complete installation of joists. Submit shop drawings in accordance with the requirements of the General Conditions and Division 1 - General Requirements.

- B Calculations and Affidavits. Submit three copies of calculations and affidavits as may be required in item "Qualification of Manufacturer."
- C Calculations, sealed by a professional engineer currently registered in Texas, confirming the structural capacity of all joists supporting special loads as shown on the drawings.

1.05 QUALIFICATION OF MANUFACTURER

The manufacturer's current designs of the joist of the type required for the project shall have been checked by the Steel Joist Institute (SJI) and found to conform to its standard specifications and load tables. If the manufacturer's current design has not been checked by SJI, design calculations and affidavits showing that the steel used in the fabrication of the joists complies with yield designations set forth in the standard specifications must be submitted along with the shop drawings. Calculations must be sealed by a professional engineer currently registered in Texas.

1.06 STORAGE AT JOB SITE

Protect joists and accessories from harmful elements when stored at the job site. Store above the ground on platforms, pallets or other supports. Keep joists free of dirt and other harmful matter.

PART 2 PRODUCTS

2.01 JOISTS

- A Furnish joists conforming to the standard specifications.
- B Sizes and types shall be as shown on the drawings.
- C Label each joist with an identifying mark.
- D Joists shall be cambered in accordance with the standard specifications, unless otherwise shown on the drawings.

2.02 SHOP PAINT

Manufacturer's standard light gray conforming to performance requirements of the standard specifications; or SSPC 15 - Type I (red oxide).

2.03 EXTENDED ENDS

Provide extended ends at locations shown on the drawings having a load carrying capacity at least equal to loads on the joist main span plus any additional loads shown on the structural drawings.

2.04 BRIDGING

A Member sizes, spacings and end anchorages in accordance with the standard specifications unless otherwise indicated on the drawings.

B K-Series Joists. Use horizontal bridging attached to joists by welding.

2.05 ACCESSORIES

Provide all accessories that are shown or as may be required for a complete installation.

2.06 BOLTS FOR END CONNECTIONS

Bolts shall conform to ANSI/ASTM A 325.

PART 3 EXECUTION**3.01 HANDLING AND ERECTION**

A Erect in accordance with standard specification and reviewed shop and erection drawings.

B During construction, brace joists for lateral stability in accordance with OSHA regulations.

C Set joists to lines, levels and spacing indicated.

D Fastening Joists. Field bolt joists at or nearest to columns. Weld all other joists to supporting steel framework. Bolting and welding shall conform to the standard specifications unless otherwise shown on the drawings. Welding shall conform to the requirements of AWS Structural Welding Code.

3.02 DAMAGED JOIST

Repair or replace all damaged joists.

3.03 PAINT TOUCH-UP

Thoroughly clean field welds, abrasions, and damaged or defective areas of shop prime with wire brushes, scrapers and emery cloth. After the surface is prepared, apply a coat of primer that matches the shop-applied primer.

END OF SECTION 05210

SECTION 05311**STEEL ROOF DECK****PART 1 GENERAL****1.01 WORK INCLUDED**

This section provides requirements for furnishing and installing steel roof decking, including all necessary accessories for a complete installation. This section also contains requirements for acoustical deck.

1.02 RELATED WORK

- A Division 5 - Metals.
 - 1. Structural Steel.
 - 2. Steel Joists.
- B Division 7 - Thermal and Moisture Protection. Rigid Roof Insulation.

1.03 REFERENCE STANDARDS

- A American Society for Testing and Materials (ANSI/ASTM).
 - 1. ANSI/ASTM A 36 - Standard Specification for Structural Steel.
 - 2. ANSI/ASTM A 446 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
 - 2. ANSI/ASTM A 611 - Standard Specification for Steel, Cold-Rolled Sheet, Carbon, Structural.
 - 3. ANSI/ASTM A 525 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
- B Steel Deck Institute (SDI).
 - 1. Specifications for Roof Deck.
 - 2. Code of Recommended Standard Practice for Composite Deck, Form Deck and Roof Deck construction.
- C American Welding Society (AWS).
 - 1. AWS D1.1 - Structural Welding Code - Steel.
 - 2. AWS D1.3 - Specification for Welding Sheet Steel in Structures.

1.04 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions and Division 1 - General Requirements. Submit the following items for review by the Engineer.

A Shop Drawings.

1. Submit shop drawings showing the following information:
 - a. Physical properties of steel deck units.
 - b. Deck layout showing framing and supports.
 - c. Type and location of welds.
 - d. Details of accessories required for a complete installation.
 - e. Sump pan locations.
2. Shop drawings shall show sufficient detail to permit erection without use of design drawings. Reproduction of design drawings for use as shop drawings will not be allowed. Steel deck shall not be fabricated until the shop drawings have been reviewed by the Engineer.

B Manufacturer's Literature. Submit the steel deck manufacturer's technical information, including recommended installation instructions, to the Engineer for review.**1.05 QUALITY ASSURANCE****A Manufacturer.** Steel deck shall be manufactured by a manufacturer regularly engaged in the production of steel roof deck.**B Erector.** Steel deck shall be erected by an erector with a minimum of 5 years' experience on comparable roof deck projects.**1.06 DELIVERY, STORAGE AND HANDLING****A Do not bend or mar metal decking.****B Store decking off ground with one end elevated for drainage.****C Cover decking with waterproof material ventilated to avoid condensation.**

PART 2 PRODUCTS**2.01 MATERIAL****A Steel Deck.**

1. Unless otherwise noted, steel deck shall meet the requirements of the SDI Specifications for Steel Roof Deck. The type, depth, gage and minimum sectional properties shall be equal to or greater than that shown on the drawings.
2. Form steel deck from steel sheets conforming to ANSI/ASTM A 446, Grade A, with a minimum of 1.25 ounces per square foot commercial class zinc coating conforming to ANSI/ASTM A 525. Steel used shall have a minimum field strength of 33 ksi.
3. Minimum thickness of material supplied shall be within 5 percent of the design thickness shown on the drawings.

B Miscellaneous steel shapes shall conform to ANSI/ASTM A 36.**C Accessories.** Furnish all flexible closure strips, sump pans, vent clips, welding washers, and all other items required for installation according to details and job conditions. Metal accessories shall be of the same material as the decking and shall not be lighter than 20 gage unless specified otherwise herein. All accessories shall be the decking manufacturer's standard type. All metal accessories, except welding washers, shall be galvanized.**D Galvanized Repair Coating.**

1. Carboline Carbo Zinc No. 11.
2. Galv-Weld Products' Galv-Weld Alloy.
3. Koppers' Organic Zinc Coating.
4. ZRC Products ZRC Cold Galvanizing Compound.
5. Or equal.

2.02 DESIGN**A** The steel deck sections, the calculation of their properties, carrying capacity and deflections shall conform to the requirements of the Steel Deck Institute's "Roof Deck Specifications". The design live load shall be as shown on the drawings.**B** After installation, the deck shall be capable of providing continuous bracing for the compression flange of horizontal supporting members such as beams and joists. Welding of deck units will be required to provide the necessary lateral support.

2.03 FABRICATION

- A Deck Units. Form deck units in lengths to span three or more support spacings, with flush, telescoped, or nested 2-inch minimum end laps and nesting side laps. All end laps shall be over supports.
- B Metal Closure Strips.
 - 1. Fabricate of galvanized sheet steel of same quality as deck units.
 - 2. Minimum thickness before galvanizing 0.0359 inch (20 gage).
 - 3. Bend to provide tight-fitting closures at open ends and sides of decking.

PART 3 EXECUTION**3.01 INSPECTION**

- A Check supporting members for correct layout and alignment.
- B Verify that surfaces to receive roof deck are free of debris.
- C Do not proceed with installation until defects are corrected.

3.02 INSTALLATION

Install roof deck units and accessories in accordance with manufacturer's recommendations, requirements of the Steel Deck Institute's "Roof Deck Specifications", and reviewed shop drawings with the following minimum requirements.

- A Placing Roof Deck Units.
 - 1. Position roof deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end-to-end before being permanently fastened. Erect with corrugations perpendicular to the supporting members.
 - 2. Lap ends not less than 2 inches. All end laps shall be over supports. Do not extend the bottom sheet beyond the supporting member.
 - 3. Do not stretch or contract the side lap interlocks.
 - 4. Place deck units flat and square, and secure to adjacent framing without warp or deflection.
- B Fastening Deck Units.
 - 1. Weld steel deck units to the supporting members with the weld size and pattern shown on the drawings.
 - 2. Welding washers shall be provided for steel roof deck.

3. Weld metal shall penetrate all layers of deck material and shall have good fusion to the supporting members.
4. Welding shall be performed by certified welders and shall conform to AWS D1.1 and D1.3. Replace any deck that has burned holes.
5. Side laps shall be fastened by welding or screws at intervals not over 30 inches on center.
6. Welds shall have all slag removed to permit visual inspection by the testing laboratory.

C Cutting and Fitting.

1. Cut and fit roof deck units and accessories around projections through roof decking.
2. Make cuts neat, square and trim.
3. Cut openings in roof deck true to dimensions using metal saws, drills or cutting torches.
4. Do not use cutting torches if neat appearance is required.

D Closure Strips.

1. Install metal closure strips at all ends and edges of roof decking, and in voids between decking and other construction.
2. Weld into position to provide complete decking installation.

E Roof Insulation Support.

1. Provide metal closure strips for support of roof insulation where rib openings in top surface of roof decking occur adjacent to edges and openings.
2. Weld closure strips into position.

F Touch-Up Painting.

1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
2. Wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.

3.03 PROTECTION

- A** Do not use deck units for storage or working platforms until permanently secured in position.
- B** Any construction loads placed on the deck shall not exceed the carrying capacity of deck.

END OF SECTION 05311

SECTION 05314**COMPOSITE STEEL FLOOR DECK****PART 1 GENERAL****1.01 WORK INCLUDED**

This section covers requirements to furnish and install composite steel floor deck including all necessary accessories required for a complete installation.

1.02 RELATED WORK

- A Division 3 - Concrete.
 - 1. Cast-in-Place Concrete.
- B Division 5 - Metals.
 - 1. Structural Steel.

1.03 REFERENCE STANDARDS

- A American Iron and Steel Institute (AISI). Light Gage Cold-Formed Steel Design Manual.
- B American Society for Testing and Materials (ANSI/ASTM).
 - 1. ANSI/ASTM A 446 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
 - 2. ANSI/ASTM A 525 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
- C American Welding Society (AWS).
 - 1. AWS D1.1 - Structural Welding Code - Steel.
 - 2. AWS D1.3 - Specification for Welding Sheet Steel in Structures.
- D Steel Deck Institute (SDI).
 - 1. Specifications for Composite Steel Floor Deck.
 - 2. Code of Recommended Standard Practice for Composite Deck, Form Deck and Roof Deck Construction.

1.04 SUBMITTALS

Submittals shall be made in accordance with the requirements of the General Conditions and Division 1 - General Requirements. Submit the following items to the Engineer for review:

- A Shop Drawings. Submit shop drawings showing deck layout, physical properties of steel deck, type and location of welds, and details of accessories. Shop drawings shall be in sufficient detail to permit erection without use of design drawings. Reproduction of design drawings for use as shop drawings will not be allowed. Steel deck shall not be fabricated until the shop drawings have been reviewed by the Engineer.
- B Manufacturer's Technical Literature. If the manufacturer of the steel deck, proposed for use by the Contractor, is different than those specified, submit the manufacturer's technical literature, including recommended installation instructions, to the Engineer for review.

1.05 QUALITY ASSURANCE

- A Manufacturer. Steel deck shall be manufactured by a firm regularly engaged in the production of steel deck.
- B Erector. Steel deck shall be erected by an erector with a minimum of 5 years of experience on comparable steel deck projects.

1.06 STORAGE AND HANDLING

Steel deck shall be stored off the ground with one end elevated to provide drainage and shall be protected from the elements by a waterproof covering ventilated to avoid condensation. Do not bend or mar decking.

PART 2 PRODUCTS**2.01 MATERIAL**

- A Composite Steel Deck.
 - 1. Unless otherwise noted, composite steel deck shall conform to the SDI "Specifications for Composite Steel Floor Deck". The type, depth, gage and minimum sectional properties shall be equal to or greater than that shown on the drawings.
 - 2. Form steel deck units from steel sheets conforming to ANSI/ASTM A 446 with a minimum yield strength of 33 ksi and with a minimum of 1.25 ounces per square foot commercial class zinc coating conforming to ANSI/ASTM A 525. The minimum physical

properties of the decking shall be as noted on the drawings. Minimum thickness of material supplied shall be within 5 percent of design thickness.

- B Accessories. Furnish all closure strips, vent clips, welding washers, and other items required for installation according to details and job conditions. Metal accessories shall be of the same material as the decking and shall not be lighter than 20 gage unless otherwise specified. All accessories shall be the decking manufacturer's standard type. All metal accessories, except welding washers, shall be galvanized.
- C Galvanized Repair Coating.
 - 1. Carboline Carbo-Zinc No. 11.
 - 2. Galv-Weld Products' Galv-Weld Alloy.
 - 3. Koppers' Organic Zinc Coating.
 - 4. ZRC Products ZRC Cold Galvanizing Compound.
 - 5. Or equal.

2.02 DESIGN

- A The composite steel deck sections, the calculation of their properties, carrying capacity, and deflections shall conform to the SOI "Specifications for Composite Steel Floor Deck". The design live load shall be as shown on the drawings.
- B Deck shall be capable of providing continuous bracing for the compression flange of horizontal supporting members such as beams and joists. Welding of deck units will be required to provide necessary lateral support.

2.03 FABRICATION

- A Fabricate deck units in lengths to span three or more support spacings, with butted ends over supports. Side laps should be nested.
- B Metal closure strips.
 - 1. Fabricate of galvanized sheet steel of same quality as deck panels.
 - 2. Minimum thickness, before galvanizing, shall be 0.0359 inch (20 gage).
 - 3. Bend to provide tight-fitting closures at open ends and side of decking.

PART 3 EXECUTION**3.01 INSPECTION**

- A Check supporting members for correct layout and alignment.
- B Verify that surfaces to receive steel deck are free of debris.
- C Do not proceed with installation until defects are corrected.

3.02 INSTALLATION

Install steel deck units and accessories in accordance with manufacturer's recommendations and reviewed shop drawings with the following minimum requirements.

A Placing Deck Units.

- 1. Position steel deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end to end before being permanently fastened. Erect with corrugations perpendicular to the supporting members.
- 2. Butt ends in accordance with manufacturer's recommendations.
- 3. Do not stretch or contract the side lap interlocks.
- 4. Place deck units flat and square, and secure to adjacent framing without warp or deflection.

B Fastening Deck Units.

- 1. Weld steel deck units to the supporting members with the weld size and pattern shown on the drawings.
- 2. Welding washers must be provided for steel deck with a minimum design thickness of 0.0239 (24 gage) or thinner.
- 3. Weld metal must penetrate all layers of deck material and must have good fusion to the supporting member.
- 4. Welding to conform to AWS D1.1 and D1.3.
- 5. Care shall be taken in welding metal deck. Any deck with burned holes must be replaced.

C Cutting and Fitting.

- 1. Cut and fit deck units and accessories around projections through decking. Provide support angles, if necessary, at columns.
- 2. Make cuts neat, square and trim.
- 3. Cut openings in deck true to dimensions using metal saws, drills or cutting torches.
- 4. Do not use cutting torches if neat appearance is required.

- D Closure Strips. Where shown or required, closure strips shall be installed in accordance with manufacturer's instructions.
- E Touch-up Painting. Touch-up galvanized surfaces damaged by welding or other operations with specified galvanizing repair coating applied in accordance with manufacturer's instructions. This touch-up shall be done to both upper and lower sides of decking.

3.03 PROTECTION

- A Do not use deck units for storage or working platforms until permanently secured in position.
- B Construction loads placed on the deck shall not exceed the carrying capacity of deck.

END OF SECTION 05314

SECTION 05400**COLD FORMED METAL FRAMING****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Load and non-load bearing formed galvanized steel stud wall framing.
- B. Formed galvanized steel framing and accessories.

1.02 RELATED WORK

- A. Section 05100 - Structural Steel: Building framing.

1.03 REFERENCES

- A. ASTM A90 - Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- B. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip process, Physical (Structural) Quality.
- C. ASTM A570 - Hot-Rolled Carbon Steel Sheet and Strip. Structural Quality.
- D. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.
- E. AWCI (Association of Wall and Ceiling Industries) - Specifications Guide for Cold Formed Steel Structural Members.
- F. AWS D1.1 - Structural Welding Code.
- G. FS TT-P-645 - Primer, Paint, Zinc-Chromate, Alkyd Type.

1.04 SYSTEM DESCRIPTION

- A. Size components to withstand design loads of latest adopted Local Code.
- B. Maximum Allowable Deflection: Shall not Exceed $L/360$.
- C. Design system to provide for movement of components without damage, failure of joints seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature range.
- D. Design system to accommodate construction tolerances, deflection of building structural member, and clearances of intended openings.

1.0 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in structural framing components with three years minimum experience.
- B. Calculate Structural properties of framing members in accordance with AWC requirements.

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Indicate on shop drawings, component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories or items required of other related work. Provide stud layout.
- C. Describe method for securing studs to tracks and for bolted/welded framing connections.
- D. Provide product data on standard framing members. Describe materials and finish, product criteria, and limitations.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 05410**COLD FORMED METAL STUD SYSTEM****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Load bearing formed steel stud exterior and interior wall framing.

1.02 RELATED WORK

- A. Section 05100 - Structural Steel: Structural building framing.

1.03 REFERENCES

- A. ASTM A90 - Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- B. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Physical (Structural) Quality.
- C. ASTM A570 - Hot-Rolled Carbon Steel Sheet and Strip. Structural Quality.
- D. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.
- E. AWCI (Association of Wall and Ceiling Industries) - Specifications Guide for Cold Formed Steel Structural Members.
- F. AWS D1.1 - Structural Welding Code.
- G. FS TT-P-645 - Primer, Paint, Zinc-Chromate, Alkyd Type.

1.04 SYSTEM DESCRIPTION

- A. Size components to withstand design loads of as follows: Vertical Assembly: 10 psf Interior.
- B. Maximum Allowable Deflection: 1/270 span.
- C. Design system to provide for movement of components without damage, failure of joints seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature range.
- D. Design system to accommodate construction tolerances, deflection of building structural member, and clearances of intended openings.

1.05 INTERFACES

- A. Interface and coordinate the work of this Section with total work.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in structural framing components with three years minimum experience.
- B. Calculate Structural properties of framing members in accordance with AWC requirements.

1.0 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Indicate on shop drawings, component details, welds, type and location of fasteners, and accessories or items required of other related work.
- C. Provide stud layout.
- D. Describe method for securing studs to tracks and for bolted/welded framing connections.
- E. Provide product data on standard framing members. Describe materials and finish, product criteria, and limitations.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Inryco
- B. Wheeling
- C. U. S. Gypsum
- D. Substitutions: Under provisions of Section 01600.

2.02 FRAMING MATERIALS

- A. Studs: ASTM A570 sheet steel, formed to channel shape, solid web, 18 gage thick 6" x 1-5/8" size at 16" o.c..
- B. Track: Formed steel, channel shaped, same gauge and width as studs, tight fit, 20 gage thick, solid web.

2.03 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

2.04 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: ASTM A90, hot dip galvanized.
- B. Anchorage Devices: Power driven fasteners.
- C. Welding: In conformance with AWS D1.1.

2.05 FABRICATION

- A. Fabricate assemblies of framed sections of sizes and profiles required; with framing members fitted, reinforced, and braced to suit design installation.
- B. Fit and assemble in largest practical sections for delivery to site, ready for installation.

2.06 FINISHES

- A. Galvanizing: G90 coating class.
- B. Primer: FS TT-P-645, touch-up for galvanized surfaces.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that building framing components are ready to receive work.
- B. Beginning of installation means acceptance of existing conditions.

3.02 ERECTION OF STUDDING

- A. Install framing components in accordance with manufacturer's instructions.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners or welding at maximum 12 inches o.c. Coordinate installation of sealant with floor and ceiling tracks.
- C. Construct corners using minimum three studs. Double stud at wall opening, door, and window jams.
- D. Erect load bearing studs on piece full length. Studs may be spliced 24" maximum.
- E. Erect load bearing studs, brace, and reinforce to develop full strength to meet design requirements.
- F. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- G. Install intermediate studs above and below openings to match wall and stud spacing.
- H. Provide deflection allowance in stud track, directly below horizontal building framing or non-load bearing framing.

- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged galvanized surfaces with primer.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/8 inch.
- B. Maximum Variation of any Member from Plane: 1/8 inch.

END OF SECTION

SECTION 05510**STEEL STAIRS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. All labor, materials, equipment and supplies for furnishing and installing steel stair units as indicated on the drawings.
- B. Deformed metal treads.
- C. Steel handrails and guardrails.

1.02 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Furnish any items required to be embedded in concrete to Section 03300 for placement.
- B. Furnish any required attachment brackets, back-up plates, etc. to Section 06100 for placement.

1.03 RELATED SECTIONS

- A. Section 05100 - Structural steel support for stringers and landings.
- B. Section 09655 - Resilient stair treads and landings.
- C. Section 09900 - Painting.

1.04 REFERENCES

- A. NAAMM - Metal Stair Manual.

1.05 SYSTEM DESCRIPTION

- A. Conform to applicable building code for live and dead loads applicable to work of this Section.
- B. Load Design: NAAMM Metal Stair Manual.
- C. Live Load to Stair: 100lb/sq ft minimum.
- D. Lateral Load to Handrail Without Permanent Set: 200 lb. minimum.
- E. Floor to Floor Height: as shown on drawings.
- F. Baluster attachment: as shown on drawings.

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Provide details of stair components, support loads, supporting accessories, final connections, floor opening details, and tolerances of building measurements.
- C. Provide descriptive product data for deformed metal treads, if used.

1.07 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Steel Stairs: Stairs will be formed to details shown on drawings.
- B. Interior Treads: Channel shaped to provide a minimum of 1 1/2 inches of concrete infill. Expanded metal lath is to be tack welded over the entire bottom surface of tread pans for anchorage of concrete infill.
- C. Steel handrails and Supports: Refer Section 05520.
- D. Steel Sections: ASTM A36.
- E. Plates: ASTM A283.
- F. Sheet Steel: ASTM A446, Grade B Structural Quality.
- G. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.
- H. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair.
- I. Welding Materials: AWS D1-1

2.02 FABRICATION - GENERAL

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Continuously seal jointed pieces by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.

2.03 FINISHES

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with one coat.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that field measurements are acceptable to suit stair assembly tolerances.
- B. Verify that supports anchors are correctly positioned.
- C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Attachment: Weld steel stair members as required for a complete assembly.
- B. Advise if field conditions exceed adjustment limits of attachments. Do not field cut or modify stair components unless approved by the Architect.

3.03 TOLERANCES

- A. Conform to NAAMM - Metal Stair Manual.
- B. Maximum Variation From Plumb: 1/4 inch in ten feet.

END OF SECTION

SECTION 05515

STEEL LADDERS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide steel access ladder where shown on the drawings and as described herein.

1.02 RELATED SECTIONS

- A. Section 05050: Metal Fasteners
- B. Section 05060: Welding
- C. Section 05070: Bolting
- D. Section 05120: Structural Steel
- E. Section 05500: Metal Fabrications
- F. Section 09900: Painting
- G. Section 09920: Interior Painting

1.03 FIELD MEASUREMENTS

- A. Obtain field measurements of area to which ladder access will be placed to insure proper height, offset clearance and location of anchors and supports.

1.04 QUALITY CONTROL

- A. Comply with local fire codes, City ordinances, and State Elevator Codes with respect to access widths and clearance.

1.05 SHOP DRAWINGS

- A. Submit shop drawings under provisions of Section 01340.
- B. Indicate profiles, sizes, spacing, and locations of steel members, connections, attachments, and fasteners.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ladder:
 - 1. Side rails: Steel angles - turned out; ASTM A36
 - 2. Rungs: Round steel bars; ASTM A36

B. Ladder Supports:

1. Offset supports: Cut steel angles; ASTM A36
2. Attachments: As shown on drawings

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Fabrication: Weld side rails to rungs as shown on the drawings. Grind weld connections smooth and prepare for painting. Weld offset supports to side rails as detailed. Insure spacing to coincide with concealed blocking provided by others.
- B. Attachment: Attach to concealed blocking with lag bolts as appropriate.
- C. Painting: Provide hop coat of red oxide paint on all surfaces. Field paint to final finish.

END OF SECTION

SECTION 05520

HANDRAILS AND RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel pipe handrails, balusters, and fittings.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 03300 - Cast-In-Place Concrete: Placement of anchors in concrete.

1.03 RELATED SECTIONS

- A. Section 05500: Metal Fabricators.
- B. Section 05510 - Metal Stairs.
- C. Section 09900 - Painting: Paint finish.
- D. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- E. SSPC - Steel Structures Painting Council.

1.04 DESIGN REQUIREMENTS

- A. Railing assembly, wall rails, and attachments to resist lateral force of 200 lb. at any point without damage or permanent set.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01340.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.06 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 STEEL RAILING SYSTEM

- A. Rails and Posts: as shown on drawings.
- B. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined steel.

- C. Mounting: Adjustable brackets and flanges, with steel inserts for casting in concrete.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- E. Splice Connectors: Steel welding collars.
- F. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.02 FABRICATION

- A. Fit and shop assemble components in largest practical sizes, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- E. Continuously seal joined pieces by continuous welds.
- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- G. Accurately form components to each other and to building structure.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete, with setting templates, to appropriate Sections.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors required for connecting railings to structure. Anchor railing to structure.
- C. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.

- D. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.05 FINISH

- A. Field paint all handrail components.

END OF SECTION

SECTION 06050

FASTENERS AND SUPPORTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. All specified metal fasteners and support devices.

1.02 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry.
- B. Section 06110 - Framing and Sheathing.
- C. Section 06114 - Wood Blocking and Curbing.
- D. Section 06200 - Finish Carpentry.

1.03 QUALITY ASSURANCE

- A. All products used for the purpose of structural fastening and/or support shall be sized appropriately to accept, or fasten, the member sizes applicable.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Simpson Strong-Tie Company, Inc.
- B. Silver Metal Products, Inc.
- C. Substitutions: Under provision of 01630.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturers guidelines and recommendations.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Rough carpentry, blocking, nailers, grounds, etc.

1.02 RELATED SECTIONS

- A. Section 03300: Setting anchorage in foundations and concrete work for work of this Section.
- B. Section 06050: Fasteners and Support.
- C. Section 06110: Framing and Sheathing.
- D. Section 06114: Wood Blocking and Curbing.
- E. Section 06200: Finish Carpentry.
- F. Section 08700: Hardware: Supply of cabinet hardware as required for installation this Section.
- G. Section 10800: Toilet and Bath Accessories.
- H. Section 06400: Architectural Woodwork.

1.03 REFERENCES

- A. MIL-L-1914-C Lumber and Plywood, Fire Retardant Treated
- B. MIL-V-13518C(1) Wood Preservative: Tetrachlorophenol and Pentachlorophenol, Surface Sealing Compound
- C. PS 1 - Construction and Industrial Plywood
- D. PS 20 - American Softwood Lumber Standard
- E. PS 51 - Hardwood and Decorative Plywood
- F. PS 58 - Basic Hardwood
- G. NFPA - National Design Specification for Wood Construction.

1.04 QUALITY ASSURANCE

- A. Rough Carpentry Lumber: Visible grade stamp, of agency certified by National Forest Products Association NFPA).

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit, and after delivery.

PART 2 PRODUCTS**2.01 ROUGH CARPENTRY MATERIALS**

- A. Lumber: PS 20; graded in accordance with established Grading rules; maximum moisture content of 19% percent; of following species and grades:
 1. Non-structural Light Framing: construction standard utility grade.
 2. Lumber Species to be Southern Yellow Pine or Douglas Fir-Larch.
- B. Nails, Spikes and Staples: Galvanized for exterior locations, high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application, and meet requirements of Building Code.
- C. Fasteners: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolts or power activated type for anchorage to steel.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Examine substrates, supporting structure and the conditions under which carpentry work is to be installed. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- B. Correlate location of furring, nailers, blocking, grounds and similar supports with work to be attached.

3.02 INSTALLATION OF FINISH CARPENTRY ITEMS AND CABINET WORK

- A. Set and secure cabinetwork and finish carpentry items in place rigid, plumb, and square.
- B. Use purpose designed fixture attachments for mounted components.
- C. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- D. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Permanently fix cabinet and counter bases to floor using appropriate angles and anchorage's.

- F. Counter-sink semi-concealed anchorage devices used to wall mount components and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.
- G. Carefully scribe cabinetwork which is against other building materials, leaving gaps of 1/32 inch maximum. Do not use additional overlay trim for this purpose.
- H. Install hardware fixtures and accessories supplied under other Sections for installation. Install items in accordance with manufacturer's instructions.
- I. Ensure that mechanical and electrical items affecting this Section of work are properly placed, complete, and have been inspected by the Architect/Engineer prior to commencement of installation.

3.04 SCHEDULE

- A. Rough Carpentry Work:
 - 1. Miscellaneous furring and stripping for wall finishes.
 - 2. Miscellaneous blocking and canting.
 - 3. Behind wall wood blocking for support of washroom accessories, and other wall attached items.

END OF SECTION

SECTION 06114

WOOD BLOCKING AND CURBING

VOL 0095
PART 569

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Parapet blocking.
- B. Blocking in wall and roof openings.
- C. Wood furring and grounds.
- D. Concealed wood blocking for support of washroom accessories wall cabinets and other items requiring substrate attachment.
- E. Wood treatment.

1.02 RELATED WORK

- A. Section 06050: Fasteners and Supports.
- B. Section 06100: Rough Carpentry.
- C. Section 06200: Finish Carpentry.
- D. Section 06220: Millwork.
- E. Section 06300: Wood Treatment.
- F. Section 06400: Architectural Woodwork.
- G. Section 06410: Cabinetwork.
- H. Section 09100: Metal Support Systems.
- I. Section 09110: Non-Load Bearing Wall Framing Systems.
- J. Section 10150: Compartments and Cubicles.
- K. Section 10800: Toilet and Bath Accessories.

1.03 REFERENCES

- A. ALSC - American Lumber Standards Committee: Softwood Lumber Standard.
- B. APA - American Plywood Association: Grades and Standards.
- C. FS TT-W-571 - Wood Preservation: Treating Practices.

569

- D. NFPA - National Forest Products Association.
- E. SFPA - Southern Forest Products Association.
- F. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.
- G. WWPA - Western Wood Products Association.

1.04 QUALITY ASSURANCE

- A. Lumber Grading Agency: Certified by ALSC.
- B. Plywood Grading Agency: Certified by APA.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber Grading Rules: NFPA RIS SFPA WCLIB WWPA.
- B. Lumber in contact with concrete or steel: Pressure Treated.
- C. Softwood Lumber: 19 percent maximum moisture content.
- D. Plywood: APA Grade C-D, With without waterproof glue, sanded.
- E. Fasteners: ElectroHot-dipped galvanized steel for exterior, high humidity, and treated wood locations; plain finish elsewhere; size and type to suit condition.
- F. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolts or ballistic fasteners for anchorage's to steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide all wood blocking required for proper support or attachment of work by other trades.

END OF SECTION

SECTION 06200
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES (Furnish and Install)

- A. Finish carpentry items.
- B. Cabinet hardware and attachment accessories.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 08710: Finish Hardware.

1.03 RELATED SECTIONS

- A. Section 06114 - Wood Blocking and Curbing.
- B. Section 08210 - Wood Doors.
- C. Section 09900 - Painting: Painting and finishing of finish carpentry items.

1.04 REFERENCES

- A. ANSI/HPHA HP - American Standard for Hardwood and Decorative Plywood.
- B. ANSI A135.4 - Basic Hardboard.
- C. AWI - Quality Standards.
- D. FS MM-L-736 - Lumber; Hardwood.
- E. FS MMM-A-130 - Adhesive, Contact.
- F. NEMA LD-3 - High Pressure Decorative Laminates.
- G. PS 1 - Construction and Industrial Hardwood.
- H. PS 20 - American Softwood Lumber Standard.
- I. UL - Underwriters Laboratories.

1.05 SAMPLES

- A. Provide samples under provisions of Section 01340.
- B. Provide one sample of each specified cabinet/millwork product listed in 2.03 of this specification.

1.06 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Submit product data under provisions of Section 01340.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.

PART 2 PRODUCTS**2.01 ADHESIVE**

- A. Contact Adhesives: solvent release type.

2.02 ACCESSORIES

- A. Nails: Size and type to suit application, plain finish.
- B. Bolts, Nuts, Washers, Blind Fasteners, Lags, and Screws: Size and type to suit application; plain finish.
- C. Lumber for Shimming and Blocking, Softwood lumber of pine species.
- D. Primer: Alkyd primer sealer type.
- E. Wood Filler: Oil base, tinted to match surface finish color.

2.03 CABINET/MILLWORK HARDWARE (SUPPLIED BY THIS SECTION)

- A. Shelf Standards and Rests: manufactured by Knape & Vogt, number: 80.
- B. Shelf Brackets: manufactured by Knape & Vogt, number: 180.
- C. Catches: manufactured by Stanley, number: SP46.
- D. Drawer Slides: manufactured by Knape & Vogt, number: 1300.
- E. Hinges: manufactured by Blum.
- F. Pulls: manufactured by Ives, number: 38.
- G. Finishes: US26D.
- H. Upper Cabinet and Drawer Locks: Manufactured by Corbin, Number 02066-7/8" and 02067-7/8".

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces and openings are ready to receive work.
- B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work. Coordinate with these trades as necessary.
- C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install work in accordance with AWI Premium quality standard.
- B. Set and secure materials and components in place, plumb and level.
- C. Apply plastic laminate finishes where indicated. Adhere with adhesive over entire surface. Make joints and corners hairline. Match patterns. Slightly bevel arises. Cap exposed edges with plastic laminate of same finish and pattern. Refer Section 06240.
- D. Install hardware in accordance with manufacturer's instructions.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

END OF SECTION

SECTION 06220

MILLWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items, other than shop fabricated casework and cabinets.
- B. Refer to schedule at end of this Section.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 06240: Laminated Plastic.

1.03 RELATED SECTIONS

- A. Section 06050: Fasteners and Supports.
- B. Section 06114: Wood Blocking and Curbing.
- C. Section 06200: Finish Carpentry.
- D. Section 06400: Architectural Woodwork.
- E. Section 06410: Cabinetwork.
- F. Section 08111: Standard Steel Frames.
- G. Section 08210: Wood Doors.
- H. Section 09920: Interior Painting.
- I. Section 09930: Transparent Finish.

1.04 REFERENCES

- A. ANSI/HPHA HP - American Standard for Hardwood and Decorative Plywood.
- B. ANSI A135.4 - Basic Hardboard.
- C. AWI - Quality Standards.
- D. FS MM-L-736 - Lumber; Hardwood.
- E. FS MMM-A-130 - Adhesive, Contact.
- F. NEMA LD-3 - High Pressure Decorative Laminates.

- G. PS 1 - Construction and Industrial Hardwood.
- H. PS 20 - American Softwood Lumber Standard.
- I. UL - Underwriters Laboratories.

1.05 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Submit shop drawings indicating materials, component profiles, fastening methods, jointing details, finishes, and accessories to a minimum scale of [1-1/2 inch to one foot.
- C. Submit product data under provisions of Section 01340.
- D. Submit samples under provisions of Section 01340.
- E. Submit two samples 12 x 24 inch in size illustrating wood grain and specified finish for all finish hardwood plywood.
- F. Submit two samples 12 inches long of all wood trim types.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees F and maximum relative humidity of 55 percent.

PART 2 PRODUCTS

2.01 LUMBER MATERIALS

- A. Softwood Lumber: (For Areas Not Exposed To View and: **Utility Shelving**) PS 20; Economy grade in accordance with AWI; maximum moisture content of 6 percent, with flat grain, of quality capable of painted finish.
- B. Hardwood Lumber: FS MM-L-736; Premium grade in accordance with AWI; maximum moisture content of 6 percent; **Birch** species, with plain sawn grain, of quality capable of transparent finish.

2.02 SHEET MATERIALS

- A. Softwood Plywood: PS 1; Standard Sheathing Grade, Group 1, Appearance Quality; used only in areas not exposed to view and for **Utility Shelving**.
- B. Hardwood Plywood: ANSI/HPHA HP; Premium Grade in accordance with AWI; lumber core material; **Birch** species, with face veneer of rotary cut grain.

2.03 ADHESIVE

- A. Contact Adhesives: FS MMM-A-130; solvent release type.
- B. Wall Adhesive: Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.

2.04 ACCESSORIES

- A. Nails: Size and type to suit application, plain finish.
- B. Bolts, Nuts, Washers, Blind Fasteners, Lags, and Screws: Size and type to suit application; plain finish.
- C. Lumber for Shimming, Blocking, and Nailers: Softwood lumber of pine or fir species.
- D. Primer: Alkyd primer/sealer type.
- E. Wood Filler: Oil base, tinted to match surface finish color.

2.05 FABRICATION

- A. Fabricate trim to AWI Premium standards.
- B. Mill run trim to longest practical lengths for field cutting and installation.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work.
- B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.
- C. Beginning of installation means acceptance of existing conditions and/or substrate.

3.02 PREPARATION

- A. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.03 INSTALLATION

- A. Install work in accordance with AWI Custom Grade requirements.
- B. Set and secure materials and components in place, plumb and level.
- C. Make all joints tight fitting using mitered joints.
- D. Install components and trim with nails, countersunk.

VOL 0095 PART 577

- E. Cover exposed edges of plywood shelving, used for utility area shelving, with 1x2 pine. Provide intermediate vertical shelf supports of 2x2 pine spaced not greater than 48" oc horizontally.
- F. All finish grade plywood edges to have T-spline hardwood edges of same wood species as plywood veneer.
- G. Apply plastic laminate finishes where indicated. Adhere with adhesive over entire surface. Make joints and corners hairline. Match patterns as applicable. Slightly bevel arises. Cap exposed edges with plastic laminate of same finish and pattern.
- H. Install hardware supplied by Section 08712 in accordance with manufacturer's instructions.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.05 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: Refer to Section 09920 and 09930.

3.06 PROTECTION

- A. Protect finished installation under provisions of Section 01500.

3.08 SCHEDULE

- A. All interior **Birch** trim and plywood to be prepared for **stained** finish.
- B. All utility shelving to be painted.

END OF SECTION

577

SECTION 06240

LAMINATED PLASTIC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Plastic laminate countertops and face veneers.

1.02 RELATED SECTIONS

- A. Section 06200: Finish Carpentry.
- B. Section 06220: Millwork.
- C. Section 06400: Architectural Woodwork.
- D. Section 06410: Cabinetwork.

1.03 REFERENCES

- A. FS MMM-A-130 - Adhesive, Contact.
- B. NEMA LD-3 - High Pressure Decorative Laminates.

1.08 SUBMITTALS

- A. Submit Product Data and Samples under requirements of Section 01340. Submit three samples of color chips.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wilson Art.
- B. Formica.
- C. Nevamar.
- D. Substitutions: Under provisions of Section 01630.

2.02 LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD 3, PF 42 post forming GP-50 33 general purpose type; color as selected by Architect.

2.03 ACCESSORIES

- A. Contact Adhesives: FS MMM-A-130; type recommended by Laminate Manufacturer to suit application.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work.
- B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.
- C. Beginning of installation means acceptance of substrate.

3.02 INSTALLATION

- A. Install work in accordance with manufacturer's recommendations.
- B. Apply plastic laminate finishes where indicated. Adhere with adhesive over entire surface. Make joints and corners hairline. Match patterns. Slightly bevel arises. Cap exposed edges with plastic laminate of same finish and pattern.

3.03 PROTECTION

- A. Protect finished installation under provisions of Section 01500.

END OF SECTION

SECTION 06300

WOOD TREATMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide wood treatment for framing and blocking materials specified.

1.02 RELATED SECTIONS (As applicable)

- A. Section 06100 - Rough Carpentry.
- B. Section 06110 - Framing and Sheathing.
- C. Section 06114 - Wood Blocking and Curbing.

1.03 REQUIREMENTS

- A. Treat all lumber required to be in contact with concrete, steel, or masonry, or otherwise specified for pressure treatment, in accordance with LP2-80 and dried after treatment.
 - 1. Lumber grade and species shall be specified for the particular use.
 - 2. Identify treated lumber as to name of treats, preservative used, and retention in lb./cu. ft.
 - 3. Season after treatment to moisture content required for non-treated material.
- B. Fire treated lumber, if used, to meet fire retardant criteria and requirements of Building Code and Underwriters Laboratories (UL).

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 06310**PRESSURE TREATED LUMBER****PART 1 GENERAL****1.01 DESCRIPTION**

- A. All lumber required to be pressure treated shall comply with the requirements of this specification.

1.02 REQUIREMENTS

- A. Provide pressure treated lumber for all wood in contact with metal, concrete, or masonry, or as otherwise specified, in accordance with LP 2-80 and dried after treatment.

1.03 QUALITY ASSURANCE

- A. The wood preservative treating process and results thereof shall meet Federal Specification TT-W-571, AWPAs commodity Standards as applicable and American wood Preservers' Bureau Standards LP-2 and LP-22.
- B. Kiln-dry wood to a maximum moisture content of 15 percent after treatment for plywood and 19 percent for lumber.

PART 2 PRODUCTS

- A. Wood preservative chemicals meeting AWPAs Standard P-5 and Federal Standard TT-W-550 for lumber and plywood designated as "Treated".

PART 3 EXECUTION**3.01 APPLICATION**

- A. Treated wood preservative shall be applied in a manner which guarantees retention at the rate of .25 pound per cubic foot as determined by assay in accordance with AWPAs Standard C-3.

END OF SECTION

ARCHITECTURAL WOODWORK**PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Special fabricated cabinet units.
- B. Countertops.

1.02 RELATED WORK (As applicable)

- A. Section 06050: Fasteners and Supports.
- B. Section 06200: Finish Carpentry.
- C. Section 06220: Millwork.
- D. Section 06240: Laminated Plastic.
- E. Section 06410: Cabinet Work.
- F. Section 09930: Transparent Finishes.

1.03 REFERENCES

- A. FS MM-L-736 - Lumber, Hardwood.
- B. FS MMM-A-130 - Adhesive, Contact.
- C. NEMA LD3 - High Pressure Decorative Laminates.
- D. PS 1 - Construction and Industrial Plywood.
- E. PS 20 - American Softwood Lumber Standard.
- F. PS 51 - Hardwood and Decorative Plywood.
- G. PS 58 - Basic Hardboard.

1.04 QUALITY ASSURANCE

- A. Perform work to premium custom economy quality in accordance with "Quality Standards" of the Architectural Woodwork Institute (AWI).
- B. The Architect's approval of the woodwork manufacturer must be received prior to any arrangement with him by the contractor to furnish the specified wood work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 06410

CABINET WORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fabricated cabinet units.
- B. Countertops.
- C. Prepared for site finishing.
- D. Prepared for utilities.

1.02 WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Section 06200: Cabinet hardware.

1.03 RELATED SECTIONS

- A. Section 06100: Rough Carpentry: Grounds and support framing.
- B. Section 06200: Finish Carpentry.
- C. Section 06220: Millwork.
- D. Section 06240: Plastic Laminate.
- E. Section 06400: Architectural Woodwork.
- F. Section 09930: Transparent Finishes.

1.04 REFERENCES

- A. FS MM-L-736 - Lumber, Hardwood.
- B. FS MMM-A-130 - Adhesive, Contact.
- C. NEMA LD3 - High Pressure Decorative Laminates.
- D. PS 1 - Construction and Industrial Plywood.
- E. PS 20 - American Softwood Lumber Standard.
- F. PS 51 - Hardwood and Decorative Plywood.
- G. PS 58 - Basic Hardboard.

1.05 QUALITY ASSURANCE

- A. Perform work to premium custom economy quality in accordance with "Quality Standards" of the Architectural Woodwork Institute (AWI).

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Include materials, component profiles, fastening methods, assembly methods, joint details, accessory listings, and schedule of finishes.
- C. Submit samples of finish wood under provisions of Section 01340.
- D. Submit one sample of cabinet with drawer and base unit.

PART 2 PRODUCTS**2.01 WOOD MATERIALS**

- A. Softwood Lumber: PS 20; graded in accordance with AWI; maximum moisture content of 6 percent; species: Fir or Pine, grade: No. 1 Premium.
- B. Hard wood Lumber: FS MM-L-736; graded in accordance with AWI; maximum moisture content of 6 percent; species: Birch, grade: No. 1 Premium.

2.02 SHEET MATERIALS

- A. Softwood Plywood: PSI; graded in accordance with AWI; core material of lumber; face veneer of: Fir or Pine, grade: No. 1 Premium.
- B. Hardwood Plywood: PS 51; graded in accordance with AWI; core material of lumber; face veneer of Birch, grade: No. 1 Premium.

2.03 MATERIAL SCHEDULE

- A. Drawers:
 - 1. Bottoms: Plywood.
 - 2. Sides: Plywood or Solid Stock.
 - 3. Back: Plywood or Solid Stock.
 - 4. Front: Plywood.
- B. Exposed cabinet ends/bottoms Plywood.
- C. Stiles and Rails: Birch (Exposed).
- D. Stile and Rails: Birch (Concealed).
- E. Doors: Plywood.
- F. Shelves: Plywood (Where open to view).
- G. Shelves: Plywood (Where concealed by solid doors)

- H. Splined Edges: Birch.
- I. Cabinet Backs: Plywood.
- J. Concealed Dividers: Plywood.
- K. Countertop Substrate: Plywood.
- L. Utility shelving.
- M. Utility shelving edges: 1 x 2 Pine or Fir.
- N. Utility shelving supports: 2 x 2 Pine or Fir.

2.04 ACCESSORIES

- A. Fasteners: Size and type to suit application.
- B. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application.

2.05 HARDWARE (REFER SECTION 06200)

2.06 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Fit shelves, doors, and exposed edges with 3/8 inch matching hardwood edging. Use full length pieces only. T-spline to sheet materials.
- C. Door and Drawer Fronts: 3/4 inch thick.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. Refer Section 06240.
- F. Mechanically fasten splash-backs to countertops with steel brackets at 16 inches on center.
- G. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.
- H. Drawer Construction:
 1. Bottoms to be 1/4 inch thick for drawers 18 inch or less in width; bottoms to be 3/8 inch thick for drawers wider than 18 inches.
 2. Sides and back to be 1/2 - 3/4 inch thick.

3. Fronts to be 3/4 inch thick.

I. Cabinet Units (Uppers and Lower):

1. Backs to be 1/4 inch thick.
2. Countertop substrate to be 3/4 inch thick.
3. Internal dividers to be 1/2 inch thick.
4. Exposed ends to be 3/4 inch thick.
5. Tops for upper cabinets to be 1/2 inch thick.
6. Bottoms for upper cabinets to be 3/4 inch thick.
7. Bottoms for lower cabinets to be 1/2 inch thick.

J. Construction:

1. Drawer components to be joined together using routed joints, glue, and cabinetry staples or nails.
2. Fixed shelving to be joined to vertical supports with routed joints, glue, and cabinetry staples or nails.
3. Stiles and rails shall be joined using cut bearing joints to provide proper support and rigidity.
4. Tops shall be connected using mechanical means.
5. Adjacent surface joints are to be smooth and uniform with no arises.
6. Nails and staples shall be neatly counter sunk and puttied.
7. All surfaces are to be sanded smooth prior to finishing.

2.07 WOOD SPECIES

- A. All exposed cabinet fronts, drawers and doors to be Birch.
- B. All exposed stiles and rails to be solid lumber Birch.
- C. Hardwood shelf edging to be Birch.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

- A. Set and secure casework in place rigid, plumb, and level.
- B. Use purpose designed fixture attachments at concealed locations for wall mounted components.
- C. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework which is against other building materials, leaving gaps of 1/32 inch maximum. Do not use additional overlay trim for this purpose.
- E. Secure cabinet and counter bases to floor using appropriate angles and anchorage's.
- F. Counter-sink anchorage devices at exposed locations used to wall mount components, and conceal with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

3.03 ADJUSTING AND CLEANING

- A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.
- B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION

SECTION 07100

WATERPROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment, and supplies necessary to complete all specified waterproofing work.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 03300: Cast-In-Place Concrete.
- C. Section 04200: Unit Masonry.

1.03 REFERENCES

- A. ANSI/ASTM D41 - Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- B. ANSI/ASTM D449 - Asphalt Used in Dampproofing and Waterproofing.
- C. ANSI/ASTM D450 - Coal-tar Bitumen Used in Roofing, Dampproofing, and Waterproofing.
- D. ANSI/ASTM D491 - Asphalt Mastic Used in Waterproofing.
- E. ASTM D43 - Creosote Primer Used in Roofing, Dampproofing, and Waterproofing.
- F. ASTM D173 - Bitumen-saturated Cotton Fabrics Used in Roofing and Waterproofing.
- G. ASTM D226 - Asphalt-saturated Organic Felt Used in Roofing and Waterproofing.
- H. ASTM D227 - Cold-tar-saturated Organic Felt Used in Roofing and Waterproofing.
- I. ASTM D1327 - Bitumen-Saturated Woven Burlap Fabrics Used in Roofing and Waterproofing.
- J. ASTM D1668 - Glass Fabrics (Woven and Treated) for Roofing Waterproofing.
- K. NRCA (National Roofing Contractors Association) - Waterproofing Manual.
- L. ANSI/ASTM D412 - Rubber Properties in Tension.
- M. ASTM D624 - Rubber Property - Tear Resistance.
- N. ASTM D822 - Practice for Operating Light-and-Water-Exposure Apparatus (Carbon-arc type) for Testing Paint, Varnish, Lacquer, and Related Products.

- O. ASTM D1004 - Initial Tear Resistance of Plastic Film and Sheeting.
- P. ASTM D2240 - Rubber Property - Durometer Hardness.
- Q. ASTM E96 - Water Vapor Transmission of Materials.
- R. ANSI/ASTM D746 - Test for Brittleness Temperature of Plastics and Elastomerics by Impact.
- S. ASTM C836 - High Solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
- T. ASTM D3468 - Liquid-Applied Neoprene and Chlorosulfonated Polyethylene for Roofing and Waterproofing.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 07150**DAMPPROOFING****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Furnish all labor, materials, equipment, and supplies necessary to complete all specified dampproofing work.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 03300: Cast-In-Place Concrete.
- C. Section 04200: Unit Masonry.
- D. Section 06100: Rough Carpentry.
- E. Section 06110: Framing and Sheathing.

1.03 REFERENCES

- A. ANSI/ASTM D41 - Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- B. ANSI/ASTM D449 - Asphalt Used in Dampproofing and Waterproofing.
- C. ANSI/ASTM D450 - Coal-tar Bitumen Used in Roofing, Dampproofing, and Waterproofing.
- D. ANSI/ASTM D491 - Asphalt Mastic Used in Waterproofing.
- E. ASTM D43 - Creosote Primer Used in Roofing, Dampproofing, and Waterproofing.
- F. ASTM D173 - Bitumen-saturated Cotton Fabrics Used in Roofing and Waterproofing.
- G. ASTM D226 - Asphalt-saturated Organic Felt Used in Roofing and Waterproofing.
- H. ASTM D227 - Cold-tar-saturated Organic Felt Used in Roofing and Waterproofing.
- I. ASTM D1327 - Bitumen-Saturated Woven Burlap Fabrics Used in Roofing and Waterproofing.
- J. ASTM D1668 - Glass Fabrics (Woven and Treated) for Roofing Waterproofing.
- K. NRCA (National Roofing Contractors Association) - Waterproofing Manual.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

Section 07150-2

592

SECTION 07160(B)**BITUMINOUS DAMPPROOFING****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide complete dampproofing in strict accordance with this specification and the applicable drawings. Dampproofing above grade to include but not be limited to:
 - 1. The exposed joints of all gypsum sheathing material located behind stone masonry or siding.
 - 2. Through wall flashing.

PART 2 PRODUCT

- A. Bituminous Compound for Above Grade Dampproofing: Karnak 86 Trowel Mash, W. R. Grace's Semimastic Dehydratine No. 10, Sonneborn's Semimastic Hydrocide or approved equal.
- B. Fabric: W. R. Grace's "Glassflex," Karnak 62 Spandrel Fabric, J & P Petroleum Projects Inc., A-S-20 Woven Glass (20 x 20 mesh) or approved equal.
- C. Through Wall Flashing: "Moist Stop" fiber reinforced polyethylene, Nervastral HD 15 or approved equal.

PART 3 EXECUTION**3.01 APPLICATION**

- A. The vertical and horizontal joints of gypsum sheathing behind stone masonry or siding shall receive asphalt emulsion dampproofing consisting of two troweled on layers of mastic with one layer of fabric in between. Connections to beams and columns shall be waterproofed with one an application of mastic. Apply mastic at the rate of three gallons per 100 square feet per layer. DO NOT APPLY TO SHEATHING BEHIND EXTERIOR FINISH SYSTEM.
- B. Provide through wall flashing where shown on the drawings. For masonry construction, extend down at least one course and out within 1/2 inch of the exterior face of the wall. For window sills and heads, extend six inches on each side of the opening.

END OF SECTION

SECTION 07200

INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all necessary labor, materials, equipment, and supplies necessary for installation of all specified insulation.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 07212 - Rigid Board Insulation.
- C. Section 07213 - Batt and Blanket Insulation.
- D. Section 07220 - Roof and Deck Insulation.
- E. Section 07532 - Elastomeric Sheet Roofing - Mechanically attached

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 07212

RIGID BOARD INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Foam insulation board in conjunction with exterior finish system.

1.02 RELATED SECTIONS

- A. Section 07240: Exterior Insulation and Finish System.
- B. Section 07900: Sealants.

1.03 REFERENCES

- A. ASTM C 578-85, Specification for Pre-formed, Cellular Polystyrene Thermal Insulation; Type IV.

1.04 SYSTEM DESCRIPTION

- A. Back-up board for Exterior Finish System.

1.05 SUBMITTALS

- A. Submit manufacturer's product data under provisions of Section 01340.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Amofoam CM.
- B. Foamular 250.
- C. Styrofoam SM
- D. Substitutions: Under provisions of Section 01630.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify adjacent materials are dry and ready to receive installation.
- B. Verify mechanical and electrical services within walls have been installed and tested.

3.02 INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.

END OF SECTION

SECTION 07213**BATT AND BLANKET INSULATION****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Batt insulation in exterior wall stud furring, interior walls (acoustic insulation), and attic areas.
- B. Batt insulation for filling perimeter window and door shim spaces.

1.02 RELATED SECTIONS

- A. Section 07212: Rigid Board Insulation.
- B. Section 07900: Sealants.

1.03 REFERENCES

- A. FS HH-I-521 - Insulation Blankets, Thermal (Mineral Fiber, for Ambient Temperatures).
- B. FS HH-I-1252 - Insulation Thermal, Reflective (Aluminum Foil).

1.04 SYSTEM DESCRIPTION

- A. Materials of this Section shall provide a thermal barrier enclosing air conditioned portions of building.

1.05 SUBMITTALS

- A. Submit manufacturer's product data under provisions of Section 01340.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Owens Corning.
- B. Johns Manville.
- C. Rockwool Insulation.
- D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Batt Insulation: FS HH-I-521; per-formed glass mineral fiber batt; with and without membranes as scheduled herein.

- B. Nails or Staples: Steel wire; electroplated; galvanized; type and size to suit application.
- C. Tape: Bright aluminum Polyethylene Polyester self-adhering type; translucent.
- D. Spindle Fasteners: Galvanized wire spindle on flat metal base; self-adhering backing.
- E. Mesh: Plastic light weight mesh for insulation retainer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify adjacent materials are dry and ready to receive installation.
- B. Verify mechanical and electrical services within walls have been installed and tested.

3.02 INSTALLATION

- A. Install batt insulation in accordance with manufacturer's instructions.
- B. Install batt insulation, in exterior walls, interior walls, and attic and ceiling spaces without gaps or voids.
- C. Trim insulation neatly to fit spaces. Use batts free of damage.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- E. Install insulation with factory applied membrane facing warm side of building spaces. Lap ends and side flanges of membrane over between framing members. Staple or nail in place at maximum 6 inches oc. Tape seal butt ends and lapped side flanges. Tape seal tears or cuts in membrane.
- F. Provide plastic mesh retainer on bottom roof truss chords or ceiling joists in all areas not scheduled to receive gypsum board ceilings.

3.03 SCHEDULE

- A. Interior Sound Partitions: 3 1/2 inch unfaced Batts.
- B. Attic Insulation: 4 inch R-11 Batts with paper facing, 8 foot or greater lengths. Install above mechanical pump room ceiling.
- C. Exterior Wall Insulation: 6 inch R-19 Batts with paper facing, 8 foot or greater lengths.

END OF SECTION

SECTION 07220B**ROOF AND DECK INSULATION****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Insulation for installation below elastomeric roofing system.

1.02 RELATED SECTIONS

- A. Section 07200 - Insulation.
- B. Section 07530 - Elastomeric Roofing.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Celotex; Hy-Therm AP Tapered
- B. GAF; Isotherm, High Density
- C. NRG Barriers; Tapered E'nergy 2
- D. Substitutions: Under provisions of Section 01340.

2.02 MATERIALS

- A. For decks over building area: 3" tapered insulation (3" minimum). Polyisocyanurate foam bonded to fiber reinforced facers. Aged R-value of 22 minimum.
- B. Insulation system must include any and all isolation boards which may be required for compatibility with the specified roofing system.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install insulation boards in strict conformance to manufacturer's printed instructions.
- B. Use all purpose fasteners.
- C. Fasteners to have not less than 1" penetration into roof deck.

END OF SECTION

SECTION 07240**EXTERIOR INSULATION AND FINISH SYSTEM****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Exterior Insulation and Finish System - Type PB as defined by the Exterior Insulation Manufacturers Association (EIMA).

1.02 RELATED SECTIONS

- A. Section 06110: Framing and Sheathing.
- B. Section 07214: Board Insulation.

1.03 REFERENCES

- A. ASTM B 117 - (Federal Test Standard 141A Method 6061) Method of Salt Spray (Fog) Testing.
- B. ASTM C 150 - Specification for Portland Cement.
- C. ASTM D 897 - Test Method for Tensile Properties of Adhesive Bonds.
- D. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 96 - Tests for Water Vapor Transmission of Materials.
- F. AP81-2 Dryvit's Application Bulletin #81-2.
- G. EIMA Standard 101.86 - Method for Resistance of Exterior Insulation Finish Systems to the Effects of Rapid Deformation (Impact).

1.04 SYSTEM DESCRIPTION

- A. Externally reinforced exterior insulation and finish system consisting of an adhesive, insulation board, fiberglass reinforcing mesh fully embedded in a base coat mixture and a cementitious plaster finish.
- B. Entire system shall meet the entire criteria of the DRYVIT "OUTSULATION" System.

1.05 SUBMITTALS

- A. Submit manufacturer's product data under provisions of Section 01340.
- B. Submit three copies of manufacturer's standard colors for selection by the Architect.

1.06 MOCK-UPS

- A. After color selection by the Architect, submit two 24 inch by 48 inch samples of the system demonstrating final finish, color, and texture. The sample shall be mounted on a substrate equal to that specified for the entire assembly including foam insulation and gypsum sheathing.
- B. Submit in accordance with Section 01350 of the specifications.

1.07 QUALITY ASSURANCE

- A. System Manufacturer shall have manufactured proposed product in the United States continuously for at least 10 years, and shall be a member of EIMA.
- B. Applicator shall be experienced in the installation of the proposed product and have documented experience of at least three years in this type of work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the specified criteria of Sections 01610 and 01620 of the specifications.
- B. Protect materials in complete accordance with manufacturer's written instructions.

1.09 WARRANTY

- A. Provide manufacturer's standard warranty against fading, chipping, cracking, peeling, and water penetration.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Dryvit Systems, Inc.
- B. Synergy, Inc.
- C. R-Wall/STO Industries.
- D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Adhesives:
 - 1. Primus/Adhesive: Acrylic base, field mixed one-to-one by weight with Portland Cement for use over substrate.
 - 2. ADEPS Adhesive: fully formulated water-based acrylic copolymer.
 - 3. Mechanical Fasteners: As specified by manufacturer.
- B. Reinforcing Mesh: Glass fiber mesh; 4.3 oz/sq. yd. weight; tensile strength of 150 lb./inch of width. Impact resistance of not less than 1.0.

- C. Finish: Shall be a factory-mixed, water-based acrylic coating with integral color and texture - "Sandblast: Medium texture. Allow for 2 colors as selected from manufacturers selections.
- D. Primers and Sealers:
 - 1. Color Prime - a water based, pigmented acrylic primer.
 - 2. Prymit - A water based acrylic primer/adhesion promoter.
- E. Portland Cement: Type I, I-II or II, meeting ASTM C 150.
- F. Water: Clean, potable.
- G. Control Joints: As required and/or recommended by manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that substrate materials are dry and ready to receive installation.
- B. Verify mechanical and electrical services within walls have been installed and tested.
- C. Beginning of work indicates acceptance of substrate conditions.

3.02 INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Create feature strips, where detailed, with neat uniform lines.
- C. Do not thin manufacturer's materials.
- D. Prior to application of base coat system, inspect foam insulation board surfaces for flatness. Sand smooth any surface irregularities.
- E. Base coat system shall be cured for 24 hours. Protect base coat from damage and weather during curing stage.
- F. Finish coat shall be prepared by stirring to a homogeneous consistency and applied in a continuous application. Final finish shall be uniform in color and texture.
- G. Repair or replace any surfaces which are damaged prior to acceptance by the Architect or which are not uniform in appearance.

END OF SECTION

SECTION 07270**FIRESTOPPING****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Fire sealants materials and installation for any and all penetrations of fire rated composite assemblies as required for preservation of UL assembly requirements.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 07200: Insulation.
- C. Section 07213: Batt and Blanket Insulation.
- D. Section 07900: Sealants.
- E. Section 09260: Gypsum Wallboard Systems.
- F. Division 15: Mechanical.
- G. Division 16: Electrical.

1.03 REFERENCES

- A. ASTM E814: Fire Test of Through-Penetration Fire Stop.
- B. UL 1479: Fire Test of Through-Penetration Fire Stops.

1.04 SYSTEM DESCRIPTION

- A. Materials, when placed in accordance to manufacturer's instructions, shall achieve complete firestopping of pipe, conduit, or other penetrations through fire rated assemblies.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.

PART 2 PRODUCTS**2.01 MANUFACTURERS/MATERIALS**

- A. GE Silicones; "PENSIL" 100 Sealant, 200 Foam, 300 Joint Sealant, 500 Intumescent Putty.
- B. Flammadur Corporation of America; E-473 Rigid Firestops, A-107 Caulk Firestop.

603

- C. Substitutions: Under provisions of Section 01630.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify areas to receive work are completed and satisfactory for proper installation.
- B. Verify that proper testing of mechanical and electrical systems have been completed to avoid removal of installed firestopping.

3.02 SAFETY

- A. Observe all safety and handling requirements of manufacturer.
- B. Provide proper ventilation of all work areas.

3.03 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions.
- B. Provide complete and uniform installation of firestopping materials to assure full firestopping and protection of fire assembly.

END OF SECTION

SECTION 07532**ELASTOMERIC SHEET ROOFING - MECHANICALLY ATTACHED****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Provide and install tapered rigid insulation. Refer Section 07220B.
- B. Vapor retarder.
- C. Mechanically attached elastomeric sheet membrane roofing over insulation with flashings and other components to comprise a roofing system.
- D. Flexible flashings.
- E. Counterflash membrane termination.

1.02 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Furnish only in-situ flashing devices for counterflashing to work of this Section.

1.03 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry
- B. Section 06125 - Wood decking
- C. Section 07220B - - Roof and Deck Insulation
- D. Section 07600 - Flashing and Sheet Metal

1.04 REFERENCES

- A. ANSI/ASTM D412 - Rubber Properties in Tension.
- B. ANSI/ASTM D746 - Brittleness Temperature of Plastics and Elastomers by Impact.
- C. ASTM D624 - Rubber Property - Tear Resistance.
- D. ASTM D822 - Practice for Operating Light and Water- exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products.
- E. ASTM D1004 - Initial Tear Resistance of Plastic Film and Sheeting.
- F. ASTM D2240 - Rubber Property - Durometer Hardness.
- G. ASTM E96 - Water Vapor Transmission of Materials.
- H. FS HH-I-524 - Insulation Board, Thermal (Polystyrene).

- I. FS HH-I-526 - Insulation Board, Thermal (Mineral Fiber).
- J. FS HH-I-529 - Insulation Board, Thermal (Mineral Aggregate).
- K. FS HH-I-530 - Insulation Board, Thermal (Urethane).
- L. FS HH-I-551 - Insulation Block and Board, Thermal (Cellular Glass).
- M. FS LLL-I-535 - Insulation Board, Thermal (Cellulosic Fiber).

1.05 SYSTEM DESCRIPTION

- A. Mechanically Attached Elastomeric Sheet Membrane Roof Assembly including structure and ceiling under to meet Factory Mutual Class 1-90 and UL Class A Assemblies.

1.06 QUALITY ASSURANCE

- A. This roofing system shall be applied by an Applicator authorized by manufacturer prior to bid.
- B. Upon completion of the installation, and the delivery to manufacturer by the Applicator of a certification that all work has been done in strict accordance with the contract specifications and manufacturer's requirements, an inspection shall be made by a technical representative of manufacturer to observe the installed roof system.
- C. There shall be no deviation made from the contract specification or the approved shop drawings without prior written approval by the Owner, the Architect and the manufacturer.
- D. All work pertaining to the installation of Membrane and Flashings shall only be completed by Applicator personnel trained and authorized by manufacturer in those procedures.

1.07 REGULATORY REQUIREMENTS

- A. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification.
- B. Factory Mutual Engineering Corporation (FM): Roof assembly classification, FM Construction Bulletin 1-28, Class 1 Construction.

1.08 MOCKUP

- A. Provide mockup of installed membrane under provisions of Section 01350.
- B. Mockup to represent conditions of finished work including internal and external corners, seam jointing, attachment method, sealing and counterflashing cover, control and expansion joints.
- C. Provide testing of mockup under provisions of Section 01410 to ensure watertightness.

1.09 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.

- B. Submit shop drawings detailing special joint or termination conditions and conditions of interface with other materials.
- C. Submit product data for sheet membrane, elastic flashing, joint cover sheet, and joint and crack sealants, with temperature range for application of membrane.
- D. Submit manufacturer's installation instructions under provisions of Section 01340.
- E. Samples of each component to be used in the roof system and manufacturer's current literature for each component.
- F. Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.
- G. Sample copy of Manufacturer's warranty.
- H. Sample copy of Applicator's warranty.
- I. Dimensioned shop drawings which shall include:
 - 1. outline of roof and roof size
 - 2. profile details of flashing methods for penetrations and terminations
 - 3. technical acceptance from manufacturer
- J. Certification by manufacture of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and industry standards or practices.
- K. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the specification.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01620.
- B. Under provisions of Section 01620, store materials in weather protected environment clear of ground and moisture. Protect insulation from direct sunlight exposure.
- C. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.
- D. Handle all materials to prevent damage. Place all materials on pallets and fully protected from moisture.
- E. Membrane rolls shall be stored lying down on pallets, and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions.
- F. All adhesives shall be stored at temperatures above 40 degrees F (5 degrees C).
- G. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- H. All materials which are determined to be damaged by the Architect or manufacturer are to be removed from the job site and replaced at no cost to the Owner.

1.11 ENVIRONMENTAL REQUIREMENTS/JOB CONDITIONS

- A. Do not apply membrane during inclement weather or when air temperature is below 40 degrees F.
- B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat-welded before leaving the jobsite.
- C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
- D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.
- E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
- F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.
- G. The Applicator is cautioned that certain membranes are incompatible with asphalt, coal tar, heavy oils and roofing cements. Creosote and preservative materials are also incompatible. Such materials shall not remain in contact with membranes. The Applicator shall consult membrane manufacturer regarding compatibility, precautions and recommendations.
- H. Arrange work sequence to avoid use of newly-constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over insulation board shall be provided for all new and existing roof areas which receive rooftop traffic during construction.
- I. Prior to and during application, all dirt, debris, and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.
- J. All roofing, insulation, flashings and metal work removed construction shall be immediately taken off the site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials obtaining asbestos, area to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.
- K. All new roofing waste material (i.e. scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material, in a legal manner.
- L. The Applicator shall take precautions that storage and/or applications of materials and/or equipment does not overload the roof deck or building structure.

- M. All rooftop contamination that is anticipated or that is occurring shall be reported to manufacturer to determine the corrective steps to be taken.
- N. The Applicator shall verify that roof drainage is functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing to the Architect for corrective action prior to installation of the Roof System.
- O. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner and Architect of such condition in writing for correction at the Owner's expense.
- P. The Applicator shall cause fastener pullout tests to be conducted in accordance with industry standards to help verify condition of deck/substrate and to confirm expected pullout values.
- Q. The mechanically attached membrane shall not be installed under the following conditions without consulting manufacturer for precautionary steps;
 - 1. The roof assembly permits interior air to pressurize the membrane underside at a rate of 2.6 lb./sq. ft. (0.125 KPa) or greater [equivalent to 1/2 inches (12 mm) water rise].
 - 2. Any exterior wall has 10% or more of the surface area comprised of opening doors or windows.
 - 3. The wall/deck intersection permits air-entry into the wall flashing area.
- R. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building.

1.12 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference one week prior to commencing work of this Section.
- B. Require attendance of parties directly affecting work of this Section.
- C. Review conditions of installation, installation procedures, and coordination required with related work.

1.13 WARRANTY

- A. Provide ten year manufacturer's warranty under provisions of Section 01740 covering labor and materials.
- B. Warranty: Include coverage of materials and installation and resultant building damage resulting from failure to resist penetration of moisture.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - MEMBRANE

- A. Sarnafil; System: Mechanically Attached - Engineered.
- B. Bondcote Roofing Systems: Mechanically attached.

C. Substitutions; In accordance with Section 01630.

2.02 APPROVED MEMBRANE SYSTEMS

- A. Sarnafil S327 polyester-reinforced membrane with an acrylic coating.
- B. Bondcote polyester-reinforced NBP membrane with an acrylic coating.

2.03 MEMBRANE

- A. Membrane shall conform to the ASTM D4434 (latest revision) Standard for Polyvinyl Chloride sheet roofing.

Classification: Type III.

- B. An manufactured, membrane shall conform to the following physical properties:

Parameters	ASTM Test Method	Minimum ASTM Requirement	Sarnafil Typical Physical Properties
Reinforcing Material	--	--	Polyester
Overall Thickness,			
min., inches (mm)	D751	0.045 (1.14)	0.047 (1.20)
Breaking Strength,			
min., lbf/in. (KN/m)	D751	200 (35.0)	230 (40.0)
Elongation at Break, min.	D751	15%	20%
Seam Strength*, min., (% of breaking strength)	D751	75	85
Retention of Properties			
After Heat Aging	D3045	--	--
Breaking Strength, min., (% of original)	D751	90	95
Elongation, min., (% of original)	D751	90	90
Tearing Strength, min., lbf (N)	D1004	45.0 (200)	50 (220)
Low Temperature Bend, -40 degrees F (-40 degrees C)	D2136	Pass	Pass
Accelerated Weathering			
Test (Xenon Arc)	D2565	5,000 Hr.	10,000 Hr.
Cracking (7x magnification)	--	None	None
Discoloration (by observation)	--	Negligible	Negligible
Crazing (7x magnification)	--	None	None
Linear Dimensional			
Change	D1204	0.5% max.	0.1%
Weight Change After Immersion of Water	D570	+ 3.0% max.	2.5%

Static PunctureResistance, 33 lbf
(15kg)

D5602

Pass

Pass

Dynamic PunctureResistance, 14.7 ft-lbf
(20 J)

D5635

Pass

Pass

* Failure occurs through membrane rupture not seam failure.

2.04 FLASHING MATERIALS

- A. Flashing materials shall be as supplied by Sarnafil. Flashing materials are generally the same material as the roofing membrane unless specified differently in the detail drawings.

2.05 FASTENERS

- A. The fasteners and plates/discs shall be provided by the manufacturer and shall be specially designed for the type of roof deck encountered.

2.06 FLASHING MEMBRANE ADHESIVE

- A. The adhesive for bonding the Sarnafil membrane flashings to accepted substrates shall be as follows:

1. Sarnacol 2170 Adhesive:

- a) Use: solvent-based adhesive for bonding Sarnafil membranes to Sarnafil approved substrates.
b) Application rates for bonding Sarnafil membranes to various substrates:

	Substrate Rate gals/100 sq. ft.	Membrane Rate gals/100 sq. ft.
metal	0.75	0.50
smooth plywood	1.00	0.50
smooth concrete	1.25	0.50
	Total Rate gals/100 sq. ft.	lt./sq. meter
metal	1.25	0.51
smooth plywood	1.50	0.61
smooth concrete	1.75	0.71

Notes:

- a. Due to an increase in viscosity when outdoor temperatures during installation are below 40 degrees F (5 degrees C), add 0.5 gal/100 sq. ft. (0.2 L/sq. m.) to rate for estimating purposes.
b. Rates will vary with finish of substrate.
2. Sarnacol V949 Adhesive:
- a. Use: solvent-based adhesive for bonding Sarnafil membranes to Sarnafil approved substrates.
b. Application rates for bonding Sarnafil membranes to various substrates:

	Substrate Rate gals/100 sq. ft.	Membrane Rate gals/100 sq. ft.
metal	1.25	0.50
smooth plywood	1.50	0.50
smooth concrete	1.75	0.50

	Total Rate gals/100 sq. ft.	lt./sq. meter
metal	1.75	0.71
smooth plywood	2.00	0.81
smooth concrete	2.25	0.92

Notes:

- a. Due to an increase in viscosity when outdoor temperatures during installation are below 40 degrees F (5 degrees C), add 0.5 gal/100 sq. ft. (0.2 L/sq. m.) to rate for estimating purposes.
- b. Rates will vary with finish of substrate.

2.07 SHEATHING MATERIALS

- A. Dry Sheathing Paper: Clean, white cellulose paper, unsaturated.

2.08 INSULATION MATERIALS

Either:

- A. 1/2" "Fesco" Board.
- Or:
- B. 1/2" Expanded Polystyrene Board
- Both:
- C. As approved by manufacturer.

2.09 CANTS

- A. Fiber Cant and Tapered Edge Strips: Asphalt impregnated wood fiberboard preformed to 45 degree angle.

2.10 WALKWAY PADS

- A. Samapad walkway pads for continuous rooftop walkway network.

2.11 ACCESSORIES

- A. Sealants: as recommended by manufacturer.
- B. Mechanical Fasteners for Insulation: Appropriate to purpose intended and approved by UL; FM; length required for thickness of material; with metal washers; manufactured by **Sarnafil or approved substitute.**
- C. Sarnabar for attaching membrane to deck.
- D. Disc Washers and Screws: **Sarnafastener.**

- E. Sarnacord - flexible PVC strip for hot-air welding.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains, valleys, or eaves. Verify flutes of steel deck are clean and dry.
- B. Verify roof openings and penetrating elements through roof are solidly set, wood cant strips wood nailing strips and reglets are in place. Verify deck is supported and secured.
- C. Do not apply roofing materials to damp, frozen, dirty, dusty, or deck surfaces unacceptable to manufacturer. applicator.
- D. Verify deck surfaces are dry and free of snow or ice. Confirm dry deck by moisture meter with 12 percent moisture maximum.
- E. Ensure flatness and verify tight joints of wood deck.
- F. Beginning installation means acceptance of existing surfaces and substrate.

3.02 PREPARATION

- A. Seal joints of plywood deck with tape. Fill knot holes with latex filler.
- B. The roof deck and existing roof construction must be structurally sound to provide support for the new roof system. The Applicator shall load materials on the rooftop in such a manner to eliminate risk of deck overload due to concentrated weight. The deck shall be secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location. Sarnafil requires fastener pullout tests prior to job start. Deck thickness shall be nominal.

3.03 INSULATION APPLICATION

- A. Verify sheathing paper is clean and dry.
- B. Place one layer of insulation in accordance with insulation manufacturer's instructions.
- C. Minimum Total Insulation Thickness: 1/2 inch.
- D. Lay insulation boards to moderate contact without forcing joints. Cut insulation to fit neatly to perimeter blocking and around protrusions through roof.
- E. Mechanically fasten insulation boards over roof surface.
- F. Tape joints of insulation in accordance with insulation manufacturer's instructions.
- G. Install cant strips to internal corners by mechanical fasteners.
- H. Apply separation sheet in accordance with manufacturer's instructions.

- I. Do not install more insulation board than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.
- J. Insulation shall be a maximum of 4 ft x 8 ft (1.2 m x 2.4 m) in size.
- K. Mechanical Attachment:
 - 1. Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's, Factory Mutual's and Sarnafil's recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no large cavities or air spaces between the boards and the substrate.
 - 2. Fasteners are to be installed in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by fastener manufacturer and Sarnafil.
 - 3. Use fastener tools with a depth locator as recommended or supplied by fastener manufacturer to ensure proper installation.
 - 4. Sarnafil requires pullout tests be done to verify deck condition and expected pullout values.

3.04 INSTALLATION OF SARNAFIL MEMBRANE

The surface of the insulation or substrate shall be inspected prior to installation of the Sarnafil roof membrane. The substrate shall be clean, dry and smooth with no excessive surface roughness, contaminated surfaces or unsound surfaces such as broken, delaminated, or damaged insulation boards. Separation layer shall be installed over any noncompatible or irregular substrate. Overlap separation layer edges 4 inches (100 mm) and fasten through the overlaps at 24 inches (0.6 m) O.C. using Sarnafasteners and Sarnaplates to hold in position. The installation of the separation layer is to be followed immediately by the installation of the S327 membrane.

- A. General
 - 1. Sarnafil membrane is to be attached with Sarnafasteners and Sarnabars according to Sarnafil's specifications and details.
 - B. Perimeter and corners
 - 1. Over the properly installed and prepared substrate surface, Sarnafil S327 membrane is positioned and rolled out, each roll overlapping the previous roll by 3 inches (75 mm). The seams are to be hot-air welded according to Section 3-8. Sarnabars are positioned over the top of the welded S327 and fastened to the deck with Sarnafasteners at a row spacing and fastener spacing determined by Sarnafil and the Architect. The Sarnafasteners are to be installed according to the manufacturer's recommendations. The Sarnafasteners are set to a depth to clamp the S327 in place without damaging the insulation surface or damage to the roof deck. Generally the row spacing in the perimeter and corner areas are 50% of the field areas. An S327 coverstrip is then welded over each Sarnabar for watertightness.
- Notes:
- a. Perimeter area is defined as the outer boundary of the roof. If the roof is broken into different levels, each roof area shall be treated as an individual roof with its outer boundary being treated as a perimeter. Typically internal expansion joints and firewalls area not considered to be the perimeter of roof areas, however a Sarnabar and Sarnacord is required on each side of these details.
 - 2. Hot-air weld overlaps according to Sarnafil's recommendations.

C. Interior - field sheets

1. Over the properly installed and prepared substrate surface, Sarnafil S327 membrane is positioned and rolled out, each roll overlapping the previous roll by 3 inches (75 mm). The seams are to be hot-air welded according to Section 3-8. Sarnabars are positioned over the top of the welded S327 and fastened to the deck with Sarnafasteners at a row spacing and fastener spacing determined by Sarnafil and the Architect. The Sarnafasteners are to be installed according to the manufacturer's recommendations. The Sarnafasteners are set to a depth to clamp the S327 in place without damaging the insulation surface or damage to the roof deck. An S327 coverstrip is then welded over each Sarnabar for watertightness.
2. Hot-air weld overlaps according to Sarnafil's recommendations.

D. Securement around perimeter and rooftop penetrations

1. Around all perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, Sarnafasteners and Sarnabars shall be installed according to perimeter rate of attachment. Fasteners shall be installed according to the manufacturer's instructions. Fasteners shall be installed using the fastener manufacturer's recommended fastening tools with depth locators. Sarnabars shall clamp the Sarnafil membrane tightly to the substrate.
2. Weld a Sarnacord along the outside edge of each Sarnabar.

3.05 HOT-AIR WELDING OF LAP AREAS

A. General

1. All seams shall be hot-air welded. Seam overlap shall be a minimum of 3 inches (75 mm) wide when automatic machine welding, and 4 inches (100 mm) wide when hand welding.
2. Welding equipment shall be provided by or approved by Sarnafil. All Mechanics intending to use the equipment shall have successfully completed a training course provided by a Sarnafil Technical Representative prior to welding.
3. All membrane to be welded shall be clean and dry. No adhesive shall be in the seam.

B. Hand Welding

Hand Welding seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
2. The nozzle shall be inserted into the seam at a 45 degree angle. Once the proper welding temperature has been reached and the membrane begins to "flow", the hand roller is positioned perpendicular to the nozzle and pressed lightly. For straight seams, the 1-1/2" (40 mm) wide nozzle shall be used. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.

C. Machine Welding

1. Machine welding seams are achieved by the use of Sarnafil's automatic welding equipment. When using this equipment, Sarnafil's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. The automatic welding machines require 218 to 230 volts at 30 amps. House power or a dedicated portable generator is recommended. No other equipment shall be operated off the generator.
2. Metal tracks may be used over the deck sheet and under the machine welder to prevent wrinkles.

D. **Quality Control of Welded Seams:**

The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark gray material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator to locations as directed by the Owner's Representative or Sarnafil's Representative. One inch (25 mm) wide cross-section samples of welding seams shall be taken at least three times a day. Correct welds display failure shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.06 WALKWAY INSTALLATION

A. **Sarnapad:**

Mark lines on the S327 to determine location and direction(s) of walkway network. The S327 membrane surface shall be clean. Apply 1 gallon/100 lineal ft. (12.4 liters/100 lineal meters) of Sarnacol 2170 or V949 adhesive to the back of the Sarnapad and allow to dry. Do not apply adhesive to the back of the welding tabs. Apply 1.5 gallons/100 lineal ft. (18.6 liters/100 m) of adhesive to the S327 membrane at a width of 24 inches (0.6 m). Turn the Sarnapads over and place in position into the wet/tacky adhesive. Walk on the Sarnapads to press the surfaces together. Heat-weld the Sarnapad welding to the S327 membrane. Consult Sarnafil for installation recommendations without the use of adhesive.

3.07 MEMBRANE FLASHINGS

All flashing shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sarnafil. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashings shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.

A. **Sarnacol 2170 or V949 Adhesive for Flashing**

1. Over the properly installed and prepared flashing substrate, Sarnacol 2170 or V949 adhesive shall be applied using solvent-resistant 3/4 inch (19 mm) nap paint rollers. The adhesive shall be applied at a rate according to Section 2-5. The Adhesive shall be applied in smooth, even coatings with no holidays, globs or similar irregularities. Only an area which can be completely covered in the same day's operations shall be coated with adhesive. The surface with adhesive coating shall be allowed to dry completely prior to installing the membrane.

Note: Drying time increases with cooler temperatures. Also, the Applicator is cautioned against work on days of high humidity because of extremely slow evaporation of the solvent. The Applicator shall check with the Sarnafil Technical Representative prior to roof operations on such days.

2. When the surface is dry, the Sarnafil flashing membrane is cut to a workable length and the underside shall be evenly coated with Sarnacol 2170 or V949 adhesive at a rate of 1/2 gallons/100 sq. ft. (0.51 liters/sq. m.). When the adhesive has dried sufficiently to produce strings when touched with a dry finger, the coated membrane shall be rolled into the previously coated substrate being careful to avoid wrinkles. **Do not allow adhesive on the underside of the Sarnafil membrane to completely dry.** The amount of membrane that can be coated with adhesive will be determined by ambient temperature, humidity, and the efficiency of the crew. Adjacent sheets shall be overlapped 3 inches (75 mm). Sarnafil flashings shall extend 4 inches (100 mm) onto to roofing membrane. The bonded sheet shall be pressed firmly in place with a hand roller.
 3. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.
- B. Install Sarnabars according to the detail drawings with acceptable fasteners into the structural deck at the base of parapets, wall and curbs. Sarnabars may be required by Sarnafil at the base of all tapered edge strips and at transitions, peaks, and valleys according to Sarnafil's details.
 - C. Sarnafil's requirements and recommendations and the specifications shall be followed. All materials submittals shall have been accepted by Sarnafil prior to installation.
 - D. All flashing shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Architect and Sarnafil Technical.
 - E. All flashing membranes shall be adhered to solvent resistant substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No Bitumen shall be in contact with the Sarnafil membrane.
 - F. All flashing membranes shall be mechanically fastened along the top edge through tin discs, washers or pre-drilled galvanized metal strip spaced at a maximum of 12 inches (0.3 m) on center.
 - G. Sarnafil flashings shall be terminated according to Sarnafil recommended details.

3.08 SARNACLAD METAL BASE FLASHINGS

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sarnafil. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

- A. Sarnaclad metal flashings shall be formed and installed per the detail drawings.
- B. All metal flashings shall be fastened according to Sarnafil's details.
- C. Adjacent sheets of Sarnaclad shall be spaced 1/4 inch (6 mm) apart. The ends of the Sarnaclad metal shall be fastened 6 inches (150 mm) on center. The joint shall be covered with 2 inch (50 mm) wide aluminum tape. A 4 inch (100 mm) wide strip of Sarnafil F410 flashing membrane shall be hot-air welded over the joint.

3.09 METAL FLASHINGS

- A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
 - 1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
 - 2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA -- latest issue).
- B. Metal, other than that provided by Sarnafil, is not covered under the Sarnafil warranty.
- C. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.
- D. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.
- E. Metal joints shall be watertight.
- F. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch (25 mm).
- G. Airtight and continuous metal hook strips are required behind metal fascias. Hood strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.
- H. Counterflashings shall overlap base flashings at least 4 inches (100 mm).

3.10 TEMPORARY CUT-OFF

- A. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops shall be constructed to provide a 100% watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. The waterstop shall be sealed to the deck and/or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as described in Section 2-14. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of off site. None of these materials shall be used in the new work.
- B. If inclement weather occurs while a temporary waterstop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.
- C. If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

3.11 COMPLETION

- A. Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects shall be noted and noncompliance with the specifications or the recommendations of Sarnafil shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner and Sarnafil prior to demobilization.

- B. All warranties, as referenced in Section 1-8 of the Specification shall have been submitted for approval and shall have been accepted at time of contract award.

3.12 PROTECTION

- A. Protect finished installation under provisions of Section 01500.
- B. After installation, close off area to prevent unauthorized traffic.

3.13 FIELD QUALITY CONTROL

- A. Inspection will be performed by manufacturer's representative for compliance to the work of this Section.

END OF SECTION

SECTION 07600

FLASHING AND SHEET METAL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all necessary labor, materials, equipment, and supplies necessary for proper installation of all specified flashing and sheet metal.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 01040 - Coordination.
- C. Section 04220 - Concrete Unit Masonry.
- D. Section 06100 - Rough Carpentry.
- E. Section 07240 - Exterior Insulation and Finish System.
- F. Section 07532 - Elastomeric Sheet Roofing - Mechanically attached.
- G. Section 07620 - Sheet Metal Flashing and Trim.
- H. Section 07630 - Roofing Specialties.

1.03 QUALITY ASSURANCE

- A. Perform all work to the standards of the National Roofing Contractors Association.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 07620**SHEET METAL FLASHING AND TRIM****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Roof flashings.

1.02 RELATED SECTIONS

- A. Section 06114: Wood blocking, nailers, and grounds.
- B. Section 07630: Roofing Specialties.
- C. Section 07650: Flexible Flashing.
- D. Section 07900: Joint Sealers.

1.03 REFERENCES

- A. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- B. NAAMM - Metal Finishes Handbook.
- C. NRCA (National Roofing Contractors Association) - Roofing Manual.
- D. SMACNA - Architectural Sheet Metal Manual.

1.04 QUALITY ASSURANCE

- A. Applicator: Company specializing in sheet metal flashing work with three years minimum experience.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.
- D. Submit samples under provisions of Section 01340.

1.06 STORAGE AND HANDLING

- A. Store products under provisions of Section 01610.

621

- B. Stack pre-formed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-coated Galvanized Steel: ASTM A525, G90; shop pre-coated coating of selected color to match roofing. Used for all flashings exposed to view.
- B. Galvanized Steel: ASTM A525, 26 gauge steel. Used for concealed flashings.

2.02 ACCESSORIES

- A. Fastener: Galvanized steel with soft neoprene washers at exposed fasteners. Finish exposed fasteners same as flashing metal.
- B. Solder: FS QQ-S-571; ANSI/ASTM B32; 50/50 type.
- C. Flux: FS O-F-506.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats and starter strips of galvanized metal type sheet metals, same material as sheet, minimum 2 inches wide, interlockable with sheet.
- C. Form pieces in longest practical lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip. Refer drawings.

2.04 FINISH

- A. Shop prepare and prime exposed ferrous metal surfaces.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that substrate conditions are as required to properly accept work of this section.
- B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Field measure site conditions prior to fabricating work.

- B. Install starter and edge strips, and cleats before starting installation.
- C. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect/Engineer.
- D. Seam and seal all joints.
- E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

3.03 INSTALLATION

- A. Provide flashings as follows:
 - 1. All roof plane intersections, including, as appropriate, ridge, hip, valley, and sidewall areas.
 - 2. All roof to wall intersections. Use stepped flashings at roof to masonry areas. Use "L" shaped flashing and counterflashing at roof to EIFS wall locations. Refer drawings.
 - 3. All areas requiring flashing metal to achieve weathertightness.
 - 4. Construct seams to be weathertight using crimping, hemming, and mechanical fastening. Roofers mastic will not be permitted for achieving integrity of flashing systems.

END OF SECTION

SECTION 07830**ROOF HATCHES****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Prefabricated roof hatches, and heat smoke vents, with integral support curbs, operable hardware, and counterflashings.

1.02 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Metal curbs.
- B. Section 06100 - Rough Carpentry: Wood curbs.
- C. Section 07600 - Flashing and Sheet Metal: Flashing to roof system.
- D. Section 07532 - Elastomeric Roofing - Mechanically attached: Roof system.
- E. Section 09900 - Painting: Field painting.

1.03 REFERENCES**1.04 REGULATORY REQUIREMENTS**

- A. Underwriters' Laboratories Inc. (UL) and Factory Mutual(FM) requirements as applicable to fire rated roof hatches.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Include general construction, configurations, jointing methods and locations when applicable, and fastening methods.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Bilco
- B. AES
- C. Babcock-Davis
- D. Substitutions: Under provisions of Section 01630.

2.02 ROOF HATCHES

- A. Unit: 36" x 30" size, single leaf type.
- B. Curb: 14 gage galvanized prime painted steel with 1 inch rigid insulation; integral cap flashing to receive roof flashing system; extended flange for mounting.
- C. Cover: 14 gage galvanized prime painted steel with one inch glass fiber insulation retained by 22 gage steel inner liner. Continuous neoprene vinyl gasket to provide weatherproof seal.
- D. Hardware: Manufacturer's standard manually operated type with compression spring operators, positive snap latch with turn handles inside and out and padlock hasp inside; automatic hold-open arm with vinyl covered grip handle for easy release; cadmium plated finish. Provide ladder safety post.
- E. Hinges: Manufacturer's recommended type. Heavy duty pintle type of aluminum galvanized steel.

2.03 FABRICATION

- A. Fabricate free of visual distortions and defects. Weld corners and joints.
- B. Provide for removal of condensation.
- C. Provide weathertight assembly.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Coordinate with installation of roofing system and related flashings. Provide weathertight installation.
- B. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.

END OF SECTION

SECTION 07850**PREFABRICATED CURBS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Provide manufactured curbs as specified herein and indicated on the drawings or required for proper mounting of roof mounted equipment.

1.02 RELATED SECTIONS

- A. Section 01040 - Coordination.
- B. Section 07220 - Roof and Deck Insulation.
- C. Section 07532 - Elastomeric Sheet Roofing - Mechanically Attached.
- D. Section 07600 - Flashing and Sheet Metal.
- E. Section 07620 - Sheet Metal Flashing and Trim.

1.03 REFERENCES

- A. ANSI/ASTM A153 - Zinc Coating (Hot -Dip) on Iron and Steel Hardware.
- B. ANSI/ASTM A167 - Stainless and Heat Resisting Chromium- Nickel Steel Plate, Sheet and Strip.
- C. ANSI/ASTM A446 - Steel Sheet, Zinc coated (Galvanized) by Hot-Dip Process, Structural (Physical) Quality.
- D. ASTM E84 - Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Submit shop drawings, and product data under provisions of Section 01340.
- B. Indicate construction details, method of anchorage, method and sequence of installation, and miscellaneous requirements.
- C. Submit in triplicate manufacturers' standard color samples for selection 01340.
- D. Submit manufacture's installation instructions under provisions of Section 01340.

1.05 WARRANTY

- A. Provide manufacturer's warranty as outlined in Section 01740 and described below:
 - 1. Weathertightness: Two years from date of Substantial Completion.
 - 2. Galvanized Finish: Warranted for a period of twenty years from date of Substantial Completion against rupture, structural failure, rust or perforation.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Thycurb
- B. RPS Roof Curbs
- C. Substitutions: Under provisions of Section 01630.

2.02 SHEET METALS

- A. Sheet Stock: ANSI/ASTM A792: Grade 50 galvanized steel.
- B. Sheet Stock: ANSI/ASTM A792: Grade 50 galvanized steel with 1 mil thick polyester surface finish.

2.03 MATERIAL

- A. Structural Roof Curbs: Gauge to be determined by manufacturer to support loads indicated in drawings.
- B. Fasteners: Manufacture's standard to suit individual application.
- C. Miscellaneous Accessories: Manufacturer's standard for providing a complete installation.
- D. Refer drawings for locations and mounted equipment weight.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install metal roof curbs in strict accordance with manufacturer's instructions.
- B. Remove all waste from finish surfaces.
- C. Permanently fasten systems to structural supports; align, level, and plumb within specified tolerances.
- D. Provide for expansion required by job conditions and material limitations.
- E. Unconcealed fasteners unless otherwise specified, or approved by Architect.

END OF SECTION

Section 07850-2

627

SECTION 07900

SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparing sealant substrate surfaces.
- B. Sealant and backing.
- C. Sealant for concrete paving.

1.02 RELATED SECTIONS

- A. Section 04400: Stone Masonry
- B. Section 06110: Framing and Sheathing.
- C. Section 06200: Finish Carpentry.
- D. Section 06400: Architectural Woodwork.
- E. Section 07240: Exterior Insulation and Finish Systems.
- F. Section 07532: Elastomeric Sheet Roofing - Mechanically Attached.
- G. Section 07600: Flashing and Sheet Metal.
- H. Section 08100: Metal Doors and Frames
- I. Section 08400: Entrances and Storefronts.
- J. Section 08500: Metal Windows.
- K. Section 08800: Glazing.
- L. Section 09250: Gypsum Wallboard.
- M. Section 09900: Painting.

1.03 REFERENCES

- A. ANSI/ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
- B. ANSI/ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).
- C. ASTM C790 - Use of latex Sealing Compounds.

D. ASTM C804 - Use of Solvent-Release Type Sealants.

VOL 0095 PAGE 629

E. ASTM C834 - Latex Sealing Compounds.

F. FS TT-C-00598 - Caulking Compound, Oil and Resin Base Type.

G. FS TT-S-001657 - Sealing Compound, Single Component, Butyl Rubber Based, solvent Release Type.

H. FS TT-S-00227 - Sealing Compound: Elastomeric Type, Multi-Component.

I. FS TT-S-00230 - Sealing Compound: Elastomeric Type, Single Component.

J. S TT-S-001543 - Sealing Compound, Silicone Rubber Base.

K. SWI (Sealing and Waterproofers Institute) - Sealant and Caulking Guide Specification.

L. AASHTO M 173 and ASTM D 1190-74 "Specifications for Concrete Joint Sealer, Hot Poured Elastic Type."

1.04 SUBMITTALS

A. Submit product data under provisions of Section 01340.

B. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

C. Submit samples under provisions of Section 01340.

D. Submit three color charts illustrating colors available

E. Submit manufacturer's installation instructions under provisions of Section 01340.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.

B. Applicator: Company specializing in applying the work of this Section with minimum three years experience.

C. Conform to Sealant and Waterproofers Institute requirements for materials and installation.

1.06 ENVIRONMENTAL REQUIREMENTS

1. Do not install solvent curing sealants in enclosed building spaces.

2. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate work with other trades.
- B. Coordinate the work of this Section with all Sections referencing this Section.

1.08 WARRANTY

- A. Provide three year product and installation warranty under provisions of Section 01740.
- B. Warranty: Include coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Caulking:
 - 1. Pecora, AC-20 One Part Acrylic Latex.
 - 2. Sonneborn, Sonolac Acrylic Latex.
 - 3. Tremco, Acrylic Latex Caulk.
- B. Sealant:
 - 1. Dow Corning, #790 Building Sealant.
 - 2. Pecora, #863 or #864 Silicone.
 - 3. PTI, #707 or #737 Butyl/Vinyl Acrylic.
 - 4. Sonneborn, Sonolastic One Part.
 - 5. Sonneborn, Butakauk.
 - 6. Tremco, Mono or THC-900.
- C. Backer Rod:
 - 1. Sonneborn, Sonofoam, size as required.
 - 2. Williams Products, Everlastic, Neoprene, NNI

2.02 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ANSI/ASTM D1056; round, closed cell foam rod; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces and or joint openings are ready to receive work and field measurements are as shown on Drawings and recommended by the manufacturer.

- B. Beginning of installation means installer accepts existing surfaces and substrate.

3.02 PREPARATION

- A. Clean and prime joints in accordance with manufacturer's instructions.
- B. Remove loose materials and foreign matter which might impair adhesion of sealant.
- C. Verify that joint backing and release tapes are compatible with sealant.
- D. Perform preparation in accordance with ASTM C804 for solvent release C790 for latex base sealants.
- E. Protect elements surrounding the work of this Section from damage or disfiguration.

3.03 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve required width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.
- D. Install bond breaker where joint backing is not used.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Tool joints concave.

3.04 CLEANING AND REPAIRING

- A. Clean work under provisions of Section 01710.
- B. Clean adjacent soiled surfaces.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.05 SCHEDULE

- A. General: Caulking is specified for joints between dissimilar materials where movement is minimum and where water penetrations is not apt to occur. Sealant is specified for joints where significant movement is anticipated and where water penetration is likely to occur.
- B. Caulking: Caulking requirements are generally shown on the drawings. Apply caulking to the following joints regardless of whether specified on the drawings:
 1. Windows: Around the interior perimeter of metal windows and around the rim of wood windows.
 2. Doors: At the head and jambs of metal and wood doors, both sides if interior.
 3. Woodwork: Between the splash and the wall surface and between the splash and the counter top.

4. Base: Between the floor surface and wood base for gaps greater than 1/16 inch.
 5. Pipes: Around pipe penetrations.
 6. Dissimilar Materials: Between joints of dissimilar materials.
- C. Sealant: Use sealant for exterior openings and control joints as follows:
1. Windows: Exterior sides of heads, jambs and sills.
 2. Doors: Exterior sides of heads and jambs.
 3. Thresholds: Set in a continuous sealant bead.
 4. Storefronts: Exterior sides of heads around jambs. Set sill in a continuous sealant bead to include all laps and edges.
 5. Masonry: At control joints.
 6. Dissimilar Materials: Between joints of dissimilar materials such as plaster to masonry, wood siding to brick, metal to concrete, etc.
 7. Concrete Paving: Control joints.
 8. All other exterior joints as required.

END OF SECTION

SECTION 08100
METAL DOORS AND FRAMES

VOL 0095
PAGE 633

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide labor, materials, equipment, and supplies for providing and installing of all specified metal doors and frames.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 08111 - Standard Steel Doors and Frames.
- C. Section 08120 - Aluminum Doors and Frames.
- D. Section 08210 - Wood Doors.
- E. Section 08700 - Hardware.

1.03 REFERENCES

- A. ANSI/ASTM A366 - Steel Sheet, Carbon, Cold-Rolled, Commercial Quality.
- B. ASTM A480 - Flat-Rolled Stainless and Heat Resisting Steel Plate, Sheet, and Strip.
- C. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, General Requirements.
- D. ASTM A569 - Steel, Carbon, Hot-Rolled Sheet and Strip, Commercial Quality.
- E. ASTM A591 - Steel Sheet, Cold-Rolled, Electrolytic Zinc Coated.
- F. ASTM E90 - Measurement of Airborne Sound Transmission Loss of Building Partitions.
- G. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- H. NAAMM CHM-1-74 - Custom Hollow Metal Doors (Section 7).

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NAAMM CHM-1-74 and as supplemented in this Section.

PART 2 PRODUCTS

Not Used.

280 2

Section 08100-1

PART 3 EXECUTION

Not Used.

END OF SECTION

Section 08100-2

634

SECTION 08111**STANDARD STEEL DOORS AND FRAMES****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Non-rated and rated rolled steel doors and frames.

1.02 RELATED SECTIONS

- A. Section 08700 - Hardware.
- B. Section 08712 - Door Hardware.
- C. Section 08800 - Glazing.
- D. Section 09910 - Exterior Painting: Field painting of doors and frames.

1.03 REFERENCES

- A. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- B. SDI-100 - Standard Steel Doors and Frames.
- C. SDI-105 - Recommended Erection Instructions for Steel Frames.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of SDI-100.
- B. When fire rating of systems is required, conform to underwriters laboratories requirements for fire labeling of door and frame assemblies.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Indicate frame configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, and finish.
- C. Indicate door elevations, internal reinforcement and closure method.
- D. Submit manufacturer's installation instructions under provisions of Section 01340.

1.06 DELIVERY, STORAGE AND PROTECTION

- A. Protect products under provisions of Section 01620.
- B. Protect doors and frames with resilient packaging sealed with heat shrunk plastic.
- C. Break seal on-site to permit ventilation.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Timely.
- B. Tex Steel.
- C. RACO.
- D. Substitutions: Under provisions of Section 01630.

2.02 DOORS AND FRAMES

- A. Exterior Doors: SDI-100 Grade I Model 1.
- B. Exterior Frames: 16 gage material. To suit model of door.
- C. Interior Frames: 18 gauge steel.
- D. Vision Panels: Provide as indicated on drawings.

2.03 ACCESSORIES

- A. Rubber silencers, resilient rubber.

2.04 PROTECTIVE COATINGS

- A. Primer: Zinc chromate type.

2.05 FABRICATION

- A. Fabricate frames as welded unit for exterior and interior units.
- B. Fabricate frames and doors with hardware reinforcement plates welded in place.
- C. Prepare frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head.
- D. Close top edge of exterior door flush with inverted steel channel closure. Seal joints watertight.

2.06 FINISH

- A. Primer: Air dried Baked on.
- B. Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch. Coating may be shop or field applied.
- C. Field paint all frames.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install frames in accordance with SDI-105.
- B. Install doors in accordance with DHI.

3.02 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.03 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth and balanced door movement.

END OF SECTION

SECTION 08200

WOOD AND PLASTIC DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all necessary labor, materials, equipment, and supplies necessary for installation of specified wood doors.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 08210 - Wood Doors.

1.03 REFERENCES

- A. AWI - Quality Standards of Architectural Woodwork Institute.
- B. ANSI/NWMA I.S.I. - Industry Standard For Wood Flush Doors.
- C. ANSI A135.4 - Basic Hardboard.
- D. ASTM E90 - Measurement of Airborne Sound, Transmission Loss of Building Partitions.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 08215

PREFINISHED WOOD DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Wood doors and panels, fire rated and non-rated.
- B. Louvers.
- C. Schedule at end of Section.

1.02 RELATED SECTIONS

- A. Section 08111 - Standard Steel Doors and Frames: Steel frames and doors.
- B. Section 08120 - Aluminum Doors and Frames
- C. Section 08700 - Hardware.

1.03 REFERENCES

- A. ANSI A135.4 - Basic Hardboard.
- B. ASTM E90 - Measurement of Airborne Sound Transmission Loss of Building Partitions.
- C. ASTM E152 - Methods of Fire Tests of Door Assemblies.
- D. AWI - Quality Standards of the Architectural Woodwork Institute.
- E. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
- F. NFPA 80 - Fire Doors and Windows.
- G. NFPA 252 - Standard Method of Fire Tests for Door Assemblies.
- H. UL 10B - Fire Tests of Door Assemblies.

1.04 PERFORMANCE

- A. Acoustic Rating for Door and Frame Assembly: ASTM E90, minimum STC 35.

1.05 QUALITY ASSURANCE

- A. Door Construction and Veneer Quality: AWI Quality Standard Section 1300, premium custom grade.

- B. Door Finish: AWI Quality Standard Section 1500 grades identified in schedule.

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Indicate door elevations, stile and rail reinforcement, internal blocking for hardware attachment, cutouts for glazing and louvers.
- C. Submit samples under provisions of Section 01340.
- D. Submit two samples 12" x 12" in size illustrating colors available.
- E. Submit manufacturer's installation instructions under provisions of Section 01340.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Protect products under provisions of Section 01620.
- B. Protect doors with resilient packaging, sealed with heat shrunk plastic. Break seal on site to permit ventilation; but do not remove.
- C. Package, deliver, and store doors in accordance with AWI requirements.

1.08 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Section 01740.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Mohawk Flush Doors, Inc.
- B. Eggers Hardwood Products Corp.
- C. Weyerhaeuser.
- D. Substitutions: Under provisions of Section 01630.

2.02 DOORS AND PANEL TYPES

- A. Flush Interior Doors: 1-3/4 inches thick; particle board core construction; birch wood veneer faces, pre-finished from manufacturer's standard colors, equal to Mohawk #MFLC7VT.

2.03 DOOR AND PANEL CONSTRUCTION

- A. Solid, Non-Rated Core: AWI SECTION 1300. PC-particleboard 28 to 32 lb. Density core meeting ANSI A 208.1, Grade 1-L-1.
- B. Edges, 1-1/4 inch stiles, 2-1/2 inch top and bottom rails; all to be hardwood.

2.04 FLUSH DOOR AND PANEL FACING

- A. Facing quality: AWI premium grade, ANSI/NWMA premium grade.
- B. Flush Interior Door Veneer: Birch species wood, plain cut, for transparent finish. Two ply veneer not acceptable.

2.05 ADHESIVES

- A. Interior Doors: AWI, ANSI/NWMA, Type II.

2.06 FABRICATION

- A. Fabricate doors in accordance with AWI Quality Standards.
- B. Provide flush doors with edge strips of wood species to match face veneer.
- C. Pre-machine doors for hardware installation.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions.
- B. Machine cut relief for hinges and closers and coring for handsets and cylinders.
- C. Trim door width by cutting equally on both jamb edges.
- D. Trim door height by cutting equally on top and bottom edges to a maximum of 3/4 inch.
- E. Pilot drill screw and bolt holes.
- F. Prepare doors to receive finish hardware in accordance with AWI requirements.
- G. Conform to AWI ANSI/AWMA requirements for fit tolerances.

3.02 INSTALLATION TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.03 ADJUSTING AND CLEANING

- A. Adjust for smooth and balanced door movement.
- B. Remove protective wrapping.
- C. Repair any damage to pre-finished surfaces. Replace any units which have blemishes that can not be satisfactorily repaired.

END OF SECTION

Section 08215-3

SECTION 08331**OVERHEAD ROLLING COUNTER DOORS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Standard overhead coiling doors; manual and crank operation; aluminum finish.

1.02 RELATED SECTIONS

- A. Section 06114 - Wood Blocking and Curbing.
- B. Section 08700 - Hardware: Cylinder core and keys.

1.03 REFERENCES

- A. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- B. ANSI/UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.
- C. ASTM A525 - General Requirements for Steel Sheet, Zinc coated (Galvanized) by the Hot-Dip Process.

1.04 SYSTEM DESCRIPTION

- A. Crank operation.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Provide pertinent dimensioning, general construction, component connections and details, anchorage methods, hardware location, and installation details.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's operation and maintenance data under provisions of Section 01730.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. North American Door Company.
- B. The Cookson Company.

C. Ceko/Windsor Door.

D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

VOL 0095 PAGE 643

A. Curtain: aluminum, ANSI/ASTM B221, alloy 6063; 2 inches wide x required length; ends of alternate each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement; bottom fitted with angles to provide reinforcement and positive contact with countertop in closed position; in accordance with requirements scheduled on Drawings.

B. Curtain Guides/Frame: extruded aluminum guides with wool pile for required sizes and configurations.

C. Roller Shaft (Counterbalance): Steel pipe and helical steel spring system capable of producing sufficient torque to assure easy operation of curtain from any position; adjustable spring tension.

D. Housing: aluminum; internally reinforced to maintain rigidity and form.

E. Hardware: As specified in Section 08700.

2.03 FINISH

A. Anodized Clear Aluminum.

2.04 PRODUCT

A. Units to be equal to North American #510.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install overhead coiling doors in accordance with manufacturer's instructions.

B. Fit, align, and adjust door assembly assemblies level and plumb; provide smooth operation.

END OF SECTION

SECTION 08400

ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide labor, material, equipment and supplies for a complete installation of specified entrance and storefront systems.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 05500: Metal Fabrications.
- C. Section 06100: Rough Carpentry.
- D. Section 07900: Joint Sealers.
- E. Section 08410: Aluminum Entrances and Storefronts.
- F. Section 08420: Entrance Doors.
- G. Section 08800: Glazing.

1.03 REFERENCES

- A. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- B. ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
- C. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- D. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle system components under provisions of Section 01610.

B. Store and protect system components under provisions of Section 01620.

VOL 0095 PAGE 645

END OF SECTION

Section 08400-2

645

SECTION 08410**ALUMINUM ENTRANCES AND STOREFRONTS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Aluminum frames and glazed lights.
- B. Glass.
- C. Anchors, brackets, and attachments.
- D. Perimeter sealant.

1.02 WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Section 08420: Entrance Doors.
- B. Section 08700 - Hardware: Door hardware items other than specified in this Section.
- C. Section 08800: Glazing.

1.03 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Fabricated metal attachment devices, framed opening.
- B. Section 06100 - Rough Carpentry: Framed blocking, Wood perimeter shims.
- C. Section 07900 - Joint Sealers: Perimeter sealant and back-up materials.
- D. Section 08120: Interior aluminum doors and frames.

1.04 REFERENCES

- A. ANSI/ASTM A36 - Structural Steel.
- B. ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.
- C. ANSI/ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- D. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- E. ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.

- F. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- G. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- H. FS TT-P-31-Paint, Oil: Iron Oxide, Ready Mixed, Red and Brown.
- I. FS TT-P-641 - Primer Coating; Zinc Dust-Zinc Oxide (for Galvanized Surfaces).
- J. FS TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.

VOL 0095 PAGE 647

1.05 PERFORMANCE

- A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 F degrees without causing detrimental effects to system or components.
- B. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with Southern Standard code.
- C. Limit mullion deflection to 1/200, or flexure limit of glass with full recovery of glazing materials, whichever is less.
- D. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.
- E. Limit air infiltration through assembly to 0.06 cu ft/min/sq. ft of assembly surface area, measured at a reference differential pressure across assembly of 0.3 inches water gage.
- F. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.
- D. Submit samples under provisions of Section 01340.
- E. Submit one sample, 12 x 12 inches in size, illustrating pre-finished aluminum surface and specified glass of each frame type.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle system components under provisions of Section 01610.
- B. Store and protect system components under provisions of Section 01620.

647

- C. Provide wrapping strippable coating to protect pre-finished aluminum surfaces.

1.08 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Section 01740.
- B. Warranty: Cover complete system for failure to meet specified requirements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Vista Wall Frame style -3000, Thermal Slot -- Exterior Frames.
- B. Vista Wall Frame style - 1000, Flush Glaze -- Interior Frames.
- C. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Extruded Aluminum: ANSI/ASTM B221.
- B. Sheet Aluminum: ASTM B209.
- C. Fasteners: Stainless steel.

2.03 FABRICATED COMPONENTS

- A. Exterior Frames: 2 x 4 1/2 inch profile, thermally broken with interior portion of frame insulated from exterior portion, flush applied glazing stops.
- B. Interior Frames: 1 3/4 x 4 inch profile.

2.04 GLASS AND GLAZING MATERIALS

- A. Glass and Glazing Materials: As specified in Section 08800.
- B. Glass in Exterior Lights: Type insulating glass, tinted, tempered where required.
- C. Glass in Interior Lights: Plate glass.
- D. Glass in Doors: Tempered glass.

2.05 FABRICATION

- A. Fabricate frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.
- B. Rigidly fit and secure joints and corners with screw and spline. internal reinforcement. Make joints and connections flush, hairline, and weatherproof.
- C. Develop drainage holes with moisture pattern to exterior.

- D. Arrange fasteners, attachments, and jointing to ensure concealment from view.

2.06 FINISHES

- A. Exterior Extruded Aluminum Surfaces: **Bronze**.
- B. Interior Exposed Aluminum Surfaces: **Bronze**.
- C. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A386 to 2.0 oz/sq. ft. Primed with iron oxide paint.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify wall openings are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install frames and glazing in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely attach frame assembly to structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Install sill flashings to conduct water to building exterior.
- E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install glass in accordance with Section 08800.
- G. Install perimeter type sealant, backing materials, and installation requirements in accordance with Section 07900.

3.03 TOLERANCES

- A. Variation from Plane: 0.03 inches per foot maximum.
- B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.04 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08420

ENTRANCE DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Exterior aluminum entrance and interior vestibule doors.
- B. Glass.
- C. Anchors, brackets, and attachments.
- D. Door hardware where specified herein.
- E. Door weatherstripping.

1.02 WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Section 08700 - Hardware: Door hardware items other than specified in this Section.

1.03 RELATED SECTIONS

- A. Section 08410: Aluminum Entrances and Storefronts.
- B. Section 08800: Glazing.

1.04 REFERENCES

- A. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- B. ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
- C. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- D. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

1.05 PERFORMANCE

- A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 F degrees without causing detrimental effects to system or components.
- B. Limit air infiltration through assembly to 0.06 cu ft/min/sq. ft of assembly surface area, measured at a reference differential pressure across assembly of 0.3 inches water gage.

- C. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle system components under provisions of Section 01610.
- B. Store and protect system components under provisions of Section 01620.
- C. Provide strippable coating to protect pre-finished aluminum surfaces.

1.08 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Section 01740.
- B. Warranty: Cover complete system for failure to meet specified requirements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. STOREFRONT DOORS:
 - 1. Vistawall Architectural Products - Series 212 Door style.
 - 2. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Extruded Aluminum: ANSI/ASTM B221.
- B. Sheet Aluminum: ASTM B209.

2.03 FABRICATED COMPONENTS

- A. Exterior Entrance Doors: 1 3/4 inches thick, 2 3/4 inch wide top rail, 2 5/8 inch wide vertical stiles, 4 1/2 inch wide bottom rail; square glazing stops.

2.04 GLASS AND GLAZING MATERIALS

- A. Glass and Glazing Materials: As specified in Section 08800.

- B. Glass in Exterior Lights: gray tinted, single pane, tempered units.
- C. Glass in Interior Lights: Clear tempered or safety glass.

2.05 HARDWARE

- A. Weatherstripping, Sill Sweep Strips, Thresholds, Hinges: Manufacturers' standard type to suit application.
- B. Weatherstripping: Wool pile, continuous.
- C. Sill Sweep Strips: Retracting resilient seal type, of neoprene compound.
- D. Threshold: Extruded aluminum, one piece per door opening, ribbed non-slip surface, 1/2" thick.
- E. Pivots: Offset type.
- F. Push/Pull: Manufacturer's standard.
- G. Closers:
 - 1. Manufacturer's Standard (Norton) for exterior storefront.
- H. Cylinder Lock: Thumb Turn: Keyed to building master. - Supplied by hardware supplier; refer Section 08712.
- I. Panic Devices (Where Scheduled): Concealed vertical rod exit device with release mechanism contained in overall mid-rail. Release mechanism to be clearly marked with the word "PUSH" and shall not extend more than 1 inch from the plane of the door in the unactivated position.

2.06 FABRICATION

- A. Fabricate doors allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.
- B. Rigidly fit and secure joints and corners. Make joints and connections flush, hairline, and weatherproof.
- C. Arrange fasteners, attachments, and jointing to ensure concealment from view.
- D. Prepare components with internal reinforcement for door operator and hinge hardware.

2.07 FINISHES

- A. Extruded Aluminum Surfaces: **Bronze.**
- B. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A388.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify openings and adjoining materials are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install doors and hardware in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely attach assembly to structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Coordinate attachment and seal of air and vapor barrier materials.
- E. Install hardware using templates provided.
- F. Install glass and infill panels in accordance with Section 08800.
- G. Install decorative pulls supplied by hardware supplier; refer Section 08120. Drill glass doors with proper tools as required for mounting.
- H. Adjust operating hardware.

3.03 TOLERANCES

- A. Variation from Plane: 0.03 inches per foot.
- B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.04 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08700**HARDWARE****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. General Conditions and Division 01.

1.02 SCOPE

- A. Includes But Not Limited To -
 - 1. Furnishing door hardware.
- B. Related Work Specified Elsewhere -
 - 1. Hardware for aluminum entries except cylinders specified in Section 08400, 08420.
 - 2. Millwork hardware specified in Section 06200
 - 3. Installation of door hardware specified in Section 06200.

1.03 QUALITY CONTROL

- A. Firms bidding this work shall employ at least one full time Architectural Hardware Consultant or Architect approved equal.

1.04 SUBMITTALS

- A. Schedule of Proposed Hardware -
 - 1. See Drawings
- B. Hardware Templates -
 - 1. Submit hardware templates to contractor immediately after hardware schedule is approved by Architect.

1.05 KEY EXPLANATION

- A. Submit to Architect two written copies of keying information.
 - 1. Floor plan showing room numbers, room names and door numbers.
 - 2. Schedule giving keying designation for each door by door number, room number, and room name.

1.06 HARDWARE FUNCTIONS (BHMA): SEE DOOR SCHEDULE

- A. Passage Latch -
 - 1. Latch bolt operated by knob from either side at all times.

- B. Exterior -
 - 1. Dead locking latch bolt operated by knob from either side, except when outside knob is locked by turn button in inside knob. When outside knob is locked, latch bolt is operated by key in outside knob or by rotating inside knob. Turn button must be manually rotated to unlock outside knob.
- C. Door Lock Set -
 - 1. Dead locking latch bolt operated by knob from either side, except when outside knob is locked, latch bolt is operated by key in outside knob or by rotating inside knob.
- D. Utility Space Door Lock -
 - 1. Dead locking latch bolt operated by key in outside knob or by rotating inside knob. Outside knob is always fixed.
- E. Door Locks -
 - 1. Dead locking latch bolt operated by key from both sides.
- F. Bored Type Dead Locks -
 - 1. Dead bolt operated by key from outside and turn button from inside. Bolt automatically dead locks when fully thrown.

1.07 KEYING

- A. Door Locks -
 - 1. Furnish four masterkeys to Architect.
 - 2. Furnish two change keys per lock.
- B. Stamp or engrave each key with appropriate keying designation (Master, 1AA, 2AA, etc.). When keys are turned over to Owner at completion of Project, secure keys with same keying designation on one ring for each keying designation.
- C. Provide construction masterkey cylinders. De-activate construction master in presence of Owner and Architect and substitute permanent keys at end of construction.

1.08 FINISHES:

- A. Hardware finishes shall be as indicated on drawings, or otherwise specified.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 08712

DOOR HARDWARE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Hardware for wood, hollow steel, aluminum, and glass doors.

1.02 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Furnish cylinders to Sections 08330, 08353, 08420 for installation.

1.03 RELATED SECTIONS

- A. Section 08100: Metal Doors and Frames.
- B. Section 08111: Standard Steel Doors and Frames.
- C. Section 08200: Wood and Plastic Doors.
- D. Section 08210: Wood Doors.
- E. Section 08330: Overhead Coiling Doors.
- F. Section 08400: Entrances and Storefronts.
- G. Section 08420: Entrance Doors (cylinders).
- H. Section 10441: Plastic Signs.
- I. Section 10800: Toilet and Bath Accessories.

1.04 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. AWM - Architectural Woodwork Institute.
- C. BHMA - Builders' Hardware Manufacturers Association.
- D. DHI - Door and Hardware Institute.
- E. NAAMM - National Association of Architectural Metal Manufacturers.
- F. NFPA 101 - Life Safety Code.
- G. SDI - Steel Door Institute.

H. Americans With Disabilities Act of 1991.

1.05 COORDINATION

- A. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.

1.06 QUALITY ASSURANCE

- A. Manufacturers: Companies specializing in manufacturing door hardware with minimum five years experience.
- B. Hardware Supplier: Company specializing in supplying commercial door hardware with five years experience, and approved by Architect.
- C. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this Section.

1.07 SUBMITTALS

- A. Submit schedule, shop drawings, and product data under provisions of Section 01340.
- B. Indicate locations and mounting heights of each type of hardware.
- C. Provide product data on specified hardware.
- D. Submit samples under provisions of Section 01340.
- E. Submit samples of hinge and latchset illustrating style, color, and finish.
- F. Samples: Will be returned to supplier.
- G. Submit manufacturer's parts lists, templates, and installation instructions under provisions of Section 01340.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Package hardware items individually; label and identify package with door opening code to match hardware schedule.
- D. Deliver keys to Architect by shipment direct from hardware supplier.
- E. Protect hardware from theft by cataloging and storing in secure area.

1.09 WARRANTY

- A. Provide five year warranty under provisions of Section 01740.
- B. Warranty: Include coverage of door closers, locksets, latchsets, deadbolts and cylinders.

1.10 MAINTENANCE MATERIALS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS**2.01 ACCEPTABLE SUPPLIERS**

- A. Hidell Builders Supply
- B. Substitutions: Under provisions of Section 01630.

2.02 ACCEPTABLE MANUFACTURERS

- A. Hinges: Hager.
- B. Latch Sets: Falcon.
- C. Push/Pulls: Quality.
- D. Cylinder Locks: Best.
- E. Mortise Locks: Falcon.
- F. Closers: Dorma or Norton.
- G. Flushbolts: Ives or Quality.
- H. Door Hardware: Pulls - Falcon or Quality.
- I. Combination Security Locks: Simplex.
- J. Stop/Holder: Glynn Johnson Corporation; #GJF9.
- K. Panic Devices and Electronic Strikes: Von Duprin.
- L. Substitutions: Under provisions of Section 01630.

2.03 KEYING

- A. Door Locks: Master keyed including construction keying; final keying to be security type, non-duplicating system. As directed by the Owner.
- B. Supply 2 keys for each lock.
- C. Supply keys in the following quantities:
 - 1. 4 master keys.
 - 2. 4 construction keys.

2.04 KEY CABINETS

- A. Key Cabinet: Sheet steel construction, piano hinged door with cylinder type lock master keyed to building system.
- B. Horizontal metal strips for key hook labeling with plastic strip cover over paper labels.
- C. Finish: Baked enamel finish, color as selected.

2.05 FINISH

- A. Finish for Architectural hardware shall be dull chrome US26D.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to center line of hardware item:
 - 1. Locksets: 38 inches
 - 2. Push/Pulls: 45 inches
 - 3. Dead Locks: 48 inches
- D. Conform to ADA Guidelines for positioning requirements for the handicapped.

3.03 SCHEDULE

HW A Door #101A, 101B, 102A, 102B, 138A, 154, 162A, 169B to have:

1 Cylinder	1E74/1E72 - as required
2 Stops	433ES

Note: Balance of hardware and panic devices by door supplier.

HW B Door #103A, 103B, 113, 116F, 117, 126, 143, 144, 150C, 162B, 166, 204, 208, 209, 211A, 211B, 226, 227, 234A, 237 to have:

1-1/2 Pr. Butts	BB1279 - 4-1/2 X 4-1/2
1 Lockset	LM561-KG - WBS - CLS
1 Cylinder	1E74 - PROPER CAM
1 Closer	P4041 - TB
1 Kickplate	10 X 2" LDW - 16GA
1 Stop	W302T
1 Set Seals	701 - BN

HW C Door #103C, 138A, 201, 202, 210, 230, 234B to have:

1-1/2 Pr. Butts	BB1279 - 4-1/2 X 4-1/2
1 Panic	99L-F-03
1 Cylinder	1E72
1 Closer	P4041 - TB
1 Kickplate	10 X 2" LDW - 16GA
1 Stop	433ES
1 Threshold	1040A
1 Sweep	332A
1 Set Seals	701 - BN

HW D Door #106, 114, 116A, 116B, 116C, 116D, 141, 203, 206, 213B, 233 to have:

1-1/2 Pr. Butts	BB1279 - 4-1/2 X 4-1/2
1 Lockset	LM581-KG - WBS - CLS
1 Cylinder	1E74 - PROPER CAM
1 Closer	P4041 - TB
1 Kickplate	10 X 2" LDW - 16GA
1 Stop	W302T
1 Set Seals	701 - BN

HW E Door #107, 118, 136, 169A, 217, 225, 238 to have:

1-1/2 Pr. Butts	1279 - 4-1/2 X 4-1/2
1 Passage	LM101-KG - WBS - CLS
1 Stop	W302T
3 Silencers	GJ64

HW F Door #110, 122, 123, 124, 125, 127, 128, 133, 134, 135, 146A, 146B, 147, 148, 149, 152, 153, 157, 158, 159, 160, 161, 165, 168A, 168B, 171, 176, 177, 178, 179A, 179B, 181, 183, 185, 215A, 215B, 220, 221, 222, 223, 228A, 228B, 240 to have:

1-1/2 Pr. Butts	1279 - 4-1/2 X 4-1/2
1 Lockset	LM521-KG - WBS - CLS
1 Cylinder	1E74 - Proper Cam
1 Stop	W302T
3 Silencers	GJ64

HW G Door #111, 150a, 150b, 150d, 164 to have:

1-1/2 Pr. Butts	BB1279 - 4-1/2 X 4-1/2
1 Push Plate	40 - 4 x 16
1 Pull Plate	1610A - 4 x 16
1 Closer	4041 - TB
1 Kickplate	10 X 2" LDW - 16GA
1 Stop	W302T
1 Silencers	GJ64

HW H Door #112, 120, 130, 131, 155, 163, 167, 172, 173, 175, 180, 182, 184, 214, 218, 219, 241 to have:

1-1/2 Pr. Butts	1279 - 4-1/2 X 4-1/2
1 Privacy	LM311-KG - WBS - CLS
1 Stop	W302T
1 Silencers	GJ64

HW I Door #116E, 211C, 236 to have:

3 Pr. Butts	BB1279 - NRP - 4-1/2 X 4-1/2
2 Auto Bolts	FB8
1 Dust Strike	DP2
1 Lockset	LM581 - KG - WBS - CLS
1 Cylinder	1E74 - Proper Cam
2 Closers	P4041 - TB
1 Coordinator	T-3092
1 Set Seals	701 - BN
1 Astragal	566A

HW J Door #119, 137, 212 to have:

1-1/2 Pr. Butts	BB1279 - 4-1/2 X 4-1/2
1 Lockset	LM581 -KG - WBS - CLS
1 Cylinder	1E74 - Proper Cam
1 Electric Strike	VD6211 - 24V DC
1 Power Supply	PS871
1 Key Pad	7311 - 24V DC
1 Closer	4041 - TB
1 Kickplate	10 X 2" LDW - 16GA
1 Stop	W302T
1 Set Seals	701 - BN

HW K Not Used

HW L Door #213A to have:

1-1/2 Pr. Butts	BB1279 - 4-1/2 X 4-1/2
1 Lockset	LM271-KG - WBX - CLS
1 Cylinder	1E74 - Proper Cam
1 Closer	P4041 - TB
1 Stop	W302T
1 Set Seals	701 - BN

END OF SECTION

SECTION 08730

WEATHER-STRIPPING AND SEALS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Weather-Stripping seals for wood and hollow steel doors.

1.02 RELATED SECTIONS

- A. Section 08111 - Standard Steel Doors and Frames.
- B. Section 08410 - Aluminum Entrances and Storefronts.
- C. Section 08420 - Entrance Doors.
- D. Section 08700 - Hardware.
- E. Section 08712 - Door Hardware.
- F. Section 08740 - Thresholds.

1.03 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. BHMA - Builders' Hardware Manufacturers Association.
- C. DHI - Door and Hardware Institute.
- D. NAAMM - National Association of Architectural Metal Manufacturers.
- E. NFPA 101 - Life Safety Code.
- F. SDI - Steel Door Institute.

1.04 COORDINATION

- A. Coordinate work of this Section with other directly affected Sections.

1.05 QUALITY ASSURANCE

- A. Manufacturers: Companies specializing in manufacturing door hardware with minimum five years experience.

- B. Hardware Supplier: Company specializing in supplying commercial door hardware with five years experience and approved by Architect.

1.06 SUBMITTALS

- A. Submit schedule, shop drawings, and product data under provisions of Section 01340.
- B. Indicate locations and mounting heights of each type of threshold.
- C. Provide product data on specified hardware.
- D. Submit samples under provisions of Section 1340.
- E. Submit manufacture's installation instructions under provisions of Section 01340.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Package hardware items individually; label and identify package with door opening code to match hardware schedule.

1.08 ALLOWANCE

- A. Refer to Section 01020 - Cash Allowances for the Cash Allowance sum applicable to this Section of Work.
- B. This Allowance includes purchase and delivery only of hardware. Installation is included in this Section and is part of the Contact Sum.

PART 2 PRODUCTS

2.01 ACCEPTABLE SUPPLIERS

- A. Hidell Builders Supply.
- B. Substitutions: Under provisions of Section 01630.

2.02 ACCEPTABLE MANUFACTURERS

- A. A.J. May.
- B. Pemko.
- C. National Guard Products, Inc.
- D. Substitutions: Under provisions of Section 01630.

2.03 FINISHING

- A. Finish of metal portions to be clear aluminum.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that door openings are ready to receive work.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install weather-stripping in accordance with manufacturer's instruction.
- B. Use templates provided by hardware manufacturer.
- C. Weather-Stripping shall be installed to provide weathertight seal.
- D. Cut strips accurately. Do not hamper door operation. Miter corners.
- E. Conform to ANSI A117.1 for requirements for the handicapped.

3.03 SCHEDULE

- A. Provide Weather-Stripping at the following locations:
 - 1. Interior doors between conditioned and non-conditioned spaces.
 - 2. Steel doors exiting to exterior.
 - 3. Where scheduled - Refer drawings.

END OF SECTION

SECTION 08740

THRESHOLDS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Metal Thresholds for wood and hollow steel doors.

1.02 RELATED SECTIONS

- A. Section 08111 - Standard Steel Doors and Frames.
- B. Section 08210 - Wood Doors.
- C. Section 08700 - Hardware.
- D. Section 08712 - Door Hardware.
- E. Section 08730 - Weather-Stripping.

1.03 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. BHMA - Builders' Hardware Manufacturers Association.
- C. DHI - Door and Hardware Institute.
- D. NAAMM - National Association of Architectural Metal Manufacturers.
- E. NFPA 101 - Life Safety Code.
- F. SDI - Steel Door Institute.

1.04 COORDINATION

- A. Coordinate work of this Section with other directly affected Sections.

1.05 QUALITY ASSURANCE

- A. Manufacturers: Companies specializing in manufacturing door hardware with minimum five years experience.
- B. Hardware Supplier: Company specializing in supplying commercial door hardware with five years experience and approved by Architect.

1.06 SUBMITTALS

- A. Submit schedule, shop drawings, and product data under provisions of Section 01340.
- B. Indicate locations and mounting heights of each type under provisions of Section 01340.
- C. Indicate locations and mounting heights of each type of threshold.
- D. Provide product data on specified hardware.
- E. Submit manufacture's installation instructions under provisions of Section 01340.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Package hardware items individually; label and identify package with door opening code to match hardware schedule.

PART 2 PRODUCTS**2.01 ACCEPTABLE SUPPLIERS**

- A. Hidell Builders Supply.
- B. Substitutions: Under provisions of Section 01630.

2.02 ACCEPTABLE MANUFACTURERS

- A. A.J. May.
- B. Pemko.
- C. National Guard Products, Inc.
- D. Substitutions: Under provisions of Section 01630.

2.03 FINISHING

- A. Finish of thresholds to be clear aluminum.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that door openings are ready to receive work and dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install thresholds in accordance with manufacturer's instruction.
- B. Use templates provided by hardware manufacturer.
- C. Conform to ANSI A117.1 for requirements for the handicapped.

3.03 SCHEDULE

- A. Provide thresholds at the following locations:
 - 1. Main entrance doors - 1/2" tall profile. Capable of installation with ceramic tile.
 - 2. Interior doors between conditioned and non-conditioned spaces - provide with vinyl insert Weather-Stripping.
 - 3. Steel doors exiting to exterior - provide with vinyl insert weather-stripping.

END OF SECTION

SECTION 08800**GLAZING****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Glazing for windows.

1.01 RELATED SECTIONS

- A. Section 07900: Joint Sealers: Sealant and back-up materials.
- B. Section 08400: Entrances and Storefronts.
- C. Section 08410: Aluminum Entrances and Storefronts.
- D. Section 08420: Entrance Doors.

1.03 REFERENCES

- A. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- B. ASTM E84 - Surface Burning Characteristics of Building Materials.
- C. FS DD-G-451 - Glass, Float or Plate, Sheet, Figured.
- D. FS DD-G-1403 - Glass, Plate (Float), Sheet, Figured, and Spandrel (Heat Strengthened and Fully Tempered).
- E. FS TT-G-410 - Glazing Compound
- F. FS TT-S-227 - Sealer Compound: Rubber Base, Two Component (for Caulking, Sealing and Glazing in Building Construction).
- G. FS TT-S-230 - Sealing Compound: Synthetic Rubber Base, Single Component, Chemically Curing for Caulking, Sealing and Glazing in Building Construction.
- H. FS TT-S-1543 - Sealing Compound: Silicone Rubber Base (for Caulking, Sealing, and Glazing in Buildings and Other Structures).
- I. FS TT-S-001657 - Sealing Compound: Single Component, Butyl Rubber Based Solvent Release Type (for Buildings and Other Types of Construction).
- J. SIGMA No. 64-7-2 - Specification for Sealed Insulating Glass Units.
- K. FGMA -Glazing Manual. Glazing Sealing Systems Manual.

1.04 QUALITY ASSURANCE

- A. Conform to Flat Glass Marketing Association (FGMA) Glazing Manual Glazing Sealing Systems Manual for glazing installation methods.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Provide data on glazing sealant. Identify colors available.
- D. Submit samples under provisions of Section 01340.
- E. Submit two samples, 12 x 12 inches in size, illustrating glass coloration.
- F. Submit 2 inch long bend of glazing sealant in color selected.
- G. Submit sealed glass unit manufacturer's certificate under provisions of Section 01405 indicating units meet or exceed specified requirements.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.

1.0 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Section 01740.
- B. Warranty: Include coverage of sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS**2.01 ACCEPTABLE GLASS MANUFACTURERS**

- A. Libbey Owens Ford (LOF).
- B. Pittsburgh Plate and Glass (PPG).
- C. Substitutions: Under provisions of Section 01630.

2.02 GLASS MATERIALS

- A. Float or Plate Glass: - Type A: FS DD-G-451.
- B. Float or Plate Glass: - Type A: Clear.
- C. Safety Glass: - Type B: FS DD-G-1403.

- D. Safety Glass: - Type B: Clear.
- E. Tinted Glass: - Type C: FS DD-G-451.
- F. Tinted Glass: - Type C: or plate; heat strengthened fully tempered normalized temper; light reducing in blue color.
- G. Insulated Glass Units: - Type G: SIGMA No. 64-7-2 double pane with glass to elastomer edge seal. Outer pane of tinted, inner pane of 1/4" clear; total unit thickness of 1 inch.

2.03 GLAZING GASKETS

- A. Glazing Gaskets: E.P.D.M. - both sides.

2.04 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene.
- B. Spacer Shims: Neoprene.
- C. Glazing Tape: Per-formed butyl.
- D. Glazing Splines: Resilient polyvinylchloride.
- E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready for work of this Section.
- B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.

3.03 INSTALLATION

- A. Install according to manufacturer's recommendations.

3.04 CLEANING

- A. After installation, mark pane with an "X" by using plastic tape or removable paste.
- B. Remove glazing materials from finish surfaces.
- C. Remove labels after work is completed.

3.05 SCHEDULE

- A. Exterior glass: Solar Cool Bronze; 48% or less transmittance factor; insulated all areas except at entrance doors.
- B. Wire glass: Interior door vision panels and interior rated windows.
- C. Interior vestibule glass: Clear, tempered where required.
- D. Interior office glass: Clear, tempered where required.
- E. Bullet Resistant Glass: Class 1 (located in JP's Waiting area).

END OF SECTION

SECTION 08912**ALUMINUM CURTAIN WALL SYSTEMS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Aluminum frames and glazed lights.
- B. Glass.
- C. Anchors, brackets, and attachments.
- D. Perimeter sealant.

1.02 WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Section 08420: Entrance Doors.
- B. Section 08700 - Hardware: Door hardware items other than specified in this Section.
- C. Section 08800: Glazing.

1.03 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Fabricated metal attachment devices, framed opening.
- B. Section 06100 - Rough Carpentry: Framed blocking, Wood perimeter shims.
- C. Section 07900 - Joint Sealers: Perimeter sealant and back-up materials.
- D. Section 08120: Interior aluminum doors and frames.

1.04 REFERENCES

- A. ANSI/ASTM A36 - Structural Steel.
- B. ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.
- C. ANSI/ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- D. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- E. ANSI/ASTM E283 - Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.

- F. ANSI/ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- G. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- H. FS TT-P-31-Paint, Oil: Iron Oxide, Ready Mixed, Red and Brown.
- I. FS TT-P-641 - Primer Coating; Zinc Dust-Zinc Oxide (for Galvanized Surfaces).
- J. FS TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.

1.05 PERFORMANCE

- A. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 F degrees without causing detrimental effects to system or components.
- B. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with Southern Standard code.
- C. Limit mullion deflection to 1/200, or flexure limit of glass with full recovery of glazing materials, whichever is less.
- D. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior.
- E. Limit air infiltration through assembly to 0.06 cu ft/min/sq. ft of assembly surface area, measured at a reference differential pressure across assembly of 0.3 inches water gage.
- F. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Include system and component dimensions; components within assembly; framed opening requirements and tolerances; anchorage and fasteners; glass and infills; door hardware requirements; and affected related work.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.
- D. Submit samples under provisions of Section 01340.
- E. Submit one sample, 12 x 12 inches in size, illustrating pre-finished aluminum surface and specified glass of each frame type.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle system components under provisions of Section 01610.
- B. Store and protect system components under provisions of Section 01620.

- C. Provide wrapping strippable coating to protect pre-finished aluminum surfaces.

1.08 WARRANTY

- A. Provide five year manufacturer's warranty under provisions of Section 01740.
- B. Warranty: Cover complete system for failure to meet specified requirements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Vista Wall Frame style - HP-175, Thermal Wall System.
- B. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Extruded Aluminum: ANSI/ASTM B221.
- B. Sheet Aluminum: ASTM B209.
- C. Fasteners: Stainless steel.

2.03 FABRICATED COMPONENTS

- A. Exterior Frames: 1 3/4 x 6 inch profile, thermally broken with interior portion of frame insulated from exterior portion, flush applied glazing stops.

2.04 GLASS AND GLAZING MATERIALS

- A. Glass and Glazing Materials: As specified in Section 08800.
- B. Glass in Exterior Lights: Type insulating glass, tinted, tempered where required.

2.05 FABRICATION

- A. Fabricate frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.
- B. Rigidly fit and secure joints and corners with screw and spline. internal reinforcement. Make joints and connections flush, hairline, and weatherproof.
- C. Develop drainage holes with moisture pattern to exterior.
- D. Arrange fasteners, attachments, and jointing to ensure concealment from view.

2.06 FINISHES

- A. Exterior Extruded Aluminum Surfaces: **Bronze**.
- B. Interior Exposed Aluminum Surfaces: **Bronze**.

- C. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A386 to 2.0 oz/sq. ft. Primed with iron oxide paint.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify wall openings are ready to receive work of this Section.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install frames and glazing in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely attach frame assembly to structure.
- C. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Install sill flashings to conduct water to building exterior.
- E. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install glass in accordance with Section 08800.
- G. Install perimeter type sealant, backing materials, and installation requirements in accordance with Section 07900.

3.03 TOLERANCES

- A. Variation from Plane: 0.03 inches per foot maximum.
- B. Misalignment of Two Adjoining Members Abutting in Plane: 0.015 inches.

3.04 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down exposed surfaces using a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 09100

METAL SUPPORT SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish all required labor, materials, equipment, and supplies necessary for the completion of work unless otherwise specified.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 09110: Non-Load Bearing Wall Framing Systems.
- C. Section 09130: Acoustical Ceiling Suspension Systems.

1.03 QUALITY ASSURANCE

- A. Systems shall be installed only by experienced workmen in strict accordance with the specifications and related manufacturer's recommendations.
- B. Systems shall be erected within tolerances specified for uniformity, trueness, plumb and level.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 09110**NON LOAD-BEARING WALL FRAMING SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Formed metal stud framing.
- B. Framing accessories.

1.02 RELATED SECTIONS

- A. Section 06114 - Wood Blocking and Curbing: Rough wood blocking within stud framing.
- B. Section 07213 - Batt and Blanket Insulation: Insulation within stud framing.
- C. Section 07900 - Joint Sealers.
- D. Section 09260 - Gypsum Board Systems: Metal studs for partitioning.

1.03 REFERENCES

- A. ASTM A525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- B. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board.
- C. ASTM C 754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board.
- D. FS TT-P-645 - Primer, Paint, Zinc-Chromate, Alkyd Type.
- E. GA 203 - Installation of Screw-Type Steel Framing Members to Receive Gypsum Board.

1.04 SYSTEM DESCRIPTION

- A. Metal stud framing system for exterior wall framing, batt type insulation specified in Section 07213, interior gypsum board specified in Section 09260.
- B. Metal stud framing system for interior walls, with batt type insulation specified in Section 07213, gypsum board specified in Section 09260.
- C. Maximum Allowable Deflection: 1/270.
- D. Design system to accommodate construction tolerances, exterior wall wind load, deflection of building structural members, and clearances of intended openings.

1.05 SUBMITTALS

VOL 0095 PAGE 679

- A. Submit product data under provisions of Section 01340.
- B. Submit product data describing standard framing member materials and finish, product criteria, load charts, and limitations.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with GA 203 and ASTM C754.

1.06 SEQUENCING AND SCHEDULING

- A. Sequence work with other work directly affected by this Section.
- B. Coordinate work under provisions of Section 01040.
- C. Coordinate the work of related Sections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum.
- B. Approved equal.
- C. Substitutions: Under provisions of Section 01630.

2.02 STUD FRAMING MATERIALS

- A. Studs: ASTM A525, galvanized to G90 coating class, ANSI/ASTM A591, non-load bearing rolled steel, channel shaped, punched for utility access.

1. INTERIOR STUDS: (NO WIND LOAD) SPACING 16" ON CENTER

SIZE	GAUGE/WEIGHT	MAX. UNBRACED LENGTH
3-5/8"	Standard	12'-2"
3-5/8"	Extra Duty	13'-4"
3-5/8"	Heavy Duty	15'-5"
6"	Standard	18'-2"
6"	Extra Duty	20'-0"
6"	Heavy Duty	23'-1"

2. EXTERIOR STUDS: (ASSUMES 1-5/8" FLANGE WIDTH) SPACING 16" ON CENTER

SIZE	GAUGE/WEIGHT	MAX. UNBRACED LENGTH
3-5/8"	20	11'-0"
3-5/8"	18	12'-0"
3-5/8"	16	13'-0"
6"	20	16'-4"
6"	18	18'-0"
6"	16	19'-3"

- B. Runners: Of same material and finish as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud. Ceiling runners with extended legs.
- C. Furring and Bracing Members: Of same material and finish as studs, thickness to suit purpose.
- D. Fasteners: Self-drilling, self-tapping screws.
- E. Metal Backing: 20 gage galvanized steel for reinforcement of hinges.
- F. Anchorage Devices: Power driven and/or Powder actuated.
- G. Primer: FSTT-P-645, for touch-up of galvanized surfaces.

2.03 FABRICATION

- A. Fabricate assemblies of studs, tracks, etc. to sizes and profiles required; with framing members fitted, reinforced, and braced to suit design requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are ready to receive work.
- B. Verify field measurements are as shown on Drawings.
- C. Verify that rough-in utilities are in proper location.
- D. Beginning of installation means installer accepts existing conditions.

3.02 ERECTION

- A. Align and secure top and bottom runners at 24 inches oc. Place two beads of acoustic sealant between runners and substrate.
- B. Fit runners under and above openings; secure intermediate studs at spacing of wall studs.
- C. Install studs vertically at 16 inches oc.
- D. Connect studs to tracks using crimping or fastener method.

- E. Stud splicing not permissible.
- F. Construct corners using minimum three studs.
- G. Double studs at wall openings, door and window jambs, and not more than 2 inches each side of openings.
- H. Brace stud framing system and make rigid.
- I. Coordinate erection of studs with requirements of door and window frame supports and attachments.
- J. Align stud web openings.
- K. Coordinate installation of bucks, anchors, and blocking with electrical and mechanical work to be placed in or behind stud framing.
- L. Blocking: Secure wood blocking to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and other wall attached items.
- M. Extend stud framing to ceiling or structure as required. Attach ceiling runner securely.
- N. Refer to Drawings for indication of partitions extending to ceiling only and for partitions extending through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
- O. Coordinate placement of insulation in multiple stud spaces made inaccessible after stud framing erection.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/16 inch.
- B. Maximum Variation of any Member from Plane: 1/16 inch.

END OF SECTION

SECTION 09130**ACOUSTICAL CEILING SUSPENSION SYSTEMS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Suspended metal grid ceiling system.
- B. Perimeter trim.

1.02 RELATED WORK

- A. Section 15872: Air diffusion devices in ceiling system.
- B. Section 16510: Light fixtures in ceiling system.

1.03 RELATED SECTIONS

- A. Section 09110 - Non-Load Bearing Wall Framing Systems.
- B. Section 09510 - Suspended Acoustical Ceiling.

1.04 REFERENCES

- A. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- B. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- C. UL - Underwriter's Laboratories System Ratings.

1.05 SYSTEM DESCRIPTION

- A. Installed System: Conform to UL rating where applicable.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture of ceiling suspension system and ceiling tile panels metal pans with three years minimum experience.
- B. Installer: Company with three years minimum documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable building code for fire rated assembly.

1.08 SUBMITTALS

- A. Provide product data on metal grid system components.
- B. Submit samples under provisions of Section 01340.
- C. Submit two samples of each type, 6 inches long, of suspension system main runner, cross runner, and edge trim.
- D. Submit manufacturer's installation instructions under provisions of Section 01340.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and humidity of 20 to 40 percent prior to, during, and after installation.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS - SUSPENSION SYSTEM**

- A. Donn.
- B. Chicago Metallic.
- C. Armstrong.
- D. Substitutions: Under provisions of Section 01630.

2.02 SUSPENSION SYSTEM MATERIALS

- A. Grid: ASTM C635, intermediate duty, non-fire rated exposed T; components die cut and interlocking.
- B. Grid: ASTM C635, intermediate duty, fire rated to one hour assembly, two directional exposed T; components die cut and interlocking.
- C. Accessories: Stabilizer bars clips splices edge moldings hold down clips and other as required for suspended grid system.
- D. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
- E. Grid Finish: White Anodized for white ceilings and color as selected for colored ceiling tile areas.
- F. Support Channels and Hangers: Galvanized Primed steel; size and type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that existing conditions are ready to receive work.

- B. Verify that layout of hangers will not interfere with other work.
- C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install system in accordance with ASTM C636 manufacturer's instructions and as supplemented in this Section.
- B. Install fire rated system in accordance with UL Design requirements.
- C. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- D. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Center Locate system on room axis leaving equal border units.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
- I. Do not eccentrically load system, or produce rotation of runners.
- J. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

3.03 TOLERANCES

- A. Variation from Flat and Level Surface: 1/8 inch in 10 ft.
- B. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

END OF SECTION

SECTION 09250

GYPSUM WALLBOARD

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, material, equipment and supplies required for a complete installation of gypsum board and related accessories.

1.02 RELATED SECTIONS

- A. General Conditions an Division 01.
- B. Section 09100: Metal Support Systems.
- C. Section 09110: Non-Load Bearing Wall Framing Systems.
- D. Section 09260: Gypsum Wallboard Systems.
- E. Section 09280: Gypsum Wallboard Accessories.

1.03 QUALITY ASSURANCE

- A. Gypsum board shall be installed in strict accordance with manufacturer's recommendations.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 09260

GYP SUM BOARD SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Gypsum board.
- B. Taped and sanded joint treatment.
- C. Texture

1.02 WORK INSTALLED BUT FURNISHED UNDER OTHER SECTIONS

- A. Section 07213 - Batt and Blanket Insulation.
- B. Section 09100 - Metal Support Systems.
- C. Section 09250 - Gypsum Wallboard.
- D. Section 09280 - Gypsum Wallboard Accessories.

1.03 RELATED SECTIONS

- A. Section 06114 - Wood Blocking and Curbing.
- B. Section 08111 - Standard Steel Doors and Frames.
- C. Section 09111 - Metal Stud Framing System.

1.04 REFERENCES

- A. ANSI/ASTM C36 - Gypsum Wallboard.
- B. ANSI/ASTM C442 - Gypsum Backing Board.
- C. ANSI/ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.
- D. ANSI/ASTM C630 - Water Resistant Gypsum Backing Board.
- E. ANSI/ASTM C646 - Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gage Steel Studs.
- F. ANSI/ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.
- G. ANSI/ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

- H. ANSI/ASTM E119 - Fire Tests of Building Construction and Materials.
- I. GA-201 - Gypsum Board for Walls and Ceilings.
- J. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

1.05 QUALITY ASSURANCE

- A. Applicator: Company specializing in gypsum board systems work with three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies.
 - 1. Fire Rated Partitions: Listed assembly by UL.
 - 2. Fire Rated Ceiling: Listed assembly by UL.

1.07 SUBMITTALS

- A. Submit and product data under provisions of Section 01340.
- B. Submit samples under provisions of Section 01340.
- C. Submit two samples of textured gypsum board 24 x 24 inch in size illustrating textured finish.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - GYPSUM BOARD SYSTEM

- A. United States Gypsum (U.S.G.).
- B. Other acceptable manufacturers offering equivalent products:
 - 1. National Gypsum Company.
 - 2. Gold Bond.
- C. Substitutions: Under provisions of Section 01630.

2.02 GYPSUM BOARD MATERIALS

- A. Standard Gypsum Board: ANSI/ASTM C36; 5/8 inch thick, maximum permissible length; ends square cut, tapered and beveled edges.
- B. Fire Rated Gypsum Board: ANSI/ASTM C36; fire resistive type, UL rated; 5/8 inch thick, maximum permissible length; ends square cut, tapered and beveled edges.
- C. Moisture Resistant Gypsum Board: ANSI/ASTM C630; 5/8 inch thick, maximum permissible length; ends square cut, square edges.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of substrate.

3.02 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with manufacturer's instructions.
- B. Erect single layer gypsum board in parallel to support members, with ends and edges occurring over firm bearing.
- C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing. Provide where required by drawings.
- D. Provide "moisture resistant" gypsum board at all walls designated to receive ceramic tile, and all "wet" walls (behind plumbing fixtures).
- E. Use screws when fastening gypsum board to metal furring or framing.
- F. Treat cut edges and holes in moisture resistant gypsum board with sealant.
- G. Place control joints consistent with lines of building spaces and as detailed. Refer Sections 09280.
- H. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board butts dissimilar materials.

3.03 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- C. Taping, filling, and sanding is not required at surfaces behind applied ceramic tile.
- D. Erect in accordance with manufacturer's instructions.

3.04 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

GYPSUM WALLBOARD ACCESSORIES**PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Metal accessories for drywall application.

1.02 RELATED SECTIONS

- A. Section 09260: Gypsum Board Systems.

1.03 REFERENCES

- A. ASTM A525 - General Requirements for Steel Sheet Zinc Coated (Galvanized) by the Hot-Dip Process.
- B. FS-TT-P-645 - Primer Paint, Zinc-chromate, Alkyd Type.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit samples of each type of accessory proposed for use on the project and description of its' use.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. United States Gypsum
- B. Gold Bond
- C. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. All accessories shall be hot-dipped galvanized, unless otherwise noted.
- B. Accessories (U.S.G. members)
 - 1. Corner (exterior) reinforcement: #103 Dur-A-Bead.
 - 2. Metal trim (casing): #200-A.
 - 3. Metal trim (casing): #200-B.
 - 4. Control joints: #093.
- C. Accessories (Misc):
 - 1. Bullnose Corner Bead: #208 as manufactured by Plastic Components, Inc.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install corner beads at all exterior drywall corners, both vertical and horizontal, full length of corner.
- B. Install casing beads at termination points of drywall which abutts other materials and is visually exposed.
- C. Install control joints at outside corners of all interior door frames (head section) both sides of wall. Install control joints at outside corners, head and sill, of window openings (inside wall surface). Install control joints in all ceiling areas of uninterrupted planes exceeding 20 feet in either direction.
- D. Install control joints approximately 20'-0" on center in all uninterrupted walls. Break wallboard behind joint using double studs. Attach control joints to face; layer with staples spaced 6 inches on center on both flanges along entire length of joint.

END OF SECTION

SECTION 09300**TILE****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Furnish all required labor, materials, equipment, and supplies required for the completion of all specified tile work.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 09311: Ceramic Tile - Floors.
- C. Section 09312: Ceramic Tile - Walls.

1.03 STANDARDS

- A. All tile work shall conform to the Tile Council of American current recommendations and manufacturer's requirements.
- B. Areas receiving tile work shall be closed to all other traffic during tiling operation and for 48 hours after completion of tile work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 09311

CERAMIC TILE- FLOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ceramic tile floor and base finish using the thinset application method.

1.02 RELATED SECTIONS

- A. Section 03347 - Self-Leveling Underlayment.
- B. Section 09312 - Ceramic Tile Wall Finish.

1.03 REFERENCES

- A. ANSI/TCA A108.5 - Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
- B. ANSI/TCA A118.1 - Dry-Set Portland Cement Mortar.
- C. ANSI/TCA A137.1 - Specifications for Ceramic Tile.
- D. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.
- C. Submit in triplicate, manufacturer's full line of color samples under provisions of Section 01340 for Architect's selection.
- D. Mount tile and apply grout on one 24 x 24 inch plywood panel, to indicate pattern, color variations, and grout joint size variations for each tile type.
- E. Submit maintenance data under provisions of Section 01730.
- F. Include recommended cleaning and stain removal methods, and cleaning materials.

1.05 QUALITY ASSURANCE

- A. Conform to ANSI/TCA A137.1
- B. Conform to TCA Handbook for Ceramic Tile Installation.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum three years documented experience.
- B. Installer: Company specializing in applying the work of this Section with minimum three years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in a closed, unventilated environment.
- B. Maintain 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS**2.01 MANUFACTURERS - TILE**

- A. Dallas Ceramic Company.
- B. American Ocean Tile Company.
- C. Monarch Marshall Tile Company.
- D. Substitutions: Under provisions of Section 01630.

2.02 TILE MATERIAL

- A. Ceramic Mosaic Floor Tile: ANSI/TCA A137.1, conforming to the following: (Toilets)

Moisture Absorption	0 to 0.5 percent
Size	2 x 2 x 1/8 inch
Edge	Cushioned
Surface	Finish Unglazed
Color	Field tile from price group 2, Accent tile from price group 3
Design	Dal-Kestones

- B. Base: Match floor tile for moisture absorption, surface finish, and color; tile length: 6 inch long x 4 inch high; coved.

2.03 MANUFACTURERS - ADHESIVE

- A. As recommended by Manufacturer.

2.04 GROUT MATERIALS

- A. Grout: Cementitious type, resistant to shrinking.
- B. Color Admixture: as selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts condition of existing surfaces.

3.02 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean existing surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Apply sealer and/or conditioner to surfaces as recommended by adhesive manufacturer.

3.03 INSTALLATION - THINSET METHOD

- A. Install adhesive, tile, and grout in accordance with manufacturer's instructions and to TCA Handbook for Ceramic Tile Installation.
- B. Request tile pattern from Architect.
- C. Place edge strips at exposed tile edges.
- D. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly.
- E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints water-tight, without voids, cracks, excess mortar, or excess grout.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Allow tile to set for a minimum of 48 hours prior to grouting
- H. Grout tile joints.

- I. Apply sealant to junction of tile and dissimilar materials and at junction of dissimilar planes.

3.04 CLEANING

- A. Clean work under provisions of 01710.
- B. Clean tile surfaces.

3.06 PROTECTION

- A. Do not permit traffic over finished floor surface for 48 hours after installation.

3.07 SCHEDULE - Refer Drawings.

END OF SECTION

CERAMIC TILE WALL FINISH

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Ceramic tile wainscot finish using the thinset application method.

1.02 RELATED SECTIONS

- A. Section 09260: Gypsum Board Systems.
- B. Section 09311 - Ceramic Tile Floors.

1.03 REFERENCES

- A. ANSI/TCA A108.4 - Installation of Ceramic Tile with Water Resistant Organic Adhesive.
- B. ANSI/TCA A136.1 - Organic Adhesives for Installation of Ceramic Tile, Type 1 and Type 2.
- C. ANSI/TCA A137.1 - Specifications for Ceramic Tile.
- D. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.04 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Submit product data under provisions of Section 01340.
- C. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.
- D. Submit three complete full range color samples under provisions of Section 01340.
- E. Mount tile and apply grout on one 24 x 24 inch plywood panel, representative of pattern, color variations, and grout joint size variations.
- F. Submit maintenance data under provisions of Section 01730.
- G. Include recommended cleaning and stain removal methods, and cleaning materials.

1.05 QUALITY ASSURANCE

- A. Conform to ANSI/TCA A137.1
- B. Conform to TCA Handbook for Ceramic Tile Installation

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in the manufacture of products specified in this Section with minimum three years documented experience.
- B. Installer: Company specializing in applying the work of this Section with minimum three years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in a closed, unventilated environment.
- B. Maintain 50 degrees F (10 degrees C) during installation of mortar materials.

PART 2 PRODUCTS**2.01 MANUFACTURERS - TILE**

- A. Dallas Ceramic Company.
- B. American Olean Tile Company.
- C. Monarch Marshall Tile Company.
- D. Substitutions: Under provisions of Section 01630.

2.02 TILE MATERIAL

- A. Ceramic Wall Tile: ANSI/TCA A137.1, conforming to the following:

Moisture Absorption	0 to 0.5 percent
Size	2 x 2 x 1/8 inch
Edge	Cushioned
Surface	Finish Unglazed
Color	Field tile from price group 2, Accent tile from price group 3
Design	Dal-Keystones

- B. Base: Match floor tile for moisture absorption, surface finish, and color; tile length: 6 inch long x 4 inch high; coved.
- C. Wainscot Cap: Match wall tile for moisture absorption, surface finish, and color. Bullnosed top edge.

2.03 MANUFACTURERS - ADHESIVE

- A. As recommended by manufacturer.

2.04 MANUFACTURERS - MORTAR AND GROUT

- A. Tex-Rite.
- B. Tamms.
- C. Durament.
- D. Substitutions: Under provisions of Section 01630.

2.05 GROUT MATERIALS

- A. Grout: Cementitious type resistant to shrinking, color as selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts condition of existing surfaces.

3.02 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean existing surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Apply sealer and/or conditioner to surfaces as recommended by adhesive manufacturer.

3.03 INSTALLATION - THINSET METHOD

- A. Install adhesive, tile, and grout [in accordance with manufacturer's instructions and TCA Handbook for Ceramic Tile Installation.
- B. Request tile pattern from Architect. Do not interrupt tile pattern around openings.
- C. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align wall, base, and floor joints.

- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar or excess grout.
- E. Form internal angles square and external angles bullnosed.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Allow tile to set for a minimum of 48 hours prior to grouting
- H. Grout tile joints.
- I. Apply sealant to junction of tile and dissimilar materials and at junction of dissimilar planes.

3.05 CLEANING

- A. Clean work under provisions of 01710.
- B. Clean tile surfaces.

3.06 SCHEDULE: Refer Drawings.

END OF SECTION

SECTION 09500

ACOUSTICAL TREATMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish labor, materials, equipment and supplies necessary for completion of work unless otherwise noted.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 07213: Batt and Blanket Insulation.
- C. Section 09100: Metal Support Systems.
- D. Section 09130: Acoustical Ceiling Suspension Systems.
- E. Section 09510: Acoustical Ceilings.

1.03 QUALITY ASSURANCE

- A. Acoustical treatment system shall be installed by experienced workmen in strict accordance with manufacturer's recommendations.
- B. Systems shall be installed complete as required for a fully integrated final product.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Acoustical tile.
- B. Non-fire rated assembly.
- C. Fire rated assembly with gypsum board boxes over light fixtures.
- D. Perimeter trim.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 07213: Batt and Blanket Insulation.
- C. Section 09130: Acoustical Ceiling Suspension Systems.
- D. Section 15872: Air diffusion devices in ceiling system.
- E. Section 16510: Light fixtures in ceiling system.

1.03 REFERENCES

- A. FS HH-1-521 - Insulation Blankets, Thermal Mineral Fiber, for Ambient Temperatures.
- B. UL - Underwriter's Laboratories System Ratings.

1.04 SYSTEM DESCRIPTION

- A. Non-fire rated ceiling system to be complete with ceiling tile and hold down clips, and miscellaneous trim.
- B. Fire-Rated System: Conform to UL rating for one hour ceiling assembly.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture of ceiling tile panels with three years minimum experience.
- B. Installer: Company with three years minimum documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable building code for fire rated assembly and combustibility requirements for materials.

1.07 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Provide product data on acoustic units.
- C. Submit samples under provisions of Section 01340.
- D. Submit three complete samples of manufacturer's full color range of specified tile.
- E. Submit two samples 4 x 4 inch in size, illustrating material and finish of acoustic units.
- F. Submit manufacturer's installation instructions under provisions of Section 01340.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and humidity of 20 to 40 percent prior to, during, and after installation.

1.09 SEQUENCING/SCHEDULING

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Schedule installation of acoustic units after interior wet work is dry.

1.10 EXTRA STOCK

- A. Provide extra quantity of acoustic units under provisions of Section 01700.
- B. Provide one carton of extra tile panels to Owner.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS - ACOUSTIC UNITS**

- A. Armstrong.
- B. Celotex.
- C. USG Interiors, Inc.
- D. Substitutions: Under provisions of Section 01630.

2.04 ACOUSTIC UNIT MATERIALS (Information Given Per Armstrong Data)

- A. Acoustic Tiles Type I: Conforming to the following:
1. Size: 24 x 48 inches.
 2. Thickness: 3/4 inches.
 3. Composition: Mineral.
 4. Density: 1.20 lb./cu ft.
 5. Light Reflectance: NA.
 6. NRC Range: .55 to .65.
 7. STC Range: .35 to .39.
 8. Flame Spread Class: 25.
 9. Edge: Square.
 10. Type: Cortega.
 11. Surface Color: White.
 12. Surface Finish: Vinyl latex paint.
- B. Acoustic Panels Type II: Conforming to the following:
1. Size: 24 x 48 inches.
 2. Thickness: 3/4 inch.
 3. Composition: Mineral.
 4. Density: .70 lb./cu ft.
 5. Light Reflectance: 0.81.
 6. NRC Range: .50 to .60.
 7. STC Range: 30 to 34.
 8. Flame Spread Classification: 25 or under.
 9. Edge: Tegular.
 10. Type: #2765 Second Look I.
 11. Surface Finish: Vinyl latex paint.
- C. Acoustic Panels Type III: Conforming to the following:
1. Size: 24 x 24 inches.
 2. Thickness: 5/8 inches.
 3. Composition: Mineral.
 4. Density: .65 lb./cu ft.
 5. Light Reflectance: 80 percent.
 6. NRC Range: .55 to .65.
 7. STC Range: 35 to 39.
 8. Flame Spread Classification: 25.
 9. Edge: Tegular.
 10. Type: #593 Fine Fissured.
 11. Surface Color: White
 12. Surface Finish: Perforated Non-Directional fissured.

- D. Acoustic Panels Type IV: Conforming to the following:
1. Size: 24 x 48 inches.
 2. Thickness: 5/8 inches.
 3. Composition: Vinyl Faced fiberglass..
 4. Density: .40 lb./cu ft.
 5. Light Reflectance: 75 percent.
 6. NRC Range: .50 to .60.
 7. STC Range: less than 20.
 8. Flame Spread Classification: 25.
 9. Edge: Square.
 10. Type: Standard vinyl faced fiberglass.
 11. Surface Color: White
 12. Surface Finish: # 2909 Non-Perforated Random fissured.

2.05 ACCESSORIES

- A. Gypsum Board: UL fire rated type; 5/8 inch thick, ends and edges square, paper faced.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that existing conditions are ready to receive work.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install system in accordance with ASTM C636 manufacturer's instructions and as supplemented in this Section.
- B. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner, or support components independently.
- C. Do not eccentrically load system, or produce rotation of runners.
- D. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
- E. Lay units one way with pattern as shown on drawings. Fit border neatly against abutting surfaces.
- F. Install acoustic units level, in uniform plane, and free from twist, warp and dents.
- G. Install hold-down clips to retain panels tight to grid system within 20 ft of an exterior door.
- H. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with UL assembly requirements. This applies to corridor to manufacturing area only.
- I. When so specified install batt insulation with long edge of insulation perpendicular to long edge of ceiling tile.

3.03 TOLERANCES

- A. Variation from Flat and Level Surface: 1/8 inch in 10 ft.
- B. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

END OF SECTION

705

Section 09510-5

SECTION 09650
RESILIENT FLOORING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Labor, Material, Equipment and Supplies for installation of resilient tile flooring.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 09660 - Resilient Tile Flooring.

1.03 QUALITY ASSURANCE

- A. Installation shall be in strict accordance with manufacturer's recommendations.
- B. Installer shall visit the site not less than thirty (30) days prior to date of commencement to inspect sub-floor conditions. Flooring installer shall discuss with the contractor any floor deviations which he cannot correct to acceptable tolerances with sub-floor fillers. General Contractor shall correct any noted deficiencies Any and all deficiencies not noted for correction will become the responsibility of the flooring installer for correction.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 09655**RESILIENT STAIR TREADS AND LANDINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient (rubber) interior stair tread covers.
- B. Resilient (rubber) interior stair landing covers.

1.02 RELATED SECTIONS

- A. Section 09650: Resilient Flooring.

1.03 REFERENCES

- A. ASTM E84 - Surface Burning Characteristics of Building
- B. Materials.
- C. FS L-F-1641 - Floor Covering, Translucent or Transparent Vinyl Surface, with Backing.
- D. FS L-F-475 - Floor Covering, Vinyl Surface (Tile and Roll), with Backing.
- E. FS RR-T-650 - Treads, Metallic and Non-metallic, Non-skid.
- F. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/fuel/smoke rating requirements.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Provide product data in triplicate on specified products, describing physical characteristics, sizes, patterns and colors available.
- C. Submit samples under provisions of Section 01340.
- D. Submit two samples 12 x 12 inches in size, illustrating color and pattern for each floor material selected.
- E. Do not submit any product data, colors or materials colors which are, or will not be available.

F. Samples submitted to the Architect for color and texture selection will be considered as available materials. Subsequent re-submittal requiring additional selections will require monetary compensation for the Architect's time by the contractor.

G. Additional charges due to lack of submittals will be borne by the contractor.

H. Submit manufacturer's installation instructions under provisions of Section 01340.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit cleaning and maintenance data under provisions of Section 01730.

B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Store materials for three days prior to installation in area of installation to achieve temperature stability.

B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.08 EXTRA MATERIALS

A. Provide one box of floor tile and 10 lineal feet of base of each material specified under provisions of Section 01750.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. AFCO Rubber Corporation

B. ENDURA Flexco Company

C. BURKE Flooring Products

D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

A. Treads: Round Stud, Hi-profile, .130 inch thick, to width required.

B. Landings: 18 inch by 18 inch Domino pattern.

C. Adhesives: as recommended by manufacturer.

2.03 BASE MATERIALS

A. Base: Type I rubber; Rubber; 4 inch high; 1/8 inch thick; straight profile.

B. Base Accessories: Pre-molded end stops and external corners, of same material, size, and color as base.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft, and are ready to receive Work.
- B. Verify concrete substrates are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, or dusting.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.02 PREPARATION

- A. Remove substrate ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to leave a smooth, flat, hard surface.
- C. Prohibit traffic from area until filler is cured.
- D. Vacuum clean substrate.

3.03 INSTALLATION

- A. Install in accordance with manufacturers' instructions.
- B. Match thicknesses and edges of adjacent flooring materials. Provide any transition strips necessary.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place, press with heavy roller to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines.
- F. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
- G. Install edge strips at unprotected or exposed edges, and where flooring terminates.
- H. Scribe flooring to walls, stringers, and other appurtenances to produce tight joints.

3.04 INSTALLATION - BASE MATERIAL

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- B. Miter internal corners. At external corners, use pre-molded units. At exposed ends use pre-molded units.
- C. Install base on solid backing. Bond tight to wall and
- D. Scribe and fit to door frames and other interruptions.

3.05 PROTECTION

- A. Prohibit traffic on finish for 48 hours after installation.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean, seal, and wax floor and base surfaces in accordance with manufacturer's instructions.

END OF SECTION

RESILIENT TILE FLOORING**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Resilient base.

1.02 RELATED SECTIONS

- A. Section 09650: Resilient Flooring.

1.03 REFERENCES

- A. ASTM E84 - Surface Burning Characteristics of Building Materials.
- B. FS L-F-1641 - Floor Covering, Translucent or Transparent Vinyl Surface, with Backing.
- C. FS L-F-475 - Floor Covering, Vinyl Surface (Tile and Roll), with Backing.
- D. FS RR-T-650 - Treads, Metallic and Non-metallic, Non-skid.
- E. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, Vinyl Composition.
- F. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/ fuel/smoke rating requirements.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Provide product data in triplicate on specified products, describing physical characteristics, sizes, patterns and colors available.
- C. Submit samples under provisions of Section 01340.
- D. Submit two samples 12 x 12 inches in size, illustrating color and pattern for each floor material selected.
- E. Submit three complete color range samples of base material for color selection.
- F. Do not submit any product data, colors or materials which will not meet required delivery schedule, or colors which are, or will not be available.

- G. Samples submitted to the Architect for color and texture selection will be considered as available materials. Subsequent re-submittal requiring additional selections will require monetary compensation for the Architect's time by the contractor.
- H. Additional charges due to lack of submittals will be borne by the contractor.
- I. Submit manufacturer's installation instructions under provisions of Section 01340.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit cleaning and maintenance data under provisions of Section 01730.
- B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping,
- C. and re-waxing.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.08 EXTRA MATERIALS

- A. Provide one box of floor tile and 10 lineal feet of base of each material specified under provisions of Section 01750.

PART 2 PRODUCTS

2.01 MANUFACTURERS - TILE FLOORING

- A. Azrock
- B. GAF Corporation
- C. Armstrong
- D. Substitutions: Under provisions of Section 01630.

2.02 TILE FLOORING MATERIALS

- A. Vinyl Composition Tile: FS SS-T-312, Type IV, Composition 1; 12 x 12 inch size, 1/8 inch thick.
- B. Lobby 103 and Lobby 210 will have multicolor VCT in a pattern to be determined by the Architect. 3 Solid colors and 2 multicolors will be used.

2.03 ACCEPTABLE MANUFACTURERS - BASE MATERIALS

- A. Roppe Rubber Corporation.

- B. Burke Flooring Products.
- C. Johnsonite Flooring Products.
- D. Substitutions: Under provisions of Section 01630.

2.04 BASE MATERIALS

- A. Base: Type I rubber; Rubber; 4 inch high; 1/8 inch thick; top set coved.
- B. Base Accessories: Pre-molded end stops and external corners, of same material, size, and color as base.

2.05 ACCESSORIES

- A. Sub-floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Edge Strips: Flooring material.
- D. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft (3 mm in 3 m), and are ready to receive Work.
- B. Verify concrete floors are dry to a maximum moisture content of 5 percent, and exhibit negative alkalinity, carbonization, or dusting.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to leave a smooth, flat, hard surface.
- C. Prohibit traffic from area until filler is cured.
- D. Vacuum clean substrate.

3.03 INSTALLATION - TILE MATERIAL

- A. Install in accordance with manufacturers' instructions.
- B. Mix tile from container to ensure shade variations are consistent.
- C. Spread only enough adhesive to permit installation of materials before initial set.

- D. Set flooring in place, press with heavy roller to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile patterns.
- F. Install tile to square grid pattern with all joints aligned, with pattern grain alternating with adjacent unit to produce basket weave pattern. Allow minimum 1/2 full size tile width at room or area perimeter.
- G. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
- H. Install edge strips at unprotected or exposed edges, and where flooring terminates.
- I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - BASE MATERIAL

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- B. Miter internal corners. At external corners, use pre-molded units. At exposed ends use pre-molded units.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.05 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean, seal, and wax floor and base surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09680**CARPETING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Labor, Material, Equipment and Supplies for installation of carpet, adhesive, and carpet accessories.

1.02 RELATED WORK

- A. General Conditions 4 Division 01.
- B. Section 03347: Self-Leveling Underlayment.
- C. Section 09683: Carpet - Direct Glue.

1.03 QUALITY ASSURANCE

- A. Installation shall be in strict accordance with manufacturer's recommendations.
- B. Installer shall visit the site not less than thirty (30) days prior to date of installation commencement to inspect sub-floor conditions. Carpet installer shall discuss with the contractor any floor deviations which he cannot correct to acceptable tolerances with sub-floor fillers. General Contractor shall correct any noted deficiencies. Any and all deficiencies not noted for correction will become the responsibility of the carpet installer for correction.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 09683

CARPET-DIRECT GLUE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpeting glue down method.
- B. Rubber cove base.
- C. Termination strips.
- D. Accessories.

1.02 RELATED SECTIONS

- A. Section 03347: Self-Leveling Underlayment.
- B. Section 09680: Carpeting.

1.03 REFERENCES

- A. ANSI/ASTM E648 - Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
- B. ASTM E84 - Surface Burning Characteristics of Building Materials.
- C. FS DDD-C-95 - Carpets and Rugs, Wool, Nylon, Acrylic, Modacrylic.
- D. FS DDD-C-0095 - Carpet and Rugs, Wool, Nylon, Acrylic, Modacrylic, Polyester, Polypropylene.
- E. FS DDD-C-1559 - Carpet, Loop, Low Pile Height, High Density, Woven or Tufted with Attached Cushioning.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Indicate seaming plan, method of joining seams, direction of carpet, and transition strips.
- C. Provide product data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Submit samples under provisions of Section 01340. Provide three complete sets of manufacturers' color samples for Architect's selection.

- E. Do not submit any product data, colors or materials which will not meet required delivery schedule or colors which are, or will not be available.
- F. Samples submitted to the Architect for color and texture selection will be considered as available materials. Subsequent re-submittals requiring additional selections will require monetary compensation for the Architect's time by the Contractor.
- G. Additional charges due to lack of submittal product availability will be borne by the contractor.
- H. Submit two samples 24 x 24 inch in size illustrating color and pattern for each carpet material selected.
- I. Submit manufacturer's installation instructions under provisions of Section 01340.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01730.
- B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and shampooing.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in woven carpet with three years minimum experience.
- B. Installer: Company with three years minimum experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for carpet flammability requirements in accordance with ASTM E84.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F ambient temperature three days prior to, during, and 24 hours after installation of materials.

1.09 EXTRA MATERIALS

- A. Provide 72 sq. ft of carpeting of each color specified, under provisions of Section 01750.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mannington.
- B. Mohawk.

C. Stratton.

D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

A. Woven Carpet: Conforming to the following criteria: (Information given for DuPont Textureweave)

Yarn Construction	Enhanced Graphics Loop
Pile Fiber	100% DuPont Type 6, 6 BLF Nylon
Ply/Yarn Size	1245/2, 1235/2
Machine Gage/Inch	1/10"
Stitches per Inch	11.33
Primary Backing	Polypropylene
Secondary Backing	Jute
Tufted Yarn Weight	24 oz./yd.
Roll Width	12 ft.

2.03 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by carpet manufacturer.
- B. Primers and Adhesives: Waterproof; of types recommended by carpet manufacturer.
- C. Edge Strips and cap strip: Metal or approved vinyl Color as selected by Architect.

2.04 BASE TRIM: 4" Rubber Base

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft (3 mm in 3 m) and are ready to receive work.
- B. Verify concrete floors are dry to a maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to leave smooth, flat, hard surface.
- C. Prohibit traffic until filler is cured.
- D. Vacuum floor surface.

718

3.03 INSTALLATION

- A. Apply carpet and adhesive in accordance with manufacturers' instructions.
- B. Lay out rolls of carpet.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Double cut carpet, to allow intended seam and pattern match. Make cuts straight, true, and unfrayed. Edge seam carpet at public and high traffic areas.
- E. Locate seams in area of least traffic.
- F. Fit seams straight, not crowded or peaked, free of gaps.
- G. Lay carpet on floors with run of pile in same direction as anticipated traffic.
- H. Do not change run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.
- I. Cut and fit carpet around interruptions.
- J. Fit carpet tight to intersection with vertical surfaces without gaps.

3.04 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

3.05 PROTECTION

- A. Prohibit traffic from carpet areas for 24 hours after installation.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Exterior Painting Application.
- B. Interior Painting Application.
- C. Transparent Finish Application.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 09910: Exterior Painting.
- C. Section 09920: Interior Painting.
- D. Section 09930: Transparent Finish.
- E. Section 09950: Wall Coverings.
- F. Section 09952: Vinyl Wall Coverings.
- G. Section 09990: Adhesive.
- H. Section 15010: Mechanical General Provisions.
- I. Section 16010: Electrical General Provisions.

1.03 REFERENCES

- A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D2016 - Test Method for Moisture Content of Wood.

1.04 DEFINITIONS

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.05 QUALITY ASSURANCE

- A. All painting materials shall be applied in strict accordance with manufacturer's recommendations.
- B. No work shall be started until environmental conditions meet specified criteria.

- C. Beginning work indicates acceptance of substrate conditions.
- D. Failure to meet specified criteria will be cause for rejection of work.
- E. Applicator: Company specializing in commercial painting and finishing with 5 years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

1.07 TESTS

- A. Coatings shall meet or exceed the thickness stated in these Specifications Periodic wet or dry testing may be done by the Architect to check compliance.

1.08 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Provide product data on all finishing products.
- C. Submit samples under provisions of Section 01340.
- D. Submit in triplicate full color range for each product to be used, to Architect for color selections.
- E. Do not submit any product data, colors or materials which will not meet required delivery schedule, colors which are not, or will not be available.
- F. Samples submitted to the Architect for color and texture selection will be considered as available materials. Subsequent re-submittal requiring additional selections will require monetary compensation for the Architect's time, by the contractor.
- G. Additional charges due to lack of submitted product availability will be borne by the contractor.
- H. Submit manufacturer's application instructions under provisions of Section 01340.

1.09 FIELD SAMPLES

- A. Provide samples under provisions of Section 01340.
- B. Provide one field sample panel, 24 inches long by 24 inches wide, illustrating each coating color, texture, and finish.
- C. Locate where directed.
- D. Accepted sample may not remain as part of the Work.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.

- B. Store and protect products under provisions of Section 01620.
- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- E. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PAINT

- A. Sherwin Williams.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.02 ACCEPTABLE MANUFACTURERS - VARNISH AND URETHANE

- A. Sherwin Williams.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.03 ACCEPTABLE MANUFACTURERS - STAIN

- A. Sherwin Williams.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.04 ACCEPTABLE MANUFACTURERS - PRIMER-SEALERS

- A. Sherwin Williams.
- B. Benjamin Moore & Company.

- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.05 ACCEPTABLE MANUFACTURERS - BLOCK FILLER

- A. Sherwin Williams.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.06 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.07 FINISH THICKNESS REQUIREMENTS

- A. Parking Stripping: 9.0 Mils.
- B. Concrete Masonry/Concrete Filler: 10.0 Mils.
- C. Concrete Masonry/Concrete Finish: 1.5 Mils.
- D. Aluminum Primer: 3.0 Mils.
- E. Aluminum Finish: 2.0 Mils.
- F. Galvanized Metal Primer: 2.0 Mils
- G. Galvanized Metal Finish: 2.0 Mils
- H. Ferrous Metal (Unprimed) Primer: 3.0 Mils
- I. Ferrous Metal (Unprimed) Finish: 2.0 Mils
- J. Ferrous Metal (Shop Coated) Primer: 1.5 Mils
- K. Ferrous Metal (Shop Coated) Finish: 2.0 Mils
- L. Plywood Primer: 1.5 Mils
- M. Plywood Finish: 1.5 Mils

- N. Gypsum Board Primer: 1.1 Mils
- O. Gypsum Board Finish: 1.4 Mils (Minimum)
- P. Interior Masonry Primer: 2.0 Mils
- Q. Interior Masonry Finish: 1.5 Mils (Minimum)
- R. Interior Painted Wood Primer 7.0 Mils
- S. Interior Painted Wood Finish 1.5 Mils (Minimum)

Note: Referenced thickness' are per coat and/or application and are minimum requirements. Manufacturer's recommendations shall govern for final per coat thickness requirements if such requirements are in excess of these indicated herein.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Beginning of installation means acceptance of existing surfaces and substrate.

END OF SECTION

SECTION 09910

EXTERIOR PAINTING

VOL 0095 PAGE 725

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Surface preparation.
- B. Surface finish schedule.
- C. Color selection schedule.

1.02 RELATED WORK

- A. Section 09900: Painting.

1.03 REFERENCES

- A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D2016 - Test Method for Moisture Content of Wood.

1.04 DEFINITIONS

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.05 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years experience.
- B. Applicator: Company specializing in commercial painting and finishing with three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

1.07 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Submit samples under provisions of Section 01340.
- C. Submit manufacturer's application instructions under provisions of Section 01340.

- A. Provide samples under provisions of Section 01340.
- B. Provide field sample panel of each paint and color, illustrating coating color, texture, and finish.
- C. Accepted sample may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- E. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Minimum Application Temperatures : 45 degrees F (7 degrees C).
- B. Wind speed to be below 15 MPH.

1.11 EXTRA STOCK

- A. Provide a one gallon container of each color to Owner.
- B. Label each container with color, texture, locations, and mix number in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PAINT

- A. Sherwin Williams Company.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01600.

2.02 ACCEPTABLE MANUFACTURERS - PRIMER-SEALERS

- A. Sherwin Williams Company.

- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01600.

2.03 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.04 FINISHES

- A. Refer to schedule on drawings.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
- D. Masonry, Concrete, and Concrete Unit Masonry: 10 percent.
- E. Thinning of painting materials shall be done strictly in accordance with manufacturer's recommendations. Thinning of water based latex paints to extend coverage shall not be permitted under any circumstances.
- F. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Correct minor defects and clean surfaces which affect work of this Section.
- B. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

- C. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- D. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
- E. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- F. Concrete and Unit Masonry Surfaces Scheduled to Receive Transparent Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- G. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- H. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- I. Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.03 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.04 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.

3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to Section 15010 and Section 16010.
- B. Paint shop primed equipment.
- C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- D. Prime and paint exposed pipes, conduit, boxes, hangers, brackets, collars and supports, except where items are pre-finished.
- E. Replace identification markings on mechanical or electrical equipment when painted accidentally.
- F. Paint exposed conduit and electrical equipment.

3.06 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.07 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

- A. Metal Fabrications Section 05500.
- B. Metal Stairs: Exposed surfaces of stringers exposed vertical risers, exposed bottoms of threads.
- C. Metal Handrails.

3.08 SCHEDULE - EXTERIOR SURFACES

- A. Metal - Unprimed:
 - 1. One coat zinc chromate primer.
 - 2. Two coats enamel, all weather.
- B. Metal - Primed:
 - 1. Touch-up with original primer.
 - 2. Two coats enamel, all weather.
- C. Metal - Galvanized:
 - 1. One coat zinc chromate primer.
 - 2. Two coats enamel, all weather.
- D. Masonry and/or Concrete:
 - 1. One coat latex filler.
 - 2. Two coats latex flat.

- E. Traffic Stripes:
 - 1. Two coats.
 - 2. Traffic Marking Paint.

- F. Masonry Sealer
 - 1. Two Coats Primapel H2O or approved equal.

END OF SECTION

SECTION 09920

INTERIOR PAINTING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Surface preparation.
- B. Surface finish schedule.

1.02 RELATED WORK

- A. Section 09900 - Painting.

1.03 REFERENCES

- A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D2016 - Test Method for Moisture Content of Wood.

1.04 DEFINITIONS

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.05 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years experience.
- B. Applicator: Company specializing in commercial painting and finishing with three years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

1.07 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit samples under provisions of Section 01340.
- C. Submit manufacturer's application instructions under provisions of Section 01340.

1.08 FIELD SAMPLES

- A. Provide samples under provisions of Section 01340.

- B. Provide field sample panel of each paint and color, illustrating coating color, texture, and finish.
- C. Accepted sample may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- E. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F 7 degrees C for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; unless required otherwise by manufacturer's instructions.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.11 EXTRA STOCK

- A. Provide a one gallon container of each color to Owner.
- B. Label each container with color, texture, room locations, and mix number in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PAINT

- A. Sherwin Williams Company.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01600.

2.02 ACCEPTABLE MANUFACTURERS - PRIMER-SEALERS

- A. Sherwin Williams Company.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01600.

2.03 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.04 FINISHES

- A. Refer to schedule on drawings.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 10 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 10 percent.
- D. Thinning of painting materials shall be done strictly in accordance with manufacturer's recommendations. Thinning of water based latex paints to extend coverage shall not be permitted under any circumstances.
- E. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.

- B. Correct minor defects and clean surfaces which affect work of this Section.
- C. Shellac and seal marks which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
- G. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- H. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- I. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- J. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- K. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- L. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.03 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.04 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.

- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceeding coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Prime back surfaces of interior woodwork with primer paint.

3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment.
- B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- C. Replace identification markings on mechanical or electrical equipment when painted accidentally.
- D. Paint interior surfaces of air ducts, that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, and grilles to match face panels.
- E. Paint exposed conduit and electrical equipment occurring in finished areas.
- F. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- G. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.

3.06 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.07 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

- A. Metal Fabrications Section 05500.
- B. Metal Stairs: Exposed surfaces of stringers exposed vertical risers, exposed bottoms of threads.
- C. Handrails.

3.08 SCHEDULE - INTERIOR SURFACES

- A. Wood - Painted
 - 1. One coat prime sealer.
 - 2. Two coats oil based enamel, semi-gloss.
- B. Steel - Unprimed
 - 1. One coat zinc chromate primer.
 - 2. Two coats latex, semi- gloss.
- C. Steel - Primed
 - 1. Touch-up with original primer.
 - 2. Two coats latex, semi- gloss.
- D. Steel - Galvanized
 - E. One coat zinc chromate primer.
 - 1. Two coats latex, semi- gloss.
- E. Gypsum Board
 - 1. One coat alkyd primer sealer.
 - 2. Two coats latex enamel eggshell.

END OF SECTION

SECTION 09930

TRANSPARENT FINISH

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Surface preparation.

1.02 REFERENCES

- A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D2016 - Test Method for Moisture Content of Wood.

1.03 DEFINITIONS

- A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.04 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years experience.
- B. Applicator: Company specializing in commercial painting and finishing with three years experience.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit samples under provisions of Section 01340.
- C. Submit manufacturer's application instructions under provisions of Section 01340.

1.06 FIELD SAMPLES

- A. Provide samples under provisions of Section 01340.
- B. Provide 24" x 24" field sample panel of each stain and/or varnish illustrating coating color, texture and finish.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.

- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- D. Container labeling to include manufacturer's name, type of material, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- E. Store materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.
- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F 7 degrees C for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior, unless required otherwise by manufacturer's instructions.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.09 EXTRA STOCK

- A. Provide a one gallon container of each color to Owner.
- B. Label each container with color, texture, locations, and mix number in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - VARNISH AND URETHANE

- A. Sherwin Williams Company.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.02 ACCEPTABLE MANUFACTURERS - STAIN

- A. Sherwin Williams Company.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.03 ACCEPTABLE MANUFACTURERS - PRIMER-SEALERS

- A. Sherwin Williams Company.
- B. Benjamin Moore & Company.
- C. Glidden.
- D. Substitutions: Under provisions of Section 01630.

2.04 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.05 FINISHES

- A. Refer to schedule on drawings.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Interior Located Wood: 15 percent, measured in accordance with ASTM D2016.
- D. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
- B. Correct minor defects and clean surfaces which affect work of this Section.
- C. Seal marks which may bleed through surface finishes.

- D. Interior Wood Items Scheduled to Receive Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

3.03 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.04 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Sand wood surfaces prior to initial application to assure uniform smooth finish.
- D. Apply each coat to uniform finish.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- H. Prime back surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.05 CLEANING

- A. As Work proceeds, promptly remove paint materials where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.06 SCHEDULE - INTERIOR SURFACES

- A. Wood Stained:
 - 1. First coat: Stain
 - 2. Second coat: Sealer
 - 3. Third coat: Varnish, Satin Finish,

- B. Wood, Natural:
 - 1. First coat: Varnish.
 - 2. Second coat: Varnish

3.07 SCHEDULE - EXTERIOR SURFACES

- A. Concrete Masonry
 - 1. Two coats Transparent Sealer

END OF SECTION

741

Section 09930-5

SECTION 09950**WALL COVERINGS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Labor, Materials, Equipment and Supplies for installation of wall coverings.

1.02 RELATED WORK

- A. General Conditions and Division 01.
- B. Section 09952: Vinyl Wall Covering.
- C. Section 09990: Adhesives.

1.03 QUALITY ASSURANCE

- A. All work shall be performed in strict accordance with manufacturer's recommendations.
- B. No work shall be started until building environment meets specified temperatures, humidity, and lighting requirements.
- C. Work not performed to specified criteria will be rejected.

1.04 SUBMITTALS

- A. Submit product data as specified.
- B. Do not submit any product data, colors or materials which will not meet required delivery schedule, or colors which are, or will not be available.
- C. Samples submitted to the Architect for color and texture selection will be considered as available materials. Subsequent re-submittals requiring additional selections will require monetary compensation for the Architect's time by the contracts.
- D. Additional charges due to lack of submitted product availability will be borne by the contractor.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

743

Section 09950-2

VINYL WALL COVERINGS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Wall covering.

1.02 RELATED SECTIONS

- A. Section 09900 - Wall covering.
- B. Section 09990 - Adhesive.

1.03 REFERENCES

- A. ANSI/ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- B. FS CCC-W-408 - Wall Covering, Vinyl Coated.
- C. FS L-P-1040 - Plastic Sheets and Strips, Polyvinylfluoride.
- D. NFPA 255 - Test of Surface Burning Characteristics of Building Materials.
- E. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing commercial wall fabrics with 10 years documented experience.
- B. Applicator: Company specializing in installing wall fabrics with 5 years documented experience.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame/fuel/smoke ratings of 15/5/10 when tested to ANSI/ASTM E84.

1.06 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Provide product data on wall covering.
- C. Submit samples under provisions of Section 01340.
- D. Submit one set of 12" x 12" samples of wall covering, color, finish, and texture.

744

- E. Submit manufacturer's installation instructions under provisions of Section 01340.
- F. Submit manufacturer's certificate under provisions of Section 01405 that products meet or exceed specified requirements.
- G. Submit test reports verifying flame/fuel/smoke ratings, when tested by UL.

1.07 FIELD SAMPLES

- A. Provide a two panel field sample panel, full height, illustrating installed wall covering, and joint seaming technique.
- B. Locate where directed.
- C. Accepted sample may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Contractor shall inspect roll materials on site to verify acceptance.
- D. Do not store roll goods on end.
- E. Contractor shall order materials immediately upon receipt of approved color selection. Subsequent availability problems arising after this date will be borne by the subcontractor alone, and any additional costs associated will be the subcontractor.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 60 degrees F, unless required otherwise by manufacturer's instructions.
- B. Maintain temperature conditions 24 hours before, during, and after installation of adhesive and wall covering.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.

1.10 EXTRA STOCK

- A. Provide one roll of each color of wall covering under provisions of Section 01750.
- B. Package and label each roll by destination room number; store where directed.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Koroseal.

- B. Borden Guard.
- C. Genon.
- D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Wall Covering: Vinyl [coated fabric] roll stock, conforming to the following:
 - 1. Total Thickness .026 inches
 - 2. Total Weight 14 oz/sq. yd
 - 3. Vinyl Finish Weight 18 oz/lin. yd
 - 4. Roll Width 54 inches
 - 5. Pattern Genon Koroseal "Collage"
 - 6. Surface Texture Textile
- B. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
- C. Termination Trim: Extruded plastic of matching color as selected by Architect.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that substrate surfaces are ready to receive work, and conform to requirements of the wall covering manufacturer.
- B. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.
- C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Sand glossy surfaces. Shellac marks which may bleed.
- B. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

- A. Apply wall covering in accordance with manufacturer's instructions.
- B. Use wall covering in roll number sequence and/or in pattern sequence.
- C. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.
- D. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tight.
- E. Horizontal seams are not acceptable.

- F. Do not seam within 2 inches of internal corners or within 6 inches of external corners.
- G. Install wall covering before installation of bases, cabinets, hardware, or items attached to or spaced slightly from wall surface. Do not install wall covering more than 1/4 inch below top of resilient base or ceramic tile border.
- H. Cover spaces above and below windows, above doors, in pattern sequence from roll.
- I. Apply fabric covering to electrical, wall plates prior to replacing.
- J. Where wall covering tucks into door frame reveals, or metal wallboard or plaster stops, apply covering with contact adhesive within 6 inches of wall covering termination. Ensure full contact bond.
- K. Tuck wall covering into full depth of wall board control joints.
- L. Install termination trim where required.
- M. Remove excess wet adhesive from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Replace wall plates and accessories removed prior to work of this Section.

3.05 SCHEDULE

- A. Refer to finish schedule on drawings.

END OF SECTION

SECTION 09970

PREFINISHED PANELS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fiberglass reinforced plastic wall panels.

1.02 RELATED SECTIONS

- A. Section 09110: Non-Load Bearing Wall Framing Systems.
- B. Section 09250: Gypsum Wallboard.
- C. Section 09260: Gypsum Wallboard Systems.
- D. Section 09990: Adhesive.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit product data including material specifications characteristics, moldings, and instruction for installation.
- C. Submit in triplicate manufacturer's full line of color samples under provisions of Section 01340 for Architect selections.
- D. Provide one 24" x 24" sample of each selected color.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. NUDO Products, Inc.
- B. Dyrotech Industries, Inc.
- C. Substitutions: Under provisions of Section 01630.

2.02 MINIMUM CRITERIA

- A. Manufacturer must have not less than sixteen standard colors for selection.
- B. Product must be USDA and MID accepted.
- C. Product to be shatter resistant.

2.03 MATERIAL

- A. Wall panels to be 48" wide x 108" x 3/32" thick (minimum).
- B. Vinyl molding, in matching colors to include cap, division bar, inside corner, and outside corner trim.
- C. Fastening devices shall be as recommended by manufacturer.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts conditions of existing surfaces.

3.02 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean substrate.

3.03 INSTALLATION

- A. Install wall panels level and plumb.
- B. Perform installation in such a manner as to minimize joints.
- C. Cut panels tight to wall penetrations, pipes, sleeves. etc.

3.04 CLEANING

- A. Clean work under provisions of Section 01710.
- B. Clean wall panels per manufacturer's instructions.

END OF SECTION

SECTION 09990**ADHESIVES****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Surface preparation and prime painting.
- B. Adhesive application.

1.02 RELATED SECTIONS

- A. Section 09950 - Wall Covering.
- B. Section 09952 - Vinyl Wall Covering.

1.03 REFERENCES

- A. NFPA 255 - Test of Surface Burning Characteristics of Building Materials.
- B. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing commercial wall fabrics and adhesives with 10 years documented experience.
- B. Applicator: Company specializing in installing wall fabrics with 5 years documented experience.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Provide product data on adhesive.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.
- D. Submit manufacturer's certificate under provisions of Section 01405 that products meet or exceed specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Protect packaged adhesive from temperature cycling and cold temperatures.

750

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 60 degrees F unless required otherwise by manufacturer's instructions.
- B. Do not apply adhesive when substrate surface temperature or ambient temperature is below 60 degrees F or relative humidity is above 40 percent.
- C. Maintain these conditions 24 hours before, during, and after installation of adhesive.
- D. Provide lighting level of 80 ft candles measured mid height at substrate surfaces.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Goodrich Company.
- B. Genon.
- C. Approved equal.
- D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- B. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
- C. Substrate Primer and Sealer: Alkyd enamel.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering manufacturer.
- B. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.
- C. Beginning of installation means acceptance of existing surfaces.

3.02 PREPARATION

- A. Fill cracks and smooth irregularities with filler; sand smooth.

- B. Wash surfaces with tri-sodium phosphate, rinse and neutralize; wipe dry.
- C. Sand glossy surfaces. Shellac marks which may bleed.
- D. Remove electrical, telephone, and wall plates and covers.
- E. Vacuum clean surfaces free of loose particles.
- F. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth. Vacuum clean.

3.03 INSTALLATION

- A. Apply adhesive in accordance with manufacturer's instructions.
- B. Apply adhesive to wall surface immediately prior to application of wall covering. Let contact adhesive set tack free.
- C. Remove excess wet adhesive from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

END OF SECTION

SECTION 10162**METAL TOILET PARTITIONS AND URINAL SCREENS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Metal toilet compartments, head rail braced.
- B. Urinal screens, wall mounted with floor to ceiling tube brace.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 06100: Installation of concealed supports.

1.03 RELATED SECTIONS

- A. Section 10800 - Toilet and Bath Accessories.

1.04 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. ANSI/ASTM A424 - Steel Sheets for Porcelain Enameling.
- C. ANSI/ASTM A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
- D. ASTM A167 - Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- E. FS RR-P-1352 - Partitions, Toilet, Complete.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Indicate on shop drawings, partition plan and elevation views, dimensions, details of wall, floor and ceiling supports, and door swings.
- C. Provide product data on panel construction, hardware, and accessories.
- D. Submit three product data color charts for color selections.
- E. Submit manufacturer's installation instructions under provisions of Section 01340.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sanimetal.
- B. Global.
- C. Approved equal.
- D. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Sheet Steel: ANSI/ASTM A526, ANSI/ASTM A424, Type I, commercial quality.
- B. Head Rails: Hollow aluminum tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Attachments, Screws, and Bolts: Stainless steel; heavy duty extruded aluminum brackets.
- D. Hardware: Chrome plated non-ferrous cast pivot hinges, gravity type, adjustable for door close positioning; nylon bearings; thumb turn door latch; door strike and keeper with rubber bumper; cast alloy chrome plated coat hook and bumper.

2.03 FABRICATION

- A. Fabricate partitions in accordance with FS RR-P-1352.
- B. Fabricate components of steel sheet as follows:
- C. Panels 20 gage steel faces. 1" total panel thickness.
 - 1. Pilaster Faces: 20 gage steel faces.
 - 2. Doors: 22 gage steel faces. 1" total door thickness.
 - 3. Reinforcement: 12 gage.
 - 4. Doors and Panels: One inch thick sheet steel face, pressure bonded to sound deadening core.
- D. Pilasters: 1-1/4 inch thick, constructed same as doors, of sizes required to suit cubicle width and spacing.
- E. Pilaster Shoes: Formed ASTM A167 Type 304 stainless steel with No. 4 finish.
- F. Doors, Panels, and Pilasters: Form and close edges, miter and weld corners, grind smooth.
- G. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.

2.04 FACTORY FINISHING

- A. Clean, degrease, and neutralize panels.
- B. Follow with a phosphatizing treatment, prime coat and two finish coats baked enamel of colors as selected.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify correct spacing of plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing, where required.
- D. Beginning of installation means acceptance of existing surfaces.

3.02 LOCATION

- A. Provide metal partitions and urinal screens where shown on drawings.

3.03 INSTALLATION

- A. Install partitions secure, plumb, and level and in accordance with manufacturers' instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to bracket with through sleeve bolts and nuts. Locate headrail joints at pilaster center lines.
- E. Anchor urinal screen panels to walls with two panel brackets and vertical upright consisting of tubular headrail stock and sockets anchored to floor and ceiling.
- F. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.
- G. Equip each door with two hinges, one door latch, and one coat hook and bumper.
- H. Install door strike and keeper with door bumper on each pilaster in alignment with door latch.
- I. Adjust hinges to locate doors in partial opening position when unlatched. Return outswing doors to close position.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

3.05 CLEANING

- A. Remove protective maskings. Clean surfaces.
- B. Field touch-up of scratches or damaged enamel finish will not be permitted.
- C. Replace damaged or scratched materials and with new materials.

3.06 SCHEDULE

- A. Refer Drawings.

END OF SECTION

SECTION 10260

WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Labor, materials, equipment, and supplies for providing and installing specified corner guards.
- B. Attachment materials.

1.02 RELATED SECTIONS

- A. Section 06100: Wall reinforcement for concealed in-wall construction.
- B. Section 10800 - Toilet and Bath Accessories.

1.03 REFERENCES

- A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Submit product data for components, hardware, and accessories.
- C. Submit samples under provisions of Section 01340.
- D. Submit one 12 inch long sample of corner guard.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Boston Metal Products Corp.
- B. Approved equal.
- C. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. 16 gauge stainless steel: Type 304; rounded top corners (1/2 inch radius); brushed (satin) finish.
- B. Installation adhesive as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate is ready to receive work.
- B. Beginning of installation means installer accepts existing conditions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Remove all excess adhesive immediately after installation.
- C. Remove protective coating at time of Substantial Completion.

3.03 CLEANING

- A. Clean work under provisions of Section 01710.
- B. Remove protective coverings.
- C. Clean surfaces and hardware.

3.04 PROTECTION OF FINISHED WORK

- A. Field touch-up of finished surfaces will not be permitted. Replace damaged components.

3.05 SCHEDULES

- A. Refer drawings for required locations.

END OF SECTION

SECTION 10350**FLAGPOLES****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Aluminum flagpoles.
- B. Ground mount.
- C. Halyards, accessories, and flag.
- D. Crank operator.

1.02 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Furnish anchor devices [and foundation tube sleeve] to Section 03300 - Cast in Place Concrete for placement.

1.03 RELATED SECTIONS

- A. Section 03300 - Cast in Place Concrete.

1.04 REFERENCES

- A. AASHTO M-36 - Corrugated Metal Culvert Pipe.
- B. ANSI/ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- C. ANSI/ASTM A312 - Seamless and Welded Austenitic Stain-less Steel Pipe.
- D. ANSI/ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- E. ANSI/ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- F. ASTM B241 - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
- G. CDA (Copper Development Association).

1.05 SYSTEM DESCRIPTION

- A. Type: Ground type.
- B. Pole Design: Cone tapered.
- C. Nominal Height: 30 ft measured from ground.

759

- D. Halyard: External type.

1.06 PERFORMANCE

- A. Pole With Flag Flying: Resistant without permanent deformation, 80 miles/hr wind velocity, non-resonant, safety design factor of 2.5.
- B. Pole Without Flag: Resistant without permanent deformation, 50 miles/hr wind velocity, non-resonant, safety design factor of 2.5.

1.07 QUALITY ASSURANCE

- A. Design flagpole [foundation] [supports] under direct supervision of a Professional Structural Engineer experienced in design of this work, registered in the State of Texas.

1.08 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Indicate on shop drawings, detailed dimensions, attachment details, anchor requirements, and imposed loads.
- C. Provide product data on pole, accessories, and configurations.
- D. Submit manufacturer's installation instructions under provisions of Section 01340.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- D. Protect flagpole and accessories on site from damage or moisture.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. American Flagpole.
- B. Concord Industries, Inc.
- C. Edder Flag Manufacturing Company, Inc.
- D. Substitutions: Under provisions of Section 01630.

2.02 POLE MATERIALS

- A. Aluminum: ASTM B241;6063 alloy, T6 temper.

2.03 COMPONENTS AND ACCESSORIES

- A. Finial Ball: Stainless steel; 6 inch diameter.
- B. Truck Assembly: Cast bronze; stainless steel ball-bearings, non-fouling.
- C. Flag: State of Texas design, 36 x 60 inches size, Nylon fabric; United States design, 36" x 60", Nylon fabric.
- D. Cleats: 9 inch size, aluminum with steel fastenings, two per halyard.
- E. Cleat Box: Aluminum, with built-in hinge and hasp assembly, attached to pole with tamperproof screws inside box.
- F. Halyard: 3/8 inch nylon, braided.
- G. Hand Crank: Removable type.

2.04 MOUNTING COMPONENTS

- A. Foundation Tube Sleeve: AASHTO M-36, corrugated 16 gage steel, galvanized, depth as indicated.
- B. Pole Base Attachment: with base cover.
- C. Lightning Ground Rod: 12 inch long copper rod, 3/4 inch diameter.

2.05 POLE FABRICATION

- A. Outside Butt Diameter: 5 inches.
- B. Outside Tip Diameter: 3 inches.
- C. Nominal Thickness: .188 inches.

2.06 FINISHES

- A. Metal Surfaces in Contact With Concrete: Asphaltic paint.
- B. Concealed Steel Surfaces: Galvanized to 1.25 oz/sq. ft.
- C. Exposed to View Steel Surfaces: Galvanized to 2.0 oz/sq. ft.
- D. Aluminum: Mill finish.
- E. Stainless Steel: No. 4 satin finish.
- F. Finial: Gold anodized finish.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

3.03 INSTALLATION

- A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
- B. Electrically ground flagpole installation.
- C. Install foundation plate and centering wedges for flagpoles base set in concrete base and fasten. Fill foundation tube sleeve with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: One inch.

3.05 ADJUSTING AND CLEANING

- A. Clean surfaces.
- B. Adjust operating devices so that halyard [and flag] function smoothly.

3.06 SCHEDULE

- A. Provide 2 flagpoles as shown on drawings.

END OF SECTION

SECTION 10400**IDENTIFYING DEVICES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Labor, Material, Equipment and Supplier for installation of all identifying devices.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 10441- Plastic Signs.

1.03 QUALITY ASSURANCE

- A. All work shall be in a neat workmanlike manner. Completed installations shall be uniformly centered and level, at the same distance from finish floor.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 10410

DIRECTORIES AND BULLETIN BOARDS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide and install directory where shown on the drawings and described herein.

1.02 SUBMITTAL

- A. Submit shop drawings for Architect's approval prior to manufacture.

PART 2 PRODUCT

2.01 MANUFACTURER

- A. Poblocki and Sons; Milwaukee, Wisconsin
- B. Claridge Products, Inc.; Farmers Branch, Texas
- C. APCO USA; Atlanta, Georgia

2.02 MATERIALS

- A. Aluminum bronze framed glazed, locking building directory/bulletin board. Provide lettering as indicated on drawings. Directory to be felt, bulletin board to be cork.

PART 3 EXECUTION

3.01 MOUNTING

- A. Surface mount with concealed fasteners in the location specified by the Architect. The Architect will coordinate location with the installer.
- B. Mount level and square with the building.

3.02 CLEANING

- A. Wipe surface of plaque clean of any smudges, adhesive or fingerprints after mounting.

END OF SECTION

SECTION 10420**PLAQUES****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Provide and install plaque where shown on the drawings and described herein.

1.02 SUBMITTAL

- A. Submit plaque rubbing for Architect's approval prior to casting. Rubbing should be actual size showing letter spacing layout type and arrangement.

PART 2 PRODUCT**2.01 MANUFACTURER**

- A. The Southwell Company; San Antonio, Texas
- B. OMC Industries, Inc.; Bryan, Texas
- C. A.R.K. Ramos; Bryan, Texas

2.02 MATERIALS

- A. Building Plaque: Cast aluminum with sprayed medium gray acrylic lacquer background and natural aluminum finish. See drawings for dimensions, lettering and layout.
- B. Cast Bronze Seal: Sand cast bronze county seal. Stain face, painted and textured background. Seal will be installed in a recessed exterior insulated finish system.

PART 3 EXECUTION**3.01 CASTING**

- A. Tablet is to be cast of virgin ingots of F214 aluminum alloy free of pits and gas holes. Borders and letter faces shall be hand tooled, sharp and of the same style specified. Background is to be stipple texture.

3.02 MOUNTING

- A. Surface mount with concealed fasteners in the location specified by the Architect. The Architect will coordinate location with the installer. County seal fasteners will be installed through non-corrosive pipe sleeves. Refer Drawings.
- B. Mount level and square with the building.

3.03 CLEANING

- A. Plaque shall be chemically cleaned, etched, treated with alodine and sprayed with tow coats of clear acrylic lacquer prior to mounting.
- B. Wipe surface of plaque clean of any smudges, adhesive or fingerprints after mounting.

END OF SECTION

VOL 0095 PAGE 766

766

Section 10420-2

SECTION 10441**PLASTIC SIGNS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Engraved plastic signs.

1.02 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Submit shop drawings listing sign styles, lettering and locations, and overall dimensions of each engraved sign.
- C. Submit samples under provisions of Section 01340.
- D. Submit one sample illustrating full size sample sign, of type, style and color specified including method of attachment.
- E. Submit manufacturer's installation instructions under provisions of Section 01340.
- F. Include installation template and hardware.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Store and protect products under provisions of Section 01620.
- C. Package signs, labeled in name groups.
- D. Store adhesive tape at ambient room temperatures.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not install signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Allenite Signs.
- B. Approved equal.
- C. Substitutions: Under provisions of Section 01630.

- D. Engraved Signs: Laminated colored plastic; total thickness of 0.125 inch 3 inches high; beveled edges; lettering engraved through face material to expose core color. Characters formed to Helvetica style.
- E. Face Color: As selected by Architect from Manufacturer's standard color selections.
- F. Core Color: White.

2.02 LETTERING

- A. Size and Style: To meet ADA requirements.
- B. Colors: White

2.03 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts existing surfaces.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install signs after surfaces are finished, in locations as directed or scheduled.
- C. Center sign 60" above floor level.
- D. Clean and polish.

3.03 SCHEDULE

- A. 101 Tax Office
- B. 102 Health Department
- C. 103 Sheriff
- D. 104 Dare
- E. 105 Juvenile Services
- F. Stairs (x4)
- G. Counselor (x2)

- H. Social Services (x3)
- I. WIC (x3)
- J. Dietitian
- K. Environmental
- L. Lab (x2)
- M. WIC Lab
- N. Nursing
- O. Restroom (ADA Unisex x 4)
- P. Exam 1
- Q. Exam 2
- R. Exam 3
- S. Training
- T. Staff Restroom (Unisex - ADA)
- U. Men (x3)
- V. Women (x3)
- W. 201 Commissioners Office
- X. 202 Community Room (x2)
- Y. 203 Courtroom
- Z. 204 Justice of the Peace
- AA. 205 Constable
- BB. International Symbol of Access for Hearing Loss (x2)

END OF SECTION

SECTION 10520

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fire extinguishers.
- B. Cabinets.
- C. Accessories.

1.02 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry.
- B. Section 09900 - Painting.

1.03 REFERENCES

- A. NFPA 10 - Portable Fire Extinguishers.

1.04 QUALITY ASSURANCE

- A. Conform to NFPA 10 requirements for extinguishers.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Include physical dimensions, operational features, color and finish, wall mounting brackets with mounted measurements, anchorage details, rough-in measurements, location, and details.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's operation and maintenance data under provisions of Section 01730.
- B. Include test, refill or recharge schedules, procedures, and re-certification requirements, including requirements applicable to the Work.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperatures may cause freezing.

937 2000

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Industries.
- B. Larsens Manufacturing Company.
- C. Substitutions: Under provisions of Section 01600. 01630.

2.02 EXTINGUISHERS

- A. Extinguishers to be TYPE 3A, 40BC; "Cosmic 5X".

2.03 CABINETS

- A. Cabinet to be " Ambassador 1012F10 with ADAC Option"; Semi-recessed.

2.04 FABRICATION

- A. Form body of cabinet with tight inside corners and seams.
- B. Pre-drill holes for anchorage.
- C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.
- D. Hinge doors for 180 degree opening with two butt continuous piano hinge. Provide nylon roller type catch.
- E. Glaze doors with resilient channel gasket glazing.

2.05 FINISHES

- A. Extinguisher: Red enamel.
- B. Cabinet Trim and Door: Primed.
- C. Cabinet Interior: enamel.

PART 3 EXECUTION**3.01 INSPECTION**

- A. Verify blockings and openings for cabinets are correctly sized and located.
- B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install cabinets plumb and level with centerline of handle 54 inches from finished floor.
- B. Secure rigidly in place.

771

3.03 SCHEDULE

- A. Provide 20 total units. Locate as directed by local Fire Marshall.

END OF SECTION

SECTION 10800

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Labor, Material, Equipment and Supplies for installation of toilet and bath, shower, washroom accessories.
- B. Attachment hardware.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 06100: Installation of concealed anchor devices.
- B. Section 06100: Installation of backing plate reinforcement.

1.03 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 06100: In wall framing and plates for support of accessories.
- C. Section 10150: Compartments and Cubicles.
- D. Section 10162: Metal Toilet Partitions and Urinal Screens.

1.04 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable by Physically Handicapped People.
- B. ANSI/ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.
- C. ANSI/ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
- D. ANSI/ASTM A386 - Zinc Coating (Hot-Dip) on Assembled Steel Products.
- E. ANSI/ASTM B456 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
- F. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- G. ASTM A269 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Provide product data on accessories describing size, finish, details of function, attachment methods.
- C. Submit samples under provisions of Section 01340.
- D. Submit manufacturer's installation instructions under provisions of Section 01340.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installing work in conformance with ANSI A117.1.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Bobrick Washroom Equipment, Inc.
- B. American Specialties, Inc.
- C. Bradley Corporation.
- D. Note - Refer 3.04 Schedule. All parts scheduled are Bobrick Manufacturer's numbers.
- E. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Sheet Steel: ANSI/ASTM A366.
- B. Stainless Steel Sheet: ASTM A167, Type 304.
- C. Tubing: ASTM A269, stainless steel.
- D. Adhesive: Two component epoxy type waterproof.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized.
- F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FABRICATION

- A. Weld and grind smooth joints of fabricated components.

- B. Form exposed surfaces from single sheet of stock, free of joints.
- C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with anchors and fittings.
- F. Provide steel anchor plates, adapters, and anchor components for installation.
- G. Hot dip galvanize exposed and painted ferrous metal and fastening devices.

2.04 FACTORY FINISHING

- A. Shop Primed Ferrous Metals: Pre-treat and clean, spray apply one coat primer and bake.
- B. Enamel: Pre-treat to clean condition, apply one coat primer and minimum two coats electrostatic baked enamel.
- C. Chrome/Nickel Plating: ANSI/ASTM B456, polished finish.
- D. Stainless Steel: No. 4 satin luster finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- B. Provide templates and rough-in measurements as required.
- C. Verify exact location of accessories for installation.

3.03 INSTALLATION

- A. Install fixtures, accessories and items in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.

3.04 SCHEDULE

- A. Mop Holders: One at each mop sink - No. B-224 X36.
- B. Paper Holders: One at each toilet room - No. B-4288.

- C. Paper Towel Dispensers - One per each wall mounted lavatory and counter mounted sink - No. B-262.
- D. Soap Dispensers - One at each counter top lavatory - No. B-822 with No. 8295-11 spacer.
- E. Handicapped Grab Bar - Provide twelve sets - set includes one each. No. B - 6206 series 42 inches long and 36 inches long.
- F. Soap Dispensers - One at each wall hung lavatories - No. B-4112.
- G. Feminine Napkin Disposal Units - Provide eleven - No. B-270.
- H. Paper towel dispensers - provide one at each main restroom group - No. B43944.
- I. Specimen pass through, provide one; No. B505
- J. Diaper Changing Station - Diaper Depot - No. 430 - by Safe Strap Co., Inc. Color as selected by Architect.
- K. Framed Mirrors: No. B-165, 2436.

END OF SECTION

SECTION 11130B

AUDIO VISUAL EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide and install electrically operated projection screen.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 06200 - Finish Carpentry.
- C. Section 09510 - Suspended Acoustical Ceilings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Brettford Screen Company, Inc., nominal size 8' wide, 8' long, "Series 700", 120 volt, 1.3 amp, 3 position switch.
- B. Substitutions: Under provisions of Section 01630.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that surrounding conditions and adjacent construction affecting work to be done under this section and in satisfactory condition.
- B. Verify that all necessary electrical supply and connections are as required.
- C. Beginning installation indicated acceptance of existing conditions.

3.02 INSTALLATION

- A. Install product in accordance with manufacturer's instructions
- B. Set unit parallel to wall, flush with ceiling, level and plumb.
- C. After installation, confirm that unit operates according to manufacturer's design.

777

3.03 PROTECTION

- A. Protect completed installation from damage until final acceptance.

END OF SECTION

VOL 0095 PAGE 778

778

Section 11130B-2

SECTION 11450(A)

RESIDENTIAL EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Installation of residential kitchen equipment provided by the Owner.
- B. Installation including connections to utilities.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 06050: Fasteners and Supports.
- C. Section 06100: Rough Carpentry.
- D. Section 06400: Architectural Woodwork.
- E. Section 07900: Sealants.
- F. Section 11451: Kitchen Equipment.
- G. Section 15010: Mechanical General Provisions.
- H. Section 16010: Electrical Systems General Provisions.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 12512
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Operating hardware.

1.02 RELATED SECTIONS

- A. Section 06114 - Wood Blocking and Curbing.

1.03 REFERENCES

- A. FS AA-V-00200 - Venetian Blinds.

1.04 SYSTEM DESCRIPTION

- A. Horizontal metal slat louver blinds installed at window openings, manual control of raising and lowering by cord; blade angle adjustable by control wand.

1.05 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Submit shop drawings indicating opening sizes, tolerances required, installation of blind at window opening, method of attachment, clearances, and operation.
- C. Submit product data under provisions of Section 01340.
- D. Submit product data indicating physical and dimensional characteristics, and operating features.
- E. Submit samples under provisions of Section 01340.
- F. Submit two samples 12 inches long illustrating slat materials and finish, color, cord, rod, and color.
- G. Submit manufacturer's installation instructions under provisions of Section 01340.

1.06 QUALITY ASSURANCE

- A. Venetian Blinds: FS AA-V-00200.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01610.
- B. Deliver blinds wrapped and crated in a manner to prevent damage to components or marring of surfaces.
- C. Store and protect products under provisions of Section 01620.
- D. Store in a clean, dry area, laid flat and blocked off ground to prevent sagging, twisting, or warping.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Levolour; Model: Riviera.
- B. Bali/Gilaber; Model: Bali Micro.
- C. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Louver Slats: 1-3/8 inch wide; 0.011 inch thick spring tempered pre-finished aluminum horizontal slats, with manufacturing burrs removed; radiused slat corners.
- B. Slat Support: Woven polypropylene, ladder configuration.
- C. Head Rail Housing: Pre-finished, formed aluminum box, internally fitted with hardware, pulleys and bearings for blind operation.
- D. Cord: Braided nylon.
- E. Control Wand: Extruded hollow plastic.
- F. Head Support Bracket: Housing attachment.
- G. Accessory Hardware: Type recommended by blind manufacturer.

2.03 FACTORY FINISHING

- A. Color as selected from manufacturers standards.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces and openings are ready to receive the work.
- B. Do not commence fabrication until field measurements are confirmed.
- C. Ensure structural supports are correctly placed.

- D. Beginning of installation means installer accepts existing surfaces.

3.02 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with concealed fasteners.

3.03 TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01660.
- B. Adjust blinds for smooth operation.

3.05 CLEANING

- A. Clean work under provisions of 01710.

3.06 SCHEDULE

- A. Provide for all windows except vestibule and stairs.

END OF SECTION

SECTION 14202**ELEVATORS****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. All necessary labor, materials, equipment, and supplies necessary for the complete installation of specified elevator systems.

1.02 RELATED SECTIONS

- A. General Conditions and Division 01.
- B. Section 01500 - Construction Facilities and Temporary Controls - Temporary Electricity: Temporary power supply and temporary elevator service.
- C. Section 02220 - Backfilling at cylinder well casing and hydraulic lines between plunger and remote machine room.
- D. Section 03300 - Concrete for elevator machine foundation.
- E. Section 09260 - Gypsum shaft walls.
- F. Section 09683 - Carpet for elevator cab.
- G. Section 16200 - Electrical service to main disconnect in elevator machine room including emergency power transfer cabinet.
- H. Section 16400 - Electrical service and lighting for machine room machine room convenience outlets including electrical power for elevator installation and testing.

1.03 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- B. ANSI/ASME A17.1 - Safety Code for Elevators and Escalators.
- C. ANSI/ASTM A366 - Steel Sheet, Carbon, Cold-Rolled Commercial Quality.
- D. ANSI/ASTM A446 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- E. ANSI/ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- F. ANSI/AWS D1.1 - Structural Welding Code, Steel.

- G. ANSI/IEEE C2 - National Electrical Safety Code.
- H. ANSI/NFPA 80 - Fire Doors and Windows.
- I. ANSI/UL 10B - Fire Tests of Door Assemblies.
- J. APA - American Plywood Association.
- K. ASTM A36 - Structural Steel.
- L. ASTM A139 - Electric-Fusion (Arc)-Welded Steel Pipe (Sizes 4 in. and Over).
- M. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- N. NEMA LD-3 - High Pressure Decorative Laminates.
- O. FS TT-P-641 - Primer Coating, Zinc Dust / Zinc Oxide (for Galvanized Surfaces).
- P. FS TT-P-645 - Primer, Paint, Zinc Chromate, Alkyd Type.
- Q. The Americans with Disabilities Act.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing elevator equipment with ten years minimum documented experience.
- B. Installer: Employees and supervisor on payroll of elevator equipment manufacturer, with locally based (Greater Austin, Texas area) service office.
- C. Conform to ANSI/ASME A17.1 and ANSI/IEEE C1 and as supplemented in this or supplemental Sections.
- D. Door and Frame Assemblies: ANSI/NFPA 80 and ANSI/UL 10B.
- E. Perform welding in accordance with ANSI/AWS D1.1.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable building code for manufacture and installation of elevator system.
- B. Conform to ANSI A117.1 and the Americans with Disabilities Act for provisions for the physically handicapped.

1.06 TESTS

- A. Provide inspection and testing of each elevator system under provisions of Section 01650.
- B. Obtain required permits to perform tests.
- C. Perform tests required by regulatory agencies.

- D. Schedule tests with authority having jurisdiction and require Architect, Owner, and Contractor presence.

1.07 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.

1.08 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01730.

1.09 WARRANTY

- A. Provide two year manufacturer's warranty under provisions of Section 01740.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 14212**HYDRAULIC ELEVATORS - PASSENGER****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. Furnish and install operating elevator system with hydraulic cylinder in buried casing.
- B. One (1) single car DMC-I, Group - DMC-I operation.
- C. Motor and pump, controllers, hoistway accessories, equipment and fittings.

1.02 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls
- B. Section 14200 - Elevators

1.03 SYSTEM DESCRIPTION

- A. This Section includes one elevator system; hydraulic type; buried cylinder and casing.
- B. Characteristics:
 - 1. Rated Net Capacity 2,100 lb.
 - 2. Rated Speed 100 ft/min
 - 3. Travel Distance (nominal) 14 ft.-7in.
 - 4. No. of Stops 2
 - 5. No. of Openings 2 front
 - 6. Nominal Platform Size 72 x 61 inches
 - 7. Hoistway and Cab Entrance
Frame Opening Sizes 36 x 84 inches
 - 8. Door Type Single leaf
 - 9. Door Operation D.C.
 - 10. Hoistway Doors and Frames: Provide baked enamel standard off set bolted construction at all floors.
- C. Program doors to open automatically when car arrives at floor.
- D. Include door protective devices consisting of movable, retractable safety edges, noiseless in operation and proximity detector device.
- E. Program door operating sequence to minimize car and hall door open and close times. Provide independently adjustable door open times.
- F. Program controls to minimize delays and the return of car to service, should doors be prevented from closing for a predetermined time.

- G. If doors are prevented from closing for approximately ten seconds because of an activated obstruction safety device, automatically disconnect door control device, allow doors to close more slowly, and recycle until obstruction is cleared. Sound alarm.

1.04 TWO-STOP AUTOMATIC OPERATION

- A. Arrange operation so that momentary pressure of car button for opposite terminal dispatches car to that terminal.
- B. Allow call registered by momentary pressure of hall button at any time, to remain registered until car stops in response to that call at that landing.

1.05 SYSTEM POWER REQUIREMENTS

- A. Elevator Motor and Pump Unit Power: 208V, 3 Phase, 30 HP.
- B. Battery Return: Automatic lowering of cab to ground floor in event of fire.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing elevator equipment with ten years minimum documented experience.
- B. Installer: Employees and supervisor on payroll of elevator equipment manufacturer.
- C. Conform to ANSI/ASME A17.1 and ANSI/IEEE C1 and as supplemented in this Section.
- D. Door and Frame Assemblies: ANSI/NFPA 80 and ANSI/UL 10B.
- E. Perform welding in accordance with ANSI/AWS D1.1.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable building code for manufacture and installation of elevator system.
- B. Conform to ANSI A117.1 for provisions for the physically handicapped, as well as the Americans with Disability Act.

1.08 TESTS

- A. Provide inspection and testing of each elevator system under provisions of Section 01410.
- B. Obtain required permits to perform tests.
- C. Perform tests required by regulatory agencies.
- D. Schedule tests with authority having jurisdiction and require Architect, Owner, and Contractor presence.

1.09 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.

- B. Indicate the following minimum information on shop drawings:
1. Motor and hydraulic pump, valves, controller, motor generator, selector, governor, and other component locations.
 2. Car, guide rails, buffers, and other components in hoistway.
 3. Rail bracket spacing and maximum loads on guide rails.
 4. Reactions at points of support.
 5. Weights of principal components.
 6. Top and bottom clearance and over travel of car and counterweight.
 7. Location of circuit breaker, switchboard panel or disconnect switch, light switch, and feeder extension points in machine room.
 8. Locations in hoistway and machine room of traveling cables and connections for car light and telephone.
 9. Location and size of trap doors and access doors.
 10. Loads on hoisting beams.
 11. Expected heat dissipation of elevator equipment in machine room.
 12. Elevator control functions and operational description.
- C. Provide product data on the following items:
1. Signal and operating fixtures, operating panels, indicators.
 2. Cab design and components.
 3. Door and frame details.
 4. Electronic equipment to control and monitor elevator control functions.
- D. Submit samples under provisions of Section 01340.
- E. Submit two samples 24 x 24 inch in size illustrating floor material, cab interior, cab ceiling, cab door, hoistway entrance door and frame finishes.

1.10 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01730.
- B. Include description of elevator system's method of operation and control including motor and pump unit, door operation, signals, and special or non-standard features provided.
- C. Provide parts catalogs with complete list of equipment replacement parts with equipment description and identifying numbers.
- D. Provide legible schematic of hydraulic piping and wiring diagrams covering electrical equipment installed, including changes made in final work, with symbols listed corresponding to identity or markings on both machine room and hoistway apparatus.
- E. Provide one copy of master electric and hydraulic schematic, behind plastic or glass glazing, in metal frame, mounted on machine room wall.
- F. Provide one copy of lubrication chart, behind plastic or glass glazing, in metal frame, mounted on machine room wall.

1.11 WARRANTY

- A. Provide one year manufacturer's warranty under provisions of Section 01740.
- B. Warranty: Include coverage of elevator system controller, operating equipment and devices.

1.12 MAINTENANCE SERVICE

- A. Furnish complete service and maintenance of elevator system and components during the Construction Contract including the time of temporary use and warranty period.
- B. Examine monthly; clean, adjust, and lubricate all equipment.
- C. Maintain hydraulic fluid levels. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment.
- D. Perform work without removing cars from service during peak traffic periods.
- E. Provide emergency call back service at all hours during working hours for this maintenance period.
- F. Maintain locally, an adequate stock of parts for replacement or emergency purposes, and have qualified installation personnel available to ensure the fulfillment of this maintenance service without unreasonable loss of time or use of equipment.
- G. Perform maintenance work using competent personnel, under the supervision and in the direct employ of the elevator manufacturer.
- H. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. DOVER ELEVATOR SYSTEMS, INC.; Model Fleetwood - 21H with single front door.
- B. Substitutions: Under provisions of Section 01630.

2.02 MATERIALS

- A. Rolled Steel Sections, Shapes, Rods: ASTM A36.
- B. Casing: ASTM A139, Grade A-36 steel.
- C. Sheet Steel: ANSI/ASTM A366; Class 1 2, with matte commercial bright luster finish.
- D. Stainless Steel: ASTM A167;
- E. Aluminum: ANSI/ASTM B221;
- F. Plastic Laminate: Wilson Art or equal; color/pattern as selected by Architect from manufacturer's standard.
- G. Primer for Galvanized Surfaces: FS TT-P-641.
- H. Primer for Plain Steel Surfaces: FS TT-P-645.

- I. Steel ladder for access to pit.

2.03 EQUIPMENT

- A. Motors, Pumps, Valves, Regulators, Fluid Tank, Hydraulic Fluid, Controller, Controls, Buttons, Wiring and Devices, Indicators: UL approved.
- B. Spring Buffers, Attachment brackets and Anchors: Purpose designed, sized according to code with safety factors.
- C. Pump Housing: Sheet steel, acoustically insulated, removable.

2.04 ELECTRICAL COMPONENTS

- A. Fittings: Steel compression type for electrical metallic tubing. Fittings with set screws are acceptable only when a separate grounding conductor is also installed across the joint.
- B. Spare Conductors: Include 10 percent extra conductors and two pairs of shielded audio cables in traveling cables.
- C. Do not use armored flexible metal conduit as grounding conductor.
- D. Provide additional disconnect switches and wiring to suit machine room layout.
- E. Include wiring and connections to elevator devices remote from hoistway and between elevator machine rooms.
- F. Include wiring and connections to emergency telephone.

2.05 LUBRICATION

- A. Grease Fittings: For lubricating bearings requiring periodic lubrication.
- B. Grease Cups: Automatic feed compression type.
- C. Lubrication Points: Visible and easily accessible.

2.06 CAR FABRICATION

- A. Frame: Rigid rolled steel sections, braced; mounted on resilient isolators.
- B. Enclosure: Sheet steel panels attached to steel frame; sheet plywood inner liner.

2.07 CAB FABRICATION

- A. Cab Design: Fleetwood 21H.
- B. Flooring: By General Contractor.
- C. Walls: Vertical applied panels DAP.
- D. Ceiling: Stainless steel down light (24).
- E. Light Fixtures and ventilation Fan: Integral with ceiling.

790

- F. Control Panel and Face Plate: Stainless steel with illuminating call buttons.
- G. Indicator Panel: Above control panel with illuminating position indicators.
- H. Bumper Rail: Round 1 1/2" stainless steel; spaced from walls.
- I. Pad Hooks: Stainless steel type, mounted near top of side and rear walls.
- J. Cab Doors: Stainless steel.
- K. Cab Door Frames: Stainless steel; 16 gage metal, of rolled profiles, smooth invisible joints.
- L. Thresholds: Extruded aluminum type.
- M. Pads: Provide furniture pads.

2.08 FINISHES

- A. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.
- B. Machine Room Components: Clean and degrease; one coat primer; and, one coat two coats enamel.
- C. Galvanized Surfaces: Clean with neutralizing solvent; prime one coat.
- D. Wood Surfaces Not Exposed to Public View: One coat primer; and, one coat two coats enamel.
- E. Baked Enamel on Steel: Clean and degrease metal surface; apply one coat of zinc oxide primer sprayed and baked; two coats of semi-gloss enamel sprayed and baked; color as selected by Architect.

2.09 CAB OPERATING PANELS

- A. Provide one flush mounted operating panel panels per car; faceplate integral with front return panels containing illuminated call buttons corresponding to floors served, emergency stop switch, alarm button and DOOR OPEN DOOR CLOSE buttons; key operated light switch.
- B. Position emergency stop switch and alarm button where they are unlikely to be accidentally actuated and not more than 35 inches above car floor.
- C. Locate a 110 V, 15 A receptacle below service cabinet.
- D. Provide ADA approved telephone vertical hall lanterns at each floor.

2.10 HALL CONTROLS

- A. Hall Buttons: Stainless steel Illuminating type, one for originating up and one for originating down calls; marked with arrows and Braille indications.

- B. Hall Position Indicators: Illuminating up and down arrows.

2.11 DESIGN FOR HANDICAPPED

- A. Comply with ANSI A117.1. and the Americans with Disabilities Act.
- B. Locate uppermost button in elevator cab control panel and center-line of telephone handset, not more than 54 inches above floor level.
- C. Sound audible soft-tone signal in car when car is stopping or stopped at a floor.
- D. Where hall indicators with gongs are provided, sound gongs once for up stops and twice for down stops.
- E. In each cab provide Arabic numerals 5/8 inch in height raised 0.03 inch Braille numerals immediately to left of floor buttons to identify floor.
- F. At each floor landing provide 2 inch floor numerals raised 0.03 inch on and adjacent to hall call buttons.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that hoistway, pit, and machine room are ready for work of this Section.
- B. Verify shaft and openings are of correct size and within tolerances.
- C. Verify location and size of machine foundation and position of machine foundation bolts.
- D. Confirm electrical power is available and of correct characteristics.
- E. Report defects or deficiencies in writing.
- F. Beginning of installation means acceptance of conditions.

3.02 PREPARATION

- A. Arrange for temporary electrical power to be available for installation work and testing of elevator components.

3.03 EXCAVATION AND BACKFILLING FOR CASING

- A. Excavation: Refer to Section 02220.
- B. Excavate for plunger casing and hydraulic lines between plunger and remote machine room in accordance with Section 02220. Remove subsoil from site. Maintain shaft alignment of one inch from plumb. Fill over excavated shaft depth with lean concrete.
- C. Maintain shaft excavation free of water.
- D. Place plunger casing full depth of shaft. Align to 1/4 inch from plumb. Cut top of casing at hoistway pit slab elevation.

- E. Backfilling: Refer to Section 02220.
- F. Backfill around plunger and hydraulic lines between plunger and remote machine room casing with select type fill; placed in 24 inches lifts compacted to recommended density.
- G. PVC Schedule 40 required for casing jack hole.

3.04 INSTALLATION

- A. Install in accordance with ANSI/ASME A17.1.
- B. Install hoistway and machine room components. Connect equipment to building utilities. Install piping between hoistway plunger and pump unit.
- C. Maintain shaft excavation free of water.
- D. Mount motor and pump unit on vibration and acoustic isolators, on bed plate, and concrete pad. Place units on structural supports and bearing plates. Securely fasten to building supports. Prevent lateral displacement.
- E. Arrange equipment in machine room so functioning equipment and other equipment can be removed for repairs or replaced without dismantling or removing other equipment components. Arrange equipment for clear passage to access door. Accommodate equipment in space indicated.
- F. Install Omega guide rails. Compensate for expansion and contraction movement of guide rails.
- G. Bolt or weld brackets directly to structural steel hoistway framing.
- H. Bolt brackets to inserts placed in concrete form work self drilling expansion shell anchors that will perform to four times the rated pull-out load.
- I. Field Welds: Chip and clean away oxidation and residue; wire brush weld; prime two coats.
- J. Coordinate installation of hoistway wall construction.
- K. Install hoistway door sills, frames and headers in hoistway walls. Grout sills in place. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
- L. Adjust equipment for smooth and quiet operation.

3.05 TOLERANCES

- A. Guide Rail Alignment: Plumb and parallel to each other within 1/8 inch in accordance with ANSI/ASME A17.1.
- B. Cab Movement on Aligned Guide Rails: Smooth movement, with no perceptible lateral or oscillating movement or vibration.

3.06 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.

- B. Perform and meet tests required by ANSI/ASME A17.1.
- C. Supply instruments and execute specific tests.
- D. Furnish test and approval certificates issued by jurisdictional authorities.
- E. Provide two weeks written notice of date and time of tests.

3.07 CLEANING

- A. Remove protective coverings from finished surfaces.
- B. Clean surfaces and components ready for inspection.

3.08 ADJUSTING

- A. Adjust for smooth acceleration and deceleration of car provide passenger comfort.
- B. Adjust doors to open only at the landing where the car is stopping leveling or at rest. The opening sequence may begin only when the car is at rest. The car must be at rest substantially level with the landing before the hoistway door is fully open.
- C. Adjust automatic floor leveling feature at each floor to achieve 1/4 inch maximum variation from flush.

3.09 PROTECTION

- A. Protect finished installation under provisions of Section 01620.

END OF SECTION

SECTION 15010
BASIC MECHANICAL REQUIREMENTS**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Basic Mechanical Requirements specifically applicable to Division 15 Sections, in addition to Division 1 - General Conditions.

1.02 GENERAL CONDITIONS

- A. All requirements incorporated under this section shall comply with General Conditions of the Contract for Construction, AIA Document A201, latest form and amendments including any Supplementary General Condition and Provisions.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. All other sections of Division 15.
- B. All other divisions of the contract documents. Refer to each division's specifications and drawings for all requirements.

1.04 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted alternates will be identified in Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work as required.

1.05 REFERENCES

- A. AIEE - American Institute of Electrical Engineers
- B. AMCA - Air Moving and Conditioning Association
- C. ASA - American Standard Association
- D. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers
- E. ASME - American Society of Mechanical Engineers
- F. ASTM - American Society of Testing Materials
- G. AWWA - American Water Works Association
- H. CS - Commercial Standards
- I. NEC - National Electrical Code
- J. NEMA - National Electrical Manufacturers' Association
- K. NFPA - National Fire Protection Association
- L. UL - Underwriters' Laboratories
- M. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
- N. SBC - Standard Building Code

1.06 SUBMITTALS AND SHOP DRAWINGS

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

- A. Submit under provisions of Division 01 and Division 15. If conflict exists between Division 01 and 15 adhere to the more stringent of the two. If a contradiction occurs follow Division 01.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Contractor shall, within 21 calendar days after issuance of work order, submit to Architect and Engineer, eight (8) brochures of equipment and materials to be furnished. Non-fabricated items such as wire, insulation, etc., will be listed with manufacturer and type, correlating information submitted to particular items designated on drawings or in specifications. Each set of submittal shall be initialed by contractor to indicate his knowledge of contents and as certification that he has checked it in detail for compliance with contract documents.
- D. Brochures shall be specific and complete in detail with dimensional drawings on items of equipment as listed in each section of specifications. Specific items that are being submitted on shall be clearly defined with pertinent data underlined in ink or highlighted on all copies. Information shall be initialed by contractor to indicate his knowledge of contents and as certification that he has checked it in detail for compliance with correct documents. Information shall be presented so a line-by-line comparison may be made with drawings and specifications. Deviations from drawings and specifications shall be enumerated. Data of a general nature will not be acceptable.
- E. Submittals shall be compiled from official manufacturer's brochures with all information necessary to prove equipment submitted is equal to or greater than that specified. Typed form letter altering equipment published values will not be accepted unless accompanied with test results from an independent lab.
- F. Shop drawings shall be submitted whenever materials and equipment proposed varies in physical size and arrangement from that shown on the drawings, thus causing re-arrangement of equipment space; where tight spaces require extreme coordination between ductwork, piping, and other equipment, and where specifically requested by Architect, shop drawings shall be made at no additional charge to Owner. Required shop drawings, except as hereinafter specified, shall be prepared by contractor at a scale no smaller than 1/4 inch = 1 foot. Submit one each blueline print and reproducible sepia of each shop drawing for approval.
- G. Submit shop drawings in sufficient time so no delay or changes in construction are necessitated due to lack of information. Contractor's failure to comply with this shall render him liable for expense of all delays occasioned by failure on his part to provide the necessary information and/or drawings. The Architect and Engineer reserve the right to go directly to manufacturer to secure details deemed necessary, charging the contractor for costs incurred.
- H. Approval rendered on shop drawings or submittals is not a guarantee of measurements or building conditions. When approved, said approval does not mean drawings have been checked in detail and does not relieve contractor from his responsibility or necessity of furnishing material or performing work as required by Contract drawings and specifications.

SECTION 15010
BASIC MECHANICAL REQUIREMENTS

- I. Replace items which are rejected for failure to comply with specifications and drawings with an acceptable item. If no satisfactory item is submitted, Architect and Engineer reserve the right to notify contractor as to type and make of materials to be provided.
- J. Contractors shall submit all necessary manufacturer's shop drawings and wiring diagrams for any equipment which is to be purchased or fabricated as required, specified or indicated on the electrical drawings. The contractor shall submit all necessary drawings before purchasing any equipment and before any fabrication is to be undertaken. Each contractor shall first submit eight (8) copies of all drawings to the Architect and Engineer for approval. When drawings are reviewed, the Engineer will mark his comments and/or approval on eight (8) copies, retaining one for his files and returning the balance to the contractors. Only after receipt of approved drawings, shall the contractor proceed with the purchasing of equipment and fabrication.
- K. The approval of shop drawings by the Engineer shall not release the contractor from the intent of the plans and specifications.

1.07 REGULATORY REQUIREMENTS AND CODES

- A. The entire mechanical system installation shall comply with all regulations applying to the latest edition of the Southern Standard Plumbing Code and the Southern Standard Mechanical Code where such standards and regulations do not conflict with Municipal and State Building and Fire Safety Codes, including any regulations of the Local Public Utility Company and Municipal Water Department.
- B. Material furnished and work installed shall comply with National Fire Code of the NFPA; with requirements of local utility companies; and with requirements of governmental departments having jurisdiction.
- C. In addition to state and local ordinances, the following industry standards apply, where applicable, except where requirements of specifications are more stringent than the following standards:
 - A. AIEE - American Institute of Electrical Engineers
 - B. AMCA - Air Moving and Conditioning Association
 - C. ASA - American Standard Association
 - D. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers
 - E. ASME - American Society of Mechanical Engineers
 - F. ASTM - American Society of Testing Materials
 - G. AWWA - American Water Works Association
 - H. CS - Commercial Standards
 - I. NEC - National Electrical Code
 - J. NEMA - National Electrical Manufacturers' Association
 - K. NFPA - National Fire Protection Association
 - L. UL - Underwriters' Laboratories
 - M. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
 - N. SBC - Standard Building Code
 - O. ADA - Americans with Disabilities Act

1.08 PROJECT/SITE CONDITIONS

797

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

VOL 0095 PAGE 798

- A. Install work in locations shown on drawings, unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of Architect/Engineer before proceeding.
- C. The contractor under this section is invited to visit the site before submitting his bid so that he will become thoroughly familiar with all conditions present directly related to his work. No allowance will be made due to the lack of full knowledge of existing conditions. Each contractor shall verify all dimensions in the field prior to submitting his base bid or starting any phase of his work.

1.09 SEQUENCING AND SCHEDULING

- A. Construct work in sequence under provisions of Division 01.

1.10 GENERAL CONTRACTOR AND SUBCONTRACTOR

- A. The terminology "General Contractor" shall be interpreted as being the person or persons, partnership, corporation or other business enterprises, under contract, and engaged with building structure complete with all electrical systems including all site utility work will all structures and improvements thereon.
- B. The terminology "Subcontractor" shall be interpreted as being the person or persons, partnership, corporation or other business, under contract, and engaged with the sole responsibility of erecting particular phases of the construction work and shall be directly responsible to the "General Contractor."
- C. The Mechanical Contractors shall be interpreted as being "Subcontractors" to the "General Contractor."
- D. Throughout the Mechanical General Requirements Division 15010, and Mechanical Specifications Section 15, the words "Contractor", "Contractors", and "Mechanical Contractor" shall be construed as being the subcontractors to the general contractor.
- E. The General Requirements for the mechanical work mentioned under this section shall be related and correlated as applying in its entirety only to the specific part of the work to be performed by each contractor as indicated in "The Scope of Work" and as further described in the specifications of Division 15 for the mechanical work.

1.11 COMPENSATION

- A. Upon the installation by the contractor and acceptance of the mechanical work by the Architects and Engineers during the various stages and progress of the construction project, the general contractor upon receiving payment due for the installed and approved work shall promptly pay the mechanical contractors and any subcontractors for the installation and use of their materials, equipment, labor, business administration, overhead and profit.

1.12 DEFINITIONS AND TERMINOLOGY

- A. Provide: To furnish and install in complete and fully operational condition.
- B. As Directed: As directed by Architect, Engineer or his authorized representative.

1.13 DRAWINGS AND SPECIFICATIONS

- A. Architectural, Structural Plans, Certified Map Surveys, and Specifications, including General Conditions, Special Conditions, Supplements issued thereto, Information to Bidders, and other pertinent documents issued by Architect, are a part of these specifications and accompanying electrical and electrical drawings, and shall be complied with in every respect. Above is included herewith, and shall be examined by all bidders. Failure to comply shall NOT relieve contractor of responsibility or be used as basis for additional compensation due to omission of architectural and/or structural details from mechanical and electrical drawings.
- B. The drawings and specifications do not undertake to illustrate or set forth every item necessary for the work as it is assumed that the contractor is expert in the trade and is capable of interpreting them. Small details not usually shown or specified but necessary for this proper installation and finishing, shall be included in the contractor's estimate, the same as if herein specified or shown on plans. The drawings and specifications are complementary each to the other and what is called for by one shall be as binding as if called for by both.
- C. In every case where equipment is referred to in the specifications it shall be furnished and installed in complete operating order. The contractor shall install, adjust, and leave in safe operating condition all controls, supplies, appliances, and all necessary mechanical and electrical connections to the equipment to the complete satisfaction of the Architect and Engineer.
- D. The contractors are to consider all drawings as schematic or diagrammatical serving only the sole purpose of indicating to the contractor the work expected from him. The final layout of all work shall be subject to the approval of the Architect and Engineer. The contractor shall be responsible for the proper installation and coordination of all the work under the various divisions and sections of the specifications without any increase in contract price.
- E. Interrelating of the specifications, drawings, and schedule, is as follows: Specifications determine nature and setting of materials; drawings establish quantities, dimensions and details; and schedules give performance characteristics.
- F. Should drawings disagree in themselves or with specifications, the better quality or greater quantity of work or materials shall be estimated upon, unless otherwise ordered by Architect, in writing. Figures given on drawings govern small scale drawings.
- G. When mechanical and electrical drawings do not give exact details as to elevation of pipe, conduit, and ducts, physically arrange the systems to fit in space available at elevations intended, with proper grades for functioning of systems involved.

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

VOL 0095 PAGE 800

- H. Exact locations of all outlets, fixtures, and equipment items shall be determined by reference to general plans and to detail drawings, equipment drawings, rough-in drawings, etc. Minor relocations necessitated by conditions at the site or directed by the Architect shall be made without additional cost to the Owner.

1.14 INTENT

- A. Intent of mechanical and electrical drawings and specifications is to provide an installation complete in every respect. If additional details or special conditions are required, it is the responsibility of contractor to furnish same, as well as provide material and equipment usually furnished with such systems or required to complete installation, whether mentioned or not.
- B. Scope of work under Division 15 of specifications shall include complete mechanical systems as shown on drawings and as specified herein. The work to be done under these specifications shall include the furnishing of all necessary labor and materials required to complete and leave ready for operation in accordance with these specifications, and the accompanying drawings. The order is not necessarily as it appears in this specification.
- C. Minor details necessary for proper installation and operation shall be included in work as if herein specified or shown.

1.15 RULES, PERMITS, FEES AND INSPECTIONS

- A. Contractor shall give notices, obtain permits and pay fees, government sales taxes, and other costs, including utility connections or extensions in connection with his work; file necessary plans, prepare documents and obtain necessary approvals of governmental departments having jurisdiction; obtain required certificates of inspection for his work and deliver same to Architect before request for acceptance and final payment.
- B. The contractor shall obtain for his phase of the work all permits and inspections required by the municipal ordinances and after completion of the work shall furnish to the Engineer and the Architect a final inspection certificate and certificate of occupancy from the Inspector of the Building Department.
- C. The contractor shall assume all expenses for permits, tests, and inspections, and he shall include all these costs in his base bid.
- D. Contractor shall include, without extra cost to Owner, any labor, materials, services, apparatus, drawings, in order to comply with applicable codes, laws, ordinances, rules, and regulations, whether or not shown on drawings and/or specified.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials and apparatus, except as specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected, and finished in every detail, and shall be selected and arranged to fit properly into building spaces. Where no

SECTION 15010
BASIC MECHANICAL REQUIREMENTS

specific kind or quality is given, furnish a first-class standard article approved by Architect and Engineer.

- B. Material and equipment for mechanical work shall bear approval label, or shall be listed by Underwriters' Laboratories, and shall be a manufactured item in the United States of America.
- C. All materials shall be new except where noted to be reused, and shall conform with the latest approved standards of the AIEE, NEMA and Underwriters' Laboratories, Inc. in every case where such a standard for the particular type of material or equipment has been established.
- D. Intent of these specifications is to establish quality standards of material and equipment installed.
- E. All materials and equipment shall be approved by the Architect and Engineer before purchasing and installing by this contractor. Where the phrases "an approved equal" or "or equal" occur in the plans or specifications for materials or equipment, the equivalent shall be decided by the Engineer. A print of all equipment and wiring diagrams shall be turned over to the Engineer for his permanent records.
- F. Materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number and such designation will establish standards of desired quality and style, which will be basis of bid.
- G. Where a definite product is specified, it is not intended to discriminate against other products, but rather to set a definite standard and indicate quality and capacity of equipment within class found satisfactory for the Owner's use. Products not mentioned by name, or not complying with detailed descriptions in specifications will require approval ten (10) days prior to bid date. Bidders will be notified of approval prior to date of bid opening. Present sufficient written information at initiation of request for approval to enable rendering an expeditious decision. Written request should be initiated with Engineer.
- H. Where a substitute item alters the design or space requirements indicated on drawings, contractor shall include items of cost for revised design and construction, including cost of allied trades involved.
- I. Acceptance or rejection of proposed substitutions shall be subjected to Architect and Engineer's approval. If Architect and Engineer so request, contractor shall submit samples of specified and substitute items for inspection.
- J. Equipment installed on project shall have local representation, local factory-authorized service and local stock repair parts within a radius of 300 miles from the building construction site.

2.02 EQUIPMENT DEVIATIONS

- A. Where contractor proposes to use an item of equipment other than that specified or detailed on drawings, which requires redesign of structure, partitions, foundations, piping, wiring or other parts of the electrical, electrical or architectural layout, such redesign, new

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

drawings and detailing required shall be prepared by contractor at his expense and submitted to Architect and Engineer for approval.

- B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, over-current protection, wiring, conduit or equipment, from that specified or indicated on drawings, contractor shall provide such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and other additional equipment required by system, shall be provided and installed at no additional cost to Owner.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES

- A. Contractor shall give full cooperation to other trades. Furnish in writing, to allied trades with copies to Architect information necessary to permit work of all trades to be installed satisfactorily, with minimum of interference and/or delay.
- B. Where work will be installed in close proximity to, or will interfere with work of other trades, contractor shall assist in working out space conditions to make a satisfactory adjustment. Plan work sufficiently in advance of construction so any conflict can be ascertained and remedial procedures initiated. If adequate solutions can be reached by sleeving or casting into building members, these methods shall be cleared with Architect. If directed by Architect, contractor shall prepare composite working drawings and sections, at scale no less than 1/4 inch = 1 foot, clearly showing how his work is to be installed in relation to work of other trades. If contractor installs his work before coordinating with other trades, causing any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.
- C. Contractor shall furnish, as required, necessary templates, patterns, setting plans and shop details for proper installation of work and for purpose of coordinating adjacent work.
- D. Each contractor shall cooperate with all sections of the entire specification so that installing of the work shall not interfere or delay the work of other sections nor the progress of the project. Any cutting or repairing made necessary due to negligence or improper workmanship by the contractor or his employees shall be paid for by the contractor. No cutting into the structural parts of the building likely to impair its strength shall be done without the approval of the Architect and Structural Engineer.
- E. The contractor, before installing any of the work, shall check to determine that the work to be installed does not interfere with the clearances required for finished partitions, pilasters, walls, columns, ceilings and ceiling beams, work of the other trades, both at the site and from the architectural and structural drawings including details. Any work installed by the contractor which later develops into any difficulties so that the architectural design cannot be followed shall be removed and replaced by the contractor at his own expense. He shall make such changes in his work as directed by the Architect so that the architectural work can be installed as shown on plans and details.

3.02 COORDINATION OF PIPING, CONDUIT AND DUCTWORK

802

- A. Piping, conduit and ductwork interferences shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, following order of precedence shall generally be observed unless otherwise directed by the Architect and Engineer and installed for accessibility:
1. Building lines.
 2. Structural members.
 3. Electrical conduit raceways with accessible out-lets, junction boxes and pull boxes.
 4. Soil, waste, vent piping with accessible cleanouts.
 5. Storm and drainage water piping with accessible cleanouts.
 6. Water piping for heating and cooling with accessible valves and pipe fittings.
 7. Domestic hot water and portable cold water piping with accessible valves and fittings.
- B. The plumbing, heating, ventilating and air conditioning contractors, and the electrical contractor shall, with the general contractor, plan the installation of all piping, conduit, and ductwork prior to the installation of any system in order to properly coordinate the work of the various trades and to avoid any conflict of same throughout this project. Where possible, install all service pipes above and out of the way of all ductwork with future accessibility and maintenance of all piping and conduit systems in mind. Redirect all ductwork and piping or conduit systems as directed by the Architect and Engineer without any additional cost to the Owner.

3.03 WORKMANSHIP AND INSTALLATION

- A. Each contractor shall furnish the services of an experienced superintendent in charge of the installation for his phase of the work together with the manufacturer's trained engineering representative to start-up, operate and test out each system and if required with the help of additional personnel.
- B. Unless otherwise indicated in specifications or drawings, equipment and material shall be installed with approval of Architect and Engineer in accordance with recommendations of the manufacturer. This includes such tests as manufacturer recommends.
- C. All equipment indicated on plans and in the specifications shall be furnished and installed in complete operating order. The contractor shall install, adjust and leave in safe operating condition all controls, supplies, appliances and all necessary mechanical and electrical connections to the equipment to the complete satisfaction of the Architect and Engineer.
- D. Equipment shall be installed in a manner to permit access to all surfaces. Clearances shall be as required by NEC or other applicable code.

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

- E. Size of mechanical equipment shown on drawings is based on dimensions of a particular manufacturer. While other manufacturers will be acceptable, it is the responsibility of the contractor to determine if equipment he proposes to furnish will fit in the space. Shop drawings shall be prepared when required by the Architect/ Engineer or Owner to indicate a substitute arrangement.
- F. All ducts and pipe shall be installed concealed throughout this project. All mechanical equipment shall be flush mounted unless otherwise directed by the Architect and Engineer. If the building construction such as in existing structures or structures to be altered does not permit flush or semi-flush mounting of equipment, the Architect and Engineer shall notify the general contractor and contractors by letter form as to the exact areas and methods to be employed for the installation of any exposed materials or equipment under this contract without any additional cost to the Owners.

3.04 TEST AND BALANCE

- A. Each contractor shall perform any tests required by the Engineer, Architect, and Building Department for any phase of the work as requested.
- B. The contractors shall see that all required tests and inspections are made rapidly and accurately throughout. The Engineer shall be notified of all tests one day in advance in order to witness all tests.
- C. Contractor shall furnish all necessary labor, materials, testing apparatus and temporary power for such test.

3.05 SLEEVES, INSERTS AND PLATES

- A. The mechanical contractor shall provide and locate sleeves and inserts required before floors, roofs and walls are built, or contractor shall be responsible for cost of cutting and patching required to insert conduit where sleeves and inserts are not installed or where incorrectly located. The contractors may not drill and install mechanical expansion pressure bolts to support equipment to be furnished and installed under their contract. When drilling, avoid cutting structural steel rods in concrete ceilings, walls, floors and columns. When necessary to properly install contractor's equipment, the type and location of expansion bolt shields shall be approved by the architect, engineer and structural engineer and shall be designed to safely carry and support the intended load.
- B. Sleeves above grade and dry locations shall be constructed from 20 to 22-gauge galvanized steel and flush on both sides of surfaces. Sleeves on or below grade and/or moist locations shall be constructed of Schedule 40 galvanized steel.
- C. Where sleeves are placed in exterior walls below grade, pack space between conduit and sleeves with oakum and lead to make completely watertight.
- D. In each finished space, furnish a chromium plated sectional escutcheon on each conduit penetrating a wall, floor or ceiling. Escutcheons shall be sized to fit snugly to lines. Where required, these plates shall be provided with set screws so that they fit snugly against the finished surface. Equipment rooms are classified as exposed areas.

3.06 EQUIPMENT AND MATERIALS PROTECTION

- A. Contractor shall protect work and material from damage by his work or workmen, and is liable for damage caused by his neglect.
- B. Contractor is responsible for work and equipment, until finally inspected, tested and accepted. He shall protect work against theft, injury or damage and shall carefully store materials and equipment received which are not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

3.07 MECHANICAL HEATING, VENTILATION, AND AIR CONDITIONING CONTRACTOR - MOTOR AND CONTROLS, INCLUDING TEMPERATURE CONTROLS AND WIRING

- A. Unless shown on electrical drawing to be provided by electrical contractor, the heating, ventilating and air conditioning contractor shall furnish and install all motors, magnetic controllers, and controls for the safe operation and proper performance of all HVAC motorized equipment to be furnished under his contract with the correct voltage and phase ratings.
- B. All motors, magnetic controllers and control enclosures shall be housed in enclosures suitable to the areas in which they are to be installed such as dry locations, dust-laden atmospheres, damp and wet locations, hazardous locations and outdoors as required by the NEC. Manual controllers and remote push button stations shall be provided with pilot lights when remote mounted from equipment to the controller.
- C. All magnetic motor controllers shall contain thermal overload protection for each phase conductor and/or each undergrounded conductor of the electrical system as directed.
- D. The electrical contractor shall furnish and install all required raceways and conductors to properly wire up all mechanical equipment and controls in complete operating order only in accordance with approved equipment manufacturer's wiring diagrams.
- E. Where required by local power company requirements, the HVAC contractor shall furnish reduced voltage starting equipment for large motors to comply with their starting current motor load requirements. HVAC contractor shall confer with local power company to determine if reduced voltage starting equipment is required on any equipment to be furnished under his contract before submitting his base bid.
- F. The HVAC contractor shall furnish all required area temperature controls, time clocks and relays as required.

3.08 TEMPERATURE CONTROLS

- A. The installing mechanical HVAC or plumbing contractor is to properly wire up all Temperature Controls.

3.09 SURVEYS AND MEASUREMENTS - GENERAL CONTRACTOR AND CONTRACTORS

- A. The general contractor shall be responsible for the establishment of all lines and levels throughout this project. He shall relate the exact horizontal and vertical measurements to each electrical contractor for the correct and proper installation of all materials and equipment under their contract.

805

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

VOL 0095 PAGE 806

- B. Contractor shall base measurements, both horizontal and vertical, from established bench marks. Work shall agree with these established lines and levels. Verify measurements at site and check correctness of same as related work, prior to fabrication of shop-made item or ordering of factory-made items.
- C. Should contractor discover a discrepancy between actual measurements and those indicated, which prevents following good practice or intent of drawings and specifications, he shall notify architect and shall not proceed with work until he has received instructions from architect.
- D. Each mechanical contractor will be responsible for all on site field measurements.

3.10 ACCESSIBILITY: GENERAL CONTRACTOR AND CONTRACTORS

- A. The general contractor shall be responsible for the proper construction and sizes of all shafts and chases, including increasing of all wall thicknesses as required to properly install all electrical conduits and equipment, especially panelboards and any other recessed electrical equipment without additional cost to the owner.
- B. Each contractor shall be certain that the minimum building space has been allotted and left open to properly install any equipment installed under his contract. If required, he shall order his equipment in sections sized to fit the openings and space planned by the Architect.
- C. The contractors shall inform the general contractor of sufficiency of size of shafts and chases and adequate clearance in double partitions and hung ceilings, for proper installation of his work. Contractor shall cooperate with other contractors working in the same space. Advise general contractor of reworking in the same space. Advise general contractor of requirements and keep spaces and clearances to minimum sizes required.
- D. Locate equipment which must be serviced, operated or maintained, in fully accessible positions. Furnish access doors if required. Minor deviations from drawings may be made to allow for better accessibility; however, changes must be approved prior to installation.
- E. Provide general contractor with exact location of access panels for each concealed device requiring service or access. Access panels will be provided by general contractor and as specified in the architectural specifications, unless noted otherwise. Location of panels shall be submitted for approval in sufficient time to be installed in the normal course of the work.

3.11 FOUNDATIONS, SUPPORTS, PIERS, ATTACHMENTS

- A. Each subcontractor shall be responsible for the installation of all required foundations, supports (for structural strength), foundations and points of attachment for materials and equipment to be installed by the contractor.
- B. Each subcontractor shall include all costs for this work in the base bid.

- C. All necessary steel angles or channel iron, anchor bolts, washers, templates, etc., shall be furnished by each contractor. Bolts shall be built into the foundations with proper sized sleeves. Bases for all equipment shall be satisfactorily isolated from building structure by approved isolation methods.
- D. Provide necessary foundations, supports, pads, bases, and piers, as required and shown on drawings for equipment furnished under this contract. Submit drawings to Engineer for approval before purchase, fabrication, or construction.
- E. For machinery and equipment where foundations are indicated, provide concrete pads as shown. Extend pads 6 inches beyond machine base in all directions; chamfer top edge. Inset 6-inch steel dowel rods into floors to anchor pads. Submit shop drawings of foundation and pads to Architect and Engineer for approval before constructing, if required.
- F. Where foundations, supports, pads, bases and piers are mounted on floor, construction shall be same material and quality of finish as adjacent flooring material.
- G. Securely attach equipment to building structure in approved manner, unless shown otherwise. Attachments shall be strong and durable and if not considered so by the engineer, contractor shall replace as directed without additional cost to the owner.

3.12 SCAFFOLDING, RIGGING, HOISTING - GENERAL CONTRACTOR AND CONTRACTOR

- A. Each subcontractor shall furnish all required mechanical equipment including operator to properly hoist all mechanical equipment into place on roofs, penthouses, electrical and mechanical rooms, and any other spaces as required.
- B. Each subcontractor shall also furnish, install and erect all required scaffolding and rigging as required to properly install all electrical work above an eight (8) foot working height, above the finished floor line.
- C. Each contractor shall remove all their mechanical equipment, hoisting equipment rigging and also scaffolds from the premises when no longer required so as not to interfere with the construction progress of other trades.
- D. Each contractor shall furnish their own ladders to install mechanical equipment up to an eight (8) foot working height.

3.13 CUTTING AND PATCHING

- A. The mechanical subcontractor shall be responsible for the cutting and patching of all floors, walls, ceilings, roofs as required for the proper installation of all electrical work under this contract.
- B. No cutting and patching shall be done by the contractors which in any way will impair the structural strength of the building structure including any joist, walls or structural supporting members.
- C. The contractors shall not drill any holes or cut into any existing or new structural members.

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

VOL 0095 PAGE 808

- D. Any cutting and patching that is required shall be done only after permission is granted by the architect and structural engineer.

3.14 PAINTING - GENERAL CONTRACTOR AND CONTRACTOR

- A. The general contractor shall be responsible for the painting of any mechanical equipment other than touch up of colors which are furnished as standard by the equipment manufacturer which shall be the subcontractors responsibility. The contractors shall base their bid on the use of standard colors shall be approved by the Architect before the contractors purchase the equipment. The contractors shall furnish specific finishes of any equipment when so noted in the specifications or on the drawings.

3.15 OPERATING INSTRUCTIONS

- A. The contractors shall furnish trained operators at no additional expense to the Owner or Architect, to give any required operating instructions to the plant personnel or owner after a final completion and acceptance of the work has been granted under this contract.
- B. Upon completion of work and tests, instruct Owner (or his representative) in operation, adjustment and maintenance of equipment. Give at least forty-eight (48) hours notice.
- C. Furnish two complete bound sets to Architect, of typewritten or blueprinted instructions for operating and maintaining systems and equipment included in this contract. Submit instructions in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalog data will not be acceptable as operating and maintenance instructions.
- D. Include in the above manuals, maintenance schedule for equipment furnished under this contract.

3.16 RECORDS FOR THE OWNER

- A. The mechanical contractor shall turn over to the General Contractor, Architect and Engineer all approved equipment manufacturer's drawings for the entire project, including Equipment Manufacturer's Guarantee, Mechanical Contractor's Guarantee and Service Contract Brochure, which is to be turned over to the owners.
- B. Turn over to the General Contractor, at time of request, for pre-final inspection, two approved bound volumes containing the following information and drawings. Binding to be such that material can be removed.
 - 1. Certificates of acceptance from inspecting authorities.
 - 2. Warranties, guarantees and manufacturer's directions on equipment and materials covered by the contract. Letter from each contractor with blanks for date of acceptance and date of expiration of warranties and guarantees.
 - 3. Approved submittal data.
 - 4. Approved mechanical equipment brochures, including manufacturer's name, catalog number, wiring diagrams and control diagrams.

5. Approved shop drawings.
 6. Other data and drawings required during construction.
 7. Repair parts list on major equipment.
 8. Record drawings showing routing of underground outside utilities with actual dimensions from buildings, and record drawings indicating actual installation of all work inside and outside of the building, all in reproducible form.
- C. Contractor shall accumulate and retain this data and information in neat form during course of project; submit to Architect and Engineer for approval and transmit to Owner to bound volume.

3.17 GUARANTEES

- A. The contractor shall furnish to the Engineer, Architect, General Contractor and Owner a guarantee for all equipment and materials installed by each contractor against any defects in workmanship or materials extending for a period of one year from the date of substantial completion. Any equipment to be removed and replaced during this guarantee period shall be done at the contractor's expense. Equipment manufacturer's guarantee shall accompany each submittal for approval, including all equipment manufacturer's whose guarantees extend beyond the one year period.
- B. Contractor shall amend and make good, at his own expense, any defects, settlements or other faults in the work, arising from defective or improper materials and/or workmanship which may appear within twelve months after completion and final acceptance of work. Suppliers of equipment shall furnish to the Architect or Engineer, through the contractor and General Contractor a written acceptance and guarantees of equipment furnished. Date of start of warranty shall be the date of final payment, or date the building is accepted by the owners as directed by the Architects.
- C. The guarantee shall be typewritten on stationery indicating the firm's letterhead and personally signed by the President or other responsible authority of the firm and sealed with the corporate seal.

3.18 SERVICE CONTRACT

- A. Upon completion and acceptance of the project by the owners, the mechanical contractor under this section shall furnish to the Engineer, Architect, General Contractor and Owners a one year service contract to properly service all equipment and materials purchased, fabricated and installed by him. The service contract shall also bind the equipment manufacturers and suppliers as part of the service contract. All costs for this service shall be included in the base bid by the mechanical contractors.
- B. Contractor shall include in the service contract the necessary service to effect repairs to mechanical systems, such as mechanical repair of equipment or other work requiring specialized training, for a period of one year, concurrent with guarantee period specified above.

**SECTION 15010
BASIC MECHANICAL REQUIREMENTS**

- C. The service contract shall be typewritten on stationery indicating the firm's letterhead and personally signed by the President or other responsible authority of the mechanical contractor's firm and sealed with the corporate seal.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Flexible pipe connections.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED WORK

- A. Section 15060 - Pipe and Pipe Fittings.
- B. Section 15140 - Supports and Anchors.

1.03 REFERENCES

- A. Conform to Standards of Expansion Joint Manufacturer's Association.

1.04 DESIGN CRITERIA

- A. Base expansion calculations on 50 degrees F installation temperature to 210 degrees F for hot water heating and 140 degrees F for domestic hot water, plus 30 percent safety factor.

1.05 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300.
- B. Flexible pipe connector shop drawing data to include maximum allowable temperature and pressure rating, overall face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure and total number of wires in braid.
- C. Expansion joint shop drawings to include maximum allowable temperature and pressure rating, and maximum expansion compensation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Metraflex
- B. Keflex
- C. Flexonics
- D. Unaflex
- E. Substitutions: Under provisions of Section 01600.

**SECTION 15121
EXPANSION COMPENSATION****2.02 FLEXIBLE PIPE CONNECTIONS**

- A. For steel piping construct with stainless steel inner hose and braided exterior sleeve.
- B. For copper piping construct with bronze inner hose and braided exterior sleeve.
- C. Use connectors suitable for minimum 125 psi WSP and 450 degrees F and 200 psi WOG and 250 degrees F.

2.03 CONNECTIONS

- A. Provide flexible pipe connections suitable to connect to adjoining piping as specified for pipe joints. Use pipe sized units.

2.04 FLEXIBLE PUMP CONNECTORS

- A. Flexible pump connectors shall be spherical molded type with 150 lb. Steel flanges with permanently attached control cables. Elastomer and fabric reinforcing shall be suitable for operating conditions.

PART 3 - EXECUTION**3.01 INSTALLATION**

- A. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation.
- B. Accomplish structural work and provide equipment required to control expansion and contraction of piping, loops, pipe offsets, and swing joints, and provide corrugated bellows type expansion joints where required.
- C. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end.
- D. Rigidly anchor pipe to building structure where necessary. Provide pipe guides so that movement takes place along axis of pipe only.
- E. Piping shall be supported such that no weight is supported by flexible pump connector.
- F. Piping shall be installed so that flexible pump connector is not deformed due to misalignment.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Pipe, duct, and equipment hangers, supports, and associated anchors.
- B. Equipment bases and supports.
- C. Sleeves and seals.
- D. Flashing and sealing equipment and pipe stacks.

1.02 RELATED WORK

- A. Section 03300 - Concrete: Concrete equipment bases.
- B. Section 15242 - Vibration Isolation.
- C. Section 15260 - Piping Insulation.
- D. Section 15890 - Ductwork.

1.03 REFERENCES

- A. ANSI/ASME B31.1 - Power Piping.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

**SECTION 15140
SUPPORTS AND ANCHORS**

- E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- F. Vertical Support: Steel riser clamp.
- G. Floor Support for Pipe Sizes to 4 inches and All Cold: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- H. Shield for Insulated Piping 2 inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.
- I. Shields for Insulated Piping 2-1/2 inches and Larger: Pipe covering protective saddles.

2.02 HANGER RODS

- A. Steel Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.03 INSERTS

- A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe or 18 gage galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Form with galvanized steel.
- E. Sleeves for Rectangular Ductwork: Form with galvanized steel or wood.
- F. Stuffing Insulation: Glass fiber type, non-combustible.
- G. Caulk: Acrylic sealant.

2.05 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe.
- C. Provide copper plated hangers and supports for copper piping.

SECTION 15140
SUPPORTS AND ANCHORS

2.06 FINISH

- A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

<u>PIPE SIZE</u>	<u>MAX. HANGER SPACING</u>	<u>HANGER DIAMETER</u>
1/2 to 1-1/4 inch	6'-6"	3/8"
1-1/2 to 2 inch	10'-0"	3/8"
2-1/2 to 3 inch	10'-0"	1/2"
4 to 6 inch	10'-0"	5/8"
8 to 12 inch	14'-0"	7/8"
14 inch and Over	20'-0"	1"

- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support vertical piping at every other floor.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.

3.02 LOW VELOCITY DUCT HANGERS AND SUPPORTS

- A. All horizontal ducts up to 48" wide shall be supported with non-perforated strap iron hangers placed down side of duct, turned under bottom of ducts and fastened to ductwork. Straps shall be fastened to building construction by approved methods specified.
- B. All horizontal ducts over 48" wide shall have angle iron trapeze hangers with rods attached to building construction by approved methods specified.
- C. Rectangular Duct Hanger Sizes:

<u>Width</u>	<u>Strap</u>	<u>Spacing</u>
Up to 18"	1" x 22 ga.	8 ft.
19" thru 24"	1" x 20 ga.	8 ft.
25" thru 30"	1" x 18 ga.	8 ft.
31" thru 47"	1" x 16 ga.	8 ft.

**SECTION 15140
SUPPORTS AND ANCHORS****D. Round Duct Hanger Sizes:**

<u>Diameter</u>	<u>Strap Band</u>	<u>Rod</u>	<u>Spacing</u>
Up to 26"	1" x 20 ga.	1/4"	10 ft.
27" thru 36"	1" x 18 ga.	3/8"	10 ft.
37" thru 50"	1" x 16 ga.	3/8"	10 ft.
51" thru 60"	1" x 18 ga.	3/8"	6 ft.

E. Trapeze Hanger Angles:

<u>Width</u>	<u>Angles</u>	<u>Rods</u>	<u>Spacing</u>
48" thru 60"	1-1/2"x1-1/2"x1/4"	3/8"	8'-0"
61" thru 72"	1-1/2"x1-1/2"x1/4"	3/8"	6'-0"
73" thru 96"	2"x2"x1/4"	1/2"	6'-0"

F. Vertical Duct Floor Support Sizes:

Supports shall be riveted or screwed to duct.
Up to 60" wide, 1-1/2"x1-1/2"x1/8" angle.
Over 60" wide, 2"x2"x3/16" angle.

3.03 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.
- C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with stuffing insulation and caulk seal. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Install chrome plated steel escutcheons at finished surfaces.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Single phase electric motors.
- B. Three phase electric motors.

1.02 RELATED WORK

- A. Section 15540 - HVAC Pumps.
- B. Section 15855 - Air Handling Units with Coils: Fan motors.
- C. Section 15870 - Power Ventilators.

1.03 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- C. ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
- D. ANSI/NEMA MG 1 - Motors and Generators.
- E. ANSI/NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Submit test results verifying nominal efficiency and power factor for three phase motors larger than 1/2horsepower.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacture of electric motors for required use, and their accessories, with minimum three years documented product development, testing, and manufacturing experience.

**SECTION 15170
MOTORS****1.07 REGULATORY REQUIREMENTS**

- A. Conform to applicable electrical code.
- B. Conform to local energy code.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

PART 2 - PRODUCTS**2.01 GENERAL CONSTRUCTION AND REQUIREMENTS**

- A. Electrical Service: Refer to Section 16480 for required electrical characteristics.
- B. Motors: Design for continuous operation in 40 degrees C environment, and for temperature rise in accordance with ANSI/NEMA MG 1 limits for insulation class, Service Factor, and motor enclosure type.
- C. Explosion-Proof Motors: UL approved and labelled for hazard classification, with over temperature protection.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency.
- E. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

2.02 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.
- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.03 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.04 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Motors: Capacitor in series with starting winding; capacitor-start/capacitor-run motors shall have two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.05 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between one and one and one-half times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Conform to ANSI/NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with ANSI/IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.
- G. Motor Frames: NEMA standard T-frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

SECTION 15170 MOTORS

- H. Thermister System (Motor Frame Sizes 254T and Larger): Three PTC thermisters imbedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 16480 - Motor Control.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To ANSI/NEMA MG 1.
- K. Nominal Efficiency: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.
- L. Nominal Power Factor: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Motors drawing less than 250 Watts and intended for intermittent service may be germane to equipment manufacturer and need not conform to these specifications.
- B. Motors shall be open drip-proof type, except where specifically noted otherwise.
- C. Motors with frame sizes 254T and larger shall be energy efficient type.
- D. Single phase motors for shaft mounted fans or blowers shall be permanent split capacitor type.

3.02 NEMA OPEN MOTOR SERVICE FACTORS

<u>HP</u>	<u>3600 RPM</u>	<u>1800 RPM</u>	<u>1200 RPM</u>	<u>900 RPM</u>
1/6-1/3	1.35	1.35	1.35	1.35
1/2	1.25	1.25	1.25	1.15
3/4	1.25	1.25	1.15	1.15
1	1.25	1.15	1.15	1.15
1.5-150	1.15	1.15	1.15	1.15

3.03 PERFORMANCE SCHEDULE: SINGLE PHASE - OPEN, DRIP-PROOF

<u>HP</u>	<u>RPM</u> <u>(Syn)</u>	<u>NEMA</u> <u>Frame</u>	<u>Percent</u> <u>Efficiency</u>	<u>Percent</u> <u>Power Factor</u>
1/6	1200	48	41	48
1/4	1200	48,56	41	51
1/3	1200	48,56	56	55

SECTION 15170
MOTORS

<u>HP</u>	<u>RPM</u> <u>(Syn)</u>	<u>NEMA</u> <u>Frame</u>	<u>Percent</u> <u>Efficiency</u>	<u>Percent</u> <u>Power Factor</u>
1/2	1200	56	62	60
3/4	1200	56,143T	68	68
1	1200	184	65	62
1-1/2	1200	215	67	60
2	1200	215	68	65
3	1200	215	75	80
1/8	1800	48		
1/6	1800	48	49	58
1/4	1800	48,56	53	52
1/3	1800	48,56	56	55
1/2	1800	48,56	64	65
3/4	1800	56	63	64
1	1800	56,143T,182T	68	72
1-1/2	1800	56,145T,184T	70	64
2	1800	56,145T,182T	73	72
3	1800	184T	78	78
5	1800	184T,213T	74	76
7-1/2	1800	215T	77	85
10	1800	215T	84	90
1/3	3600	48,56	55	68
1/2	3600	48,56	57	71
3/4	3600	56	62	75
1	3600	56	63	69
1-1/2	3600	56,143T	68	77
2	3600	56,145T	71	75
3	3600	56,182T	76	88
5	3600	184T	76	88
7-1/2	3600	213T	81	82
10	3600	215T	83	86

3.04 PERFORMANCE SCHEDULE: THREE PHASE - ENERGY EFFICIENT, OPEN, DRIP-PROOF

<u>HP</u>	<u>RPM</u> <u>(Syn)</u>	<u>NEMA</u> <u>Frame</u>	<u>Percent</u> <u>Efficiency</u>	<u>Percent</u> <u>Power Factor</u>
1	1200	145T	81	72
1-1/2	1200	182T	83	73
2	1200	184T	85	75

SECTION 15170
MOTORS

<u>HP</u>	<u>RPM</u> <u>(Syn)</u>	<u>NEMA</u> <u>Frame</u>	<u>Percent</u> <u>Efficiency</u>	<u>Percent</u> <u>Power Factor</u>
3	1200	213T	86	60
5	1200	215T	87	65
7-1/2	1200	254T	89	73
10	1200	256T	89	74
15	1200	284T	90	77
20	1200	286T	90	78
25	1200	324T	91	74
30	1200	326T	91	78
40	1200	364T	93	77
50	1200	365T	93	79
60	1200	404T	93	82
75	1200	405T	93	80
100	1200	444T	93	80
125	1200	444T	93	84
1	1800	143T	82	84
1-1/2	1800	145T	84	85
2	1800	145T	84	85
3	1800	182T	86	86
5	1800	184T	87	87
7-1/2	1800	213T	88	86
10	1800	215T	89	85
15	1800	256T	91	85
20	1800	256T	91	86
25	1800	284T	91	85
30	1800	286T	92	88
40	1800	324T	92	83
50	1800	326T	93	85
60	1800	364T	93	88
75	1800	365T	93	88
100	1800	404T	93	83
125	1800	405T	93	86
150	1800	444T	93	85
200	1800	445T	94	85
1-1/2	3600	143T	82	85
2	3600	145T	82	87
3	3600	145T	84	85
5	3600	182T	85	86

SECTION 15170
MOTORS

<u>HP</u>	<u>RPM</u> <u>(Syn)</u>	<u>NEMA</u> <u>Frame</u>	<u>Percent</u> <u>Efficiency</u>	<u>Percent</u> <u>Power Factor</u>
7-1/2	3600	184T	86	88
10	3600	213T	87	86
15	3600	215T	89	89
20	3600	254T	90	89
25	3600	256T	90	92
30	3600	284T	91	91
40	3600	286T	92	92
50	3600	324T	93	89
60	3600	326T	93	91
75	3600	364T	93	88
100	3600	365T	92	88

3.05 PERFORMANCE SCHEDULE: THREE PHASE - ENERGY EFFICIENT, TOTALLY ENCLOSED, FAN COOLED

<u>HP</u>	<u>RPM</u> <u>(Syn)</u>	<u>NEMA</u> <u>Frame</u>	<u>Percent</u> <u>Efficiency</u>	<u>Percent</u> <u>Power Factor</u>
1	1200	145T	81	72
1-1/2	1200	182T	83	65
2	1200	184T	85	68
3	1200	213T	85	63
5	1200	215T	86	66
7-1/2	1200	254T	89	68
10	1200	256T	89	75
15	1200	284T	90	72
20	1200	286T	90	76
25	1200	324T	90	71
30	1200	326T	91	79
40	1200	364T	92	78
50	1200	365T	92	81
60	1200	404T	92	83
75	1200	405T	92	80
100	1200	444T	93	83
125	1200	445T	93	85
1	1800	143T	82	84
1-1/2	1800	145T	84	85
2	1800	145T	84	85

SECTION 15170
MOTORS

VOL 0095 PAGE 824

HP	RPM (Syn)	NEMA Frame	Percent Efficiency	Percent Power Factor
3	1800	182T	87	83
5	1800	184T	88	83
7-1/2	1800	213T	89	85
10	1800	215T	90	84
15	1800	254T	91	86
20	1800	256T	91	85
25	1800	284T	92	84
30	1800	286T	93	86
40	1800	324T	93	83
50	1800	326T	93	85
60	1800	364T	93	87
75	1800	365T	93	87
100	1800	405T	94	86
125	1800	444T	94	87
150	1800	445T	94	88
200	1800	447T	95	87
1-1/2	3600	143T	82	85
2	3600	145T	82	87
3	3600	182T	82	87
5	3600	184T	85	88
7-1/2	3600	213T	86	86
10	3600	215T	86	86
15	3600	254T	88	91
20	3600	256T	89	89
25	3600	284T	90	92
30	3600	286T	91	92
40	3600	324T	91	91
50	3600	326T	90	92
60	3600	364T	91	93
75	3600	365T	91	91
100	3600	405T	92	92

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Identification of mechanical products installed under Division 15.

1.02 REFERENCES

- A. ANSI/ASME A13.1 - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 01345.
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Submit manufacturer's installation instructions under provisions of Section 01345.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1.
- B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and fluid being conveyed.
- E. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- F. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inch wide by 4 mil thick, manufactured for direct burial service.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

**SECTION 15190
MECHANICAL IDENTIFICATION**

VOL 0095 PAGE 826

3.02 INSTALLATION

- A. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners, or adhesive.
- B. Metal Tags: Install with corrosive-resistant chain.
- C. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.
- D. Plastic Tape Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.
- E. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade, directly above buried pipe.
- F. Equipment: Identify air handling units, fans, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with metal tags.
- G. Controls: Identify control panels and major control components outside panels with plastic nameplates.
- H. Valves: Identify valves in main and branch piping with tags.
- I. Piping: Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

3.03 VALVE CHART AND SCHEDULE

- A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install at location as directed.

END OF SECTION

SECTION 15242
VIBRATION ISOLATION**PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Inertia bases.
- B. Vibration isolation.

1.02 RELATED WORK

- A. Section 15510 - HVAC system.

1.03 REFERENCES

- A. ASHRAE - Guide to Average Noise Criteria Curves.

1.04 QUALITY ASSURANCE

- A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Indicate inertia bases on shop drawings.
- C. Indicate vibration isolator locations, with static and dynamic load on each, on shop drawings and described on product data.
- D. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Kinetics.
- B. Vibration Eliminator, Inc.
- C. Mason Industries.
- D. Substitutions: Under provisions of Section 01600.

2.02 INERTIA BASES

- A. Type D: Reinforced 3,000 psi concrete base with chamfered edges, without channel frame.

2.03 VIBRATION ISOLATORS

SECTION 15242
VIBRATION ISOLATION

- A. Type 1: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
- B. Type 2: Open spring mount with stiff springs (horizontal stiffness equal to vertical stiffness).
- C. Type 3: Open spring mount with stiff springs, heavy mounting frame, and limit stop.
- D. Type 4: Closed spring mount with stiff springs and limit stop.
- E. Type 7: Elastomer mount with threaded insert and hold down holes.
- F. Type 8: Neoprene jacketed pre-compressed molded glass fiber.
- G. Type 9: Rubber waffle pads, 30 durometer, minimum 1/2 inch thick, maximum loading 40 psi. Use neoprene in oily or exterior locations.
- H. Type 10: 1/2 inch thick rubber waffle pads bonded each side of 1/4 inch thick steel plate.

2.04 FABRICATION

- A. Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop.
- B. Color code spring mounts.
- C. Select springs to operate at 2/3 maximum compression strain, with 1/4 inch ribbed neoprene pads.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install vibration isolators for motor driven equipment.
- B. Set steel bases for one inch clearance between housekeeping pad and base. Set concrete inertia bases for 2 inch clearance. Adjust equipment level.

3.02 SCHEDULE

<u>ISOLATED EQUIPMENT</u>	<u>BASE</u>		<u>ISOLATOR</u>	
	<u>Type</u>	<u>Thickness</u>	<u>Type</u>	<u>Thickness</u>
Pumps	D	4"	9	1"
Air Handling Units	D	4"	4	As required

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Piping insulation.

1.02 RELATED WORK

- A. Section 15190 - Mechanical Identification.
- B. Section 15410 - Plumbing Piping.

1.03 REFERENCES

- A. ANSI/ASTM C578 - Preformed, Block Type Cellular Polystyrene Thermal Insulation.
- B. ASTM B209 - Aluminum and Aluminum-alloy Sheet and Plate.
- C. NFPA 255 - Surface Burning Characteristics of Building Materials.
- D. ANSI/ASTM C547 - Mineral Fiber Preformed Pipe Insulation.

1.04 QUALITY ASSURANCE

- A. Applicator: Company specializing in piping insulation application with three years minimum experience.
- B. Materials: Flame spread/fuel contributed/smoke developed rating of 25/25/50 in accordance with NFPA 255.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01345.
- B. Include product description, list of materials and thickness for each service, and locations.
- C. Submit manufacturer's installation instructions under provisions of Section 01345.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Mansville.
- B. Armstrong.
- C. Certainteed.
- D. Owens-Corning.

2.02 INSULATION

- A. Type A: Glass fiber insulation; ANSI/ASTM C547; 'k' value of 0.24 at 75 degrees F; noncombustible.
- B. Type G: Cellular foam; flexible, plastic; 'k' value of 0.28 at 75 degrees F.

829

**SECTION 15260
PIPING INSULATION**

VOL 0095 PAGE 830

2.03 JACKETS

A. Interior Applications:

1. Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
2. PVC Jackets: One piece, premolded type (fittings only).

2.04 ACCESSORIES

- A. Insulation Bands:** 3/4 inch wide; 0.015 inch thick aluminum.
- B. Adhesives:** Compatible with insulation.

2.05 JACKETS

A. Aluminum Jacket: ASTM B209.

1. Thickness: 0.025 inch sheet.
2. Finish: Embossed.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Install materials after piping has been tested and approved.**

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.**
- B. Continue insulation with vapor barrier through penetrations.**
- C. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.**
- D. Provide an insert, not less than 6 inches long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2 inches diameter or larger, to prevent insulation from sagging at support points. Inserts shall be cork or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used.**

SECTION 15260
PIPING INSULATION

- E. Neatly finish insulation at supports, protrusions, and interruptions.
- F. On exposed piping, locate insulation and cover seams in least visible locations.
- G. Jackets:
1. Indoor, Concealed Applications: Insulated pipes conveying fluids above ambient temperature shall have standard jackets, with or without vapor barrier, factory-applied or field-applied. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass cloth and adhesive. PVC jackets may not be used.
 2. Indoor, Concealed Applications: Insulated dual-temperature pipes or pipes conveying fluids below ambient temperature shall have vapor barrier jackets, factory-applied or field-applied. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe, and finish with glass cloth and vapor barrier adhesive.
 3. Indoor, Exposed Applications: For pipe exposed in mechanical equipment rooms or in finished spaces, insulate as for concealed applications. Finish with canvas jacket; size for finish painting. Do not use PVC jackets.
- H. For exterior applications, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULE

<u>PIPING</u>	<u>TYPE</u>	<u>PIPE SIZE</u> Inch (mm)	<u>INSULATION THICKNESS</u> Inch (mm)
Domestic Hot Water	A	1/2" to 2" Over 2"	1" 1 1/2"
Domestic Cold Water	A	All	1"
Condensate Drain	G	All	1/2"
Chilled Water	A	All	1"
Heating Hot Water	A	All	1"

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Equipment insulation.
- B. Covering.

1.02 RELATED SECTIONS

- A. Section 15190 - Mechanical Identification.

1.03 REFERENCES

- A. ASTM C195 - Mineral Fiber Thermal Insulation Cement.
- B. ASTM C552 - Cellular Glass Block and Pipe Thermal Insulation.
- C. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
- D. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
- E. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
- F. ASTM E96 - Water Vapor Transmission of Materials.
- G. UL 723 - Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide product description, list of materials and thickness for equipment scheduled.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.05 QUALITY ASSURANCE

- A. Applicator: Company specializing in insulation application with three years minimum experience.
- B. Insulation and Covering: Flame spread/fuel contributed/ smoke developed rating of 25/ /50 in

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

**SECTION 15280
EQUIPMENT INSULATION****PART 2 - PRODUCTS****2.01 GLASS FIBER, FLEXIBLE****A. Manufacturers:**

1. Knauf
2. John Manville
3. Owens Corning

B. Insulation: ASTM C553; flexible, noncombustible.

1. 'K' value: ASTM C335, at 75 degrees F.
2. Maximum service temperature: 250 degrees F.
3. Maximum moisture absorption: 0.2 percent by volume.
4. Density: 2.0 lb/cu ft density.

C. Vapor Barrier Jacket

1. ASTM C921, kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
2. Moisture vapor transmission: ASTM E96; 0.02 perm.
3. Secure with self sealing longitudinal laps and butt strips.
4. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Tire Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers.**E. Vapor Barrier Lap Adhesive**

1. Compatible with insulation.

2.02 Jackets**A. Canvas Jacket: UL Listed**

1. Fabric: ASTM C921, 6 oz/sq yd, plain weave cotton treated with dilute fire retardant lagging adhesive.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Verify that equipment has been tested before applying insulation materials.

- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Do not insulate factory insulated equipment.
- C. On exposed equipment, locate insulation and cover seams in least visible locations.
- D. Apply insulation as close as possible to equipment by grooving, scoring, and beveling insulation. Secure insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
- F. Insulated dual temperature equipment or cold equipment containing fluids below ambient temperature:
1. Provide vapor barrier jackets, factory applied or field applied.
 2. Finish with glass cloth and vapor barrier adhesive.
 3. Insulate entire system.
- G. Finish insulation at supports, protrusions, and interruptions.
- H. For equipment in mechanical equipment rooms or in finished spaces, finish with canvas jacket sized for finish painting.
- I. Do not insulate over nameplate or ASME stamps. Bevel and seal insulation around such.
- J. When equipment with insulation requires periodical opening for maintenance, repair, or cleaning, install insulation in such a manner that it can be easily removed and replaced without damage.

3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

3.04 GLASS FIBER, FLEXIBLE INSULATION SCHEDULE

<u>EQUIPMENT</u>	<u>THICKNESS</u>
Pump Bodies	1"
Air Separators	1"
Expansion Tanks	1"

END OF SECTION

**SECTION 15290
DUCTWORK INSULATION****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Ductwork Insulation.
- B. Insulation Jackets

1.02 RELATED WORK

- A. Section 15190 - Mechanical Identification

1.03 REFERENCES

- A. ANSI/ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
- B. ANSI/ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
- C. ASTM E84 - Surface Burning Characteristics of Building Materials.
- D. NFPA 255 - Surface Burning Characteristics of Building Materials.
- E. UL 723 - Surface Burning Characteristics of Building Materials.

1.04 QUALITY ASSURANCE

- A. Applicator: Company specializing in ductwork insulation application with three years minimum experience.
- B. Materials: UL listed; flame spread/fuel contributed/smoke developed rating of 25/25/50 in accordance with NFPA 255.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Include product description, list of materials and thickness for each service, and locations.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Certainteed
- B. Manville
- C. Knauf
- D. Owens-Corning

**SECTION 15290
DUCTWORK INSULATION****2.02 MATERIALS**

- A. Type A: Flexible glass fiber; ANSI/ASTM C612; commercial grade; 'k' value of 0.29 at 75 degrees F; 0.002 inch foil scrim facing.
- B. Type C: Flexible glass fiber; ANSI/ASTM C553; 'k' value of 0.24 at 75 degrees F lb/cu ft. minimum density; coated air side for maximum 4,000 ft/min air velocity.
- C. Adhesives: Waterproof fire retardent type.
- D. Lagging Adhesive: Fire resistive to NFPA 255.
- E. Impale Anchors: Galvanized steel, 12 gage, self-adhesive pad.
- F. Joint Tape: Glass fiber cloth, open mesh.
- G. Tie Wire: Annealed steel, 16 gage.

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Install materials after ductwork has been tested and approved.
- B. Clean surfaces for adhesives.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.
- C. Exterior Insulation (Type A or Type B) Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.
 - 3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping

SECTION 15290
DUCTWORK INSULATION

3.02 SCHEDULE

DUCTWORK_____

TYPE

INSULATION
THICKNESS

Sheet Metal Supply Ducts

A

1½"

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDED:**

- A. Pipe, pipe fittings, Valves and connections for sprinkler system.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION:

- A. Section 15140: Placement of pipe sleeves.

1.03 RELATED SECTIONS:

- A. Section 02225 - Trenching.
- B. Section 00900 - Painting.
- C. Section 15140 - Supports and Anchors.
- D. Section 15190 - Mechanical Identification.
- E. Section 15325 - Sprinkler Systems.

1.04 REFERENCES:

- A. ANSI/ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
- B. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings, Class 150 and 300.
- C. ANSI/ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.
- D. ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings.
- E. ANSI/ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.
- F. ANSI/ASME B16.11 - Forged Steel Fittings, Socket-welding and Threaded.
- G. ANSI/ASTM A135 - Electric-Resistance-Welded Steel Pipe.
- H. ANSI/ASTM A47 - Malleable Iron Castings.
- I. ASTM A53 - Pipe, Steel. Black and Hot Dipped, Zinc-coated Welded and Seamless.
- J. ASTM A234 - Pipe fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- K. ANSI/ASSE 1012 - Backflow preventers.
- L. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.
- M. NFPA 13 - Installation of Sprinkler Systems.

N. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.

1.05 SUBMITTALS:

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate pipe materials used, jointing methods supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- C. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings
- D. Manufacturer's Field Report: Submit under provisions of Section 01400.
- E. Manufacturer's Field Report: Indicate time of start-up of treatment systems and include analysis of system water after cleaning and treatment.

1.06 OPERATION AND MAINTENANCE DATA:

- A. Submit under provisions of Section 017300.
- B. Maintenance Instructions: Include installation instructions, spare parts lists, procedures, and treatment programs.

1.07 QUALITY ASSURANCE:

- A. Sprinkler Systems: Perform work to NFPA 13.
- B. Welding Materials and Procedures: Perform to ASME Code.
- C. Valves: Bear UL or FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- D. Maintain one copy of document on site.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600.
- B. Deliver and store valves in shipping containers, with labeling in place.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 - PRODUCTS

2.01 SPRINKLER PIPING, BURIED

839

- A. Steel Pipe: ASTM A53 or ANSI/ASTM A135 double layer, half-lapped 10 mil polyethylene tape.
- 1. Steel Fittings: ANSI/ASME B16.9, wrought steel, butt welded; ANSI/ASME B16.25, butt weld ends; ASTM A234, wrought carbon steel and alloy steel; ANSI/ASME B16.5, steel flanges and fittings; ANSI/ASME B16.11 forged steel socket welded and threaded; with double layer, half-lapped 10 mil polyethylene tape.
- 2. Cast Iron Fittings: ANSI/ASME B16.1, flanges and fittings.
- 3. Joints ANSI/ AWS D1.1, welded.

2.02 SPRINKLER PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53; or ANSI/ASTM A135; Schedule 40 black.
- 1. Steel Fittings: ANSI/ASME B16.9, wrought steel, butt welded; ANSI/ASME B16.25, butt welded ends; ASTM A234, wrought carbon steel and alloy steel; ANSI/ASME B16.5, steel flanges and fittings; ANSI/ASME B16.11, forged steel socket welded and threaded.
- 2. Malleable Iron Fittings: ANSI/ASME B16.3, screwed type. ANSI/ASTM A47. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washer; galvanized for galvanized pipe.

2.03 GATE VALVES

- A. Manufacturers:
 - 1. Jenkins
 - 2. Stockham
 - 3. Grinnell
- B. Up to and including 2 Inches: Bronze body, bronze trim, rising stem, handwheel, inside screw, single wedge or disc, threaded ends.
- C. Over 2 Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, double wedge, flanged or grooved ends.

2.04 ANGLE VALVES:

- A. Manufacturers:
 - 1. Jenkins
 - 2. Stockman
 - 3. Grinnell
- B. Up to 2 Inches: Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable composition disc, screwed ends, with backseating capacity repackable

840

under pressure.

- C. Over 2 Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.05 BALL VALVES

A. Manufacturers:

- 1. Victaulic
- 2. Stockham
- 3. Grinnell

- B. Up to and including 2 Inches: Bronze one piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle threaded ends.

2.06 BUTTERFLY VALVES

A. Manufacturers:

- 1. Grinnell
- 2. Victaulic
- 3. Stockham

2.07 CHECK VALVES

A. Manufacturers:

- 1. Grinnell
- 2. Victaulic
- 3. Stockham

- B. Up to and including 2 Inches: Bronze swing disc screwed ends.
- C. Over 2 Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.
- D. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends.

2.08 DRAIN VALVES

A. Manufacturers:

- 1. Grinnell
- 2. Stockham
- 3. Jenkins

- B. Bronze compression stop with hose thread nipple and cap.
- C. Brass ball valve with cap and chain, 3/4 inch hose thread.

2.09 BACKFLOW PREVENTERS

- A. Manufacturers:
1. Watts
 2. Clay-Val
 3. Ames

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install piping in accordance with NFPA 13 for sprinkler systems.
- B. Route piping in orderly manner, plumb and parallel /perpendicular to building structure. Maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09900.
- G. Do not penetrate building structural members unless indicated.
- H. Provide sleeves when penetrating floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required. Refer to Section 15140.
- I. Die cut screw joints with full cut standard taper pipe threads with red lead and linseed oil or other virgin teflon joint compound applied to make threads only.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Provide gate valves for shut-off or isolating services.

- L. Provide drain valves at main shut-off valves, low points of piping and apparatus.
- M. Install backflow preventer in closet with alarm check valve.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Wet-pipe sprinkler system.
- B. System design, installation, and certification.
- C. Fire department connection.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15140: Placement of sleeves.

1.03 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 15310 - Fire Protection Piping: Piping and valves.

1.04 RELATED SECTIONS

- A. Section 02225 - Trenching.
- B. Section 15190 - Mechanical Identification.
- C. Section 15140 - Supports and Anchors

1.05 REFERENCES

- A. NFPA 13 1989 EDITION - Installation of Sprinkler Systems.

1.06 SYSTEM DESCRIPTION

- A. Wet pipe system to provide coverage for entire occupied building.
- B. Provide system to NFPA 13 light hazard and ordinary hazard, Group 1 occupancy requirements.
- C. Interface system with building fire and smoke alarm system.

1.07 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Preliminary Shop Drawings: Prior to detailed submission, submit preliminary layout of finished ceiling areas indicating only head locations coordinated with ceiling installation.
- C. Shop Drawings: Indicate hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls.
- D. Product Data: Provide data on sprinkler heads, valves, and specialties, including manufacturers catalogue information. Submit performance ratings rough-in details, weights, support requirements, and piping connections.
- E. Submit shop drawings, product data, hydraulic calculations to authority having jurisdiction for approval. Submit proof of approval to Architect/Engineer.

1.08 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Record actual locations of sprinkler heads and deviations of piping from drawings. Indicate drain and test locations.

1.09 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include components of system, servicing requirements, Record Drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.10 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 13.
- B. Equipment and Components: Bear UL or FM label or marking.

1.11 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this Section with minimum three years experience.
- B. Design sprinkler system under direct supervision of a responsible managing employee licensed by the State of Texas Fire Marshal.

1.12 REGULATORY REQUIREMENTS

- A. Hydraulic Calculations, Product Data, Shop Drawings: Bear stamp of approval of authority having jurisdiction.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and protect products to site under provisions of Section 01600.
- B. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.14 EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.
- B. Provide extra sprinkler heads under provisions of NFPA 13.
- C. Provide suitable wrenches for each head type.
- D. Provide metal storage cabinet in location designated.

PART 2 - PRODUCTS**2.01 SPRINKLER HEADS****A. Manufacturers:**

1. Viking.
2. Central.
3. Reliable.
4. Substitutions: Under provisions of Section 01600.

B. Suspended Ceiling:

1. Type: Semi-recessed pendant type with matching screw on escutcheon plate.
2. Head Finish: Chrome plated.
3. Escutcheon Plate Finish: Chrome plated.
4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

C. Exposed Area Type:

1. Type: Standard upright type
2. Head Finish: Brass
3. Fusible Link: Glass bulb type temperature rated for specific area hazard.

D. Sidewall Type:

1. Type: Standard horizontal sidewall type with matching escutcheon plate
2. Head Finish: Chrome plated.
3. Escutcheon Plate Finish: Chrome plated.
4. Fusible Link: Glass bulb link type temperature rated for specific area hazard.

2.02 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate electrically and hydraulically operated alarms, with pressure retard chamber and variable pressure trim.
- B. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate electrically and hydraulically operated alarms with accelerator.
- C. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy red enameled gong and motor housing, nylon bearings, and inlet strainer.
- D. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts rated 10 amp at 115 volt AC.
- E. Fire Department Connection: Fire Department Inlet connection: Standard post type siamese. Chromed brass finish, 2½ inch size, thread to match fire department hardware,

**SECTION 15330
SPRINKLER SYSTEMS**

automatic drip two way threaded dust cap and chain of same material and finish, marked "AUTOSPKR".

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Coordinate work of this Section with other affected work.

3.02 INSTALLATION

- A. Install equipment in accordance with manufacturers instructions.
- B. Install buried shut-off valves in valve box. Provide post indicator.
- C. Provide double check valve assembly at sprinkler system water source connection.
- D. Locate fire department connection at remote fire department valve pit.
- E. Locate water motor alarm on exterior building wall.
- F. Route pipe in an orderly manner, plumb and parallel/perpendicular to building structure. Maintain gradient.
- G. Place piping in concealed spaces above finished ceilings.
- H. Center sprinklers on lay-in ceiling tiles.
- I. Flush entire piping system of foreign matter.
- J. Hydrostatically test entire system to 250 psi for 2 hours in accordance with NFPA 13.
- K. Require test be witnessed by authority having jurisdiction Architect/Engineer and owner's representative.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Pipe and pipe fittings.
- B. Valves.
- C. Storm and Sanitary sewer piping systems.
- D. Domestic water piping system.
- E. Natural Gas Piping System.

1.02 RELATED WORK

- A. Section 02222 - Excavation.
- B. Section 02223 - Backfilling.
- C. Section 02225 - Trenching.
- C. Section 15121 - Expansion Compensation.
- D. Section 15140 - Supports and Anchors.
- E. Section 15190 - Mechanical Identification.
- F. Section 15242 - Vibration Isolation.
- G. Section 15260 - Piping Insulation.
- H. Section 15430 - Plumbing Specialties.
- I. Section 15440 - Plumbing Fixtures.
- J. Section 15450 - Plumbing Equipment.

1.03 REFERENCES

- A. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 NS 300.
- B. ANSI/ASME Sec. 9 - Welding and Brazing Qualifications.
- C. ANSI/ASTM B32 - Solder Metal.
- D. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- E. ANSI/AWS D1.1 - Structural Welding Code.
- F. ANSI/AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
- G. ANSI/AWWA C110 - Ductile - Iron and Gray - Iron Fittings 3 in. through 48 in., for Water and Other Liquids.
- H. ANSI/AWWA C111- Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.
- I. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- J. ASME - Boiler and Pressure Vessel Code.

- K. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- L. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- M. ASTM B88 - Seamless Copper Water Tube.
- N. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- O. AWS A5.8 - Brazing Filler Metal.
- P. AWWA C601 - Standard Methods for the Examination of Water and Waste Water.
- Q. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.

1.04 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
- C. Welders Certification: In accordance with ANSI/ASME Sec 9.

1.05 SUBMITTALS

- A. Submit product data under provisions of the General Conditions.
- B. Include data on pipe materials, pipe fittings, valves and accessories.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of the General Conditions.
- B. Store and protect products under provisions of the General Conditions.
- C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.01 STORM AND SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast Iron
 - 2. Joints: ASTM C564, neoprene gasket system.

2.02 STORM AND SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast Iron
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.03 WATER PIPING ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 95TA.

2.04 WATER PIPING, BURIED

- A. Copper Tubing: ASTM B88, Type L, annealed.
1. Fittings: ASME B16.26, cast bronze.
2. Joints: Flared.

2.05 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53 or A120, Schedule 40 black.
1. Fittings: ASME B16.3, malleable iron, or ASTM A234, forged steel welding type.
2. Joints: NFPA 54 Threaded or welded to ANSI B31.1.

2.06 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Steel pipe: ASTM A53 or A120, Schedule 40 black.
1. Fittings: ASTM A234, forged steel welding type, with AWWA C105 polyethylene jacket or double layer, half lapped 10 mil polyethylene tape.
2. Joints: ANSI B31.1, welded.

2.09 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16 inch thick.
- C. Grooved and Shouldered Pipe End Couplings: Malleable iron housing clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; "C" shape composition sealing gasket; steel bolts, nuts, and washers; galvanized couplings for galvanized pipe.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, water impervious isolation barrier.

2.10 ACCEPTABLE MANUFACTURERS - GATE VALVES

- A. Stockham Model B-103, G-623
B. Milwaukee Model 105, 115, F-2889
C. Hammond Model 645, 647, 1R-1140

2.11 GATE VALVES

- A. Up to 2 Inches: Bronze body, non-rising stem and handwheel, inside screw, single wedge or disc, threaded ends, 150 psi working pressure.

- B. Over 2 Inches: Iron body, bronze trim, rising stem and handwheel, OS&Y, single wedge, flanged ends, 200 psi working pressure.

2.12 ACCEPTABLE MANUFACTURERS - GLOBE VALVES

- A. Stockham Model B-22
- B. Milwaukee Model 590, 1590
- C. Hammond Model 1B-413 or 1B-423

2.13 GLOBE VALVES

- A. Up to 2 Inches: Bronze body, rising stem and handwheel, inside screw, renewable composition disc, screwed ends, with backseating capacity and 150 psi working pressure.

2.14 ACCEPTABLE MANUFACTURERS - BALL VALVES

- A. Stockham Model S-214 BRT T
- B. Conbraco "Apollo" Model 70-100, 70-200
- C. Hammond Model 8201, 8211

2.15 BALL VALVES

- A. Up to 2 Inches: Bronze body, stainless steel ball, teflon seats and stuffing box ring, lever handle, threaded ends and 200 psi working pressure.

2.16 RELIEF VALVES

- A. Bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.

- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08305.
- H. Slope water piping and arrange to drain at low points.
- I. Establish elevations of buried piping outside the building to ensure not less than 5 feet of cover.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Section 09900.
- L. Establish invert elevations, slopes for drainage to one percent minimum. Maintain gradients.
- M. Excavate in accordance with Division 2 for work of this Section.
- N. Backfill in accordance with Division 2 for work of this Section.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Provide one plug cock wrench for every ten plug cocks sized 2 inches and smaller, minimum of one. Provide each plug cock sized 2-1/2 inches and larger with a wrench with set screw.

3.03 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe or ball valves for throttling, bypass, or manual flow control services.

3.04 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C601.
- I. Tests to be performed by certified technician. Certified test results are to be submitted to Engineer for review.
- J. Flush water piping prior to connection to existing system.

3.05 SERVICE CONNECTIONS

- A. Connect to site sanitary sewer systems. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Connect to site water system. Refer to Civil Plans
- C. Connect to gas system. Refer to plans.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Water closets.
- B. Urinals.
- C. Lavatories.
- D. Sinks.
- E. Water Cooler

1.02 RELATED WORK

- A. Section 06410 - Custom Casework: Preparation of counters for sinks.
- B. Section 07900 - Joint Sealers: Seal fixtures to walls and floors.
- C. Section 10800 - Toilet and Bath Accessories: Lavatory tops.
- D. Section 11400 - Food Services Equipment.
- E. Section 15140 - Anchors and Supports.
- F. Section 15410 - Plumbing Piping.
- G. Section 15430 - Plumbing Specialties.
- H. Section 15450 - Plumbing Equipment.

1.03 REFERENCES

- A. ANSI A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- B. ANSI A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
- C. ANSI A112.19.2 - Vitreous China Plumbing Fixtures.
- D. ANSI A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.

1.04 QUALITY ASSURANCE

- A. Fixtures: By same manufacturer for each product specified throughout.
- B. Trim: By same manufacturer for each product specified throughout.

1.05 SUBMITTALS

- A. Submit product data under provisions of the General Conditions.
- B. Include fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

**SECTION 15440
PLUMBING FIXTURES****1.06 OPERATION AND MAINTENANCE DATA**

- A. Submit operation and maintenance data under provisions of the General Conditions.
- B. Include fixture trim exploded view and replacement parts lists.

1.07 WARRANTY

- A. Provide five-year manufacturer's warranty.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS - FIXTURES**

- A. American Standard
- B. Kohler
- C. Eljer

2.02 ACCEPTABLE MANUFACTURERS - FIXTURE TRIM

- A. Chicago Faucet Company
- B. T and S Brass
- C. Delta Faucet Company
- D. Fixture Manufacturer

2.03 ACCEPTABLE MANUFACTURERS - FLUSH VALVES

- A. Sloan Royal
- B. Delaney
- C. Zurn

2.04 ACCEPTABLE MANUFACTURERS - WATER CLOSET SEATS

- A. Olsonite
- B. Behneke
- C. Bemis
- D. Fixture Manufacturer

2.05 ACCEPTABLE MANUFACTURERS - FIXTURE CARRIERS

- A. Wade
- B. Smith
- C. Josam
- D. Zurn

2.06 FIXTURE SCHEDULES

- A. See drawings for fixture schedules.

PART 3 - EXECUTION**3.01 INSPECTION**

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- B. Verify adjacent construction is ready to receive rough-in work of this Section.

3.02 INSTALLATION

- A. Install each fixture with 17 gauge brass trap, easily removable for servicing and cleaning. P-traps shall be provided without a cleanout.
- B. Provide chrome plated rigid supplies to fixtures with loose key stops reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07900, color to match fixture.
- F. Refer to Architectural drawings for fixture mounting.
- G. All exposed parts shall be chrome plated.

3.03 ADJUSTING AND CLEANING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- B. At completion clean plumbing fixtures and equipment.

END OF SECTION

SECTION 15450
PLUMBING EQUIPMENT**PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Electric Water Heaters

1.02 RELATED WORK

- A. Section 15140 - Supports and Anchors.

1.03 REFERENCES

- A. ANSI/ASME Section 8D - Pressure Vessels.
- B. ANSI/NFPA 70 - National Electrical Code.

1.04 QUALITY ASSURANCE

- A. Provide water heaters with manufacturer's name, model number, and rating/capacity identified.
- B. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
 - 1. National Sanitation Foundation (NSF).
 - 2. American Society of Mechanical Engineers (ASME).
 - 3. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
 - 4. National Electrical Manufacturers' Association (NEMA).
 - 5. Underwriters Laboratories (UL).

1.05 REGULATORY REQUIREMENTS

- A. Conform to NSF, ANSI/NFPA 54, ANSI/NFPA 70, ANSI/UL 1453 requirements for water heaters.

1.06 SUBMITTALS

- A. Submit shop drawing and product data under provisions of the General Conditions.
- B. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.
- C. Submit manufacturer's installation instructions under provisions of the General Conditions.
- D. Submit manufacturer's certificate under provisions of the General Conditions that pressure vessels meet or exceed specified requirements.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of the General Conditions.

**SECTION 15450
PLUMBING EQUIPMENT**

- B. Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of the General Conditions.
- B. Store and protect products under provisions of the General Conditions.
- C. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

- A. Provide five-year manufacturer's warranty under provisions of the General Conditions.
- B. Warranty: Include coverage of domestic water heaters.

PART 2 - GENERAL**2.01 ELECTRIC WATER HEATERS**

- A. Type: Factory assembled and wired, electric, vertical storage.
- B. Performance: Refer to Schedule on Plans
- C. Tank: Glass lined welded steel ASME labeled; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
- D. Accessories: Brass water connections and dip tube, drain valve, high density magnesium anode, and ASME rated temperature and pressure relief valve.
- E. Controls: Automatic immersion water thermostat with temperature range adjustable from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.

PART 3 - EXECUTION**3.01 WATER HEATER SCHEDULE**

- A. See drawings for schedule.

3.02 WATER HEATER INSTALLATION

- A. Install water heaters in accordance with manufacturer's instructions and to AGA requirements.
- B. Coordinate with plumbing piping and electrical work to achieve operating system.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Pipe and pipe fittings.
- B. Valves.
- C. Heating water piping system.
- D. Chilled water piping system.

1.02 RELATED WORK

- A. Section 15121 - Expansion Compensation.
- B. Section 15140 - Supports and Anchors.
- C. Section 15190 - Mechanical Identification.
- D. Section 15242 - Vibration Isolation.
- E. Section 15260 - Piping Insulation.
- F. Section 15515 - Hydronic Specialties.

1.03 REFERENCES

- A. ANSI/ASME - Boiler and Pressure Vessel Code.
- B. ANSI/ASME Sec 9 - Welding and Brazing Qualifications.
- C. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 and 300.
- D. ANSI/AWS A5.8 - Brazing Filler Metal.
- E. ANSI/AWS D1.1 - Structural Welding Code.
- F.. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- G. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.
- H. ASTM A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- I. ASTM B32 - Solder Metal.
- J. ASTM B88 - Seamless Copper Water Tube.

1.04 REGULATORY REQUIREMENTS

**Section 15510
HYDRONIC PIPING**

- A. Conform to ANSI/ASME B31.9.
- 1.05 QUALITY ASSURANCE
 - A. Valves: Manufacturer's name and pressure rating marked on valve body.
 - B. Welding Materials and Procedures: Conform to ANSI/ASME SEC 9 and applicable state labor regulations.
 - C. Welders Certification: In accordance with ANSI/ASME SEC 9.
- 1.06 SUBMITTALS
 - A. Submit product data under provisions of Section 01300.
 - B. Include data on pipe materials, pipe fittings, valves, and accessories.
 - C. Include welders certification of compliance with ANSI/ASME SEC 9.
- 1.07 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver products to site under provisions of Section 01600.
 - B. Store and protect products under provisions of Section 01600.
 - C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

- 2.01 HEATING WATER PIPING, ABOVE GROUND
 - A. Steel Pipe: ASTM A53 or A120, Schedule 40, black.
 - 1. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings.
 - 2. Joints: Screwed, or ANSI/AWS D1.1, welded.
- 2.02 CHILLED WATER PIPING, BURIED
 - A. Steel Pipe: ASTM A535 or A120, Schedule 40, black.
 - 1. Fittings: ASTM A234, forged steel welding type.
 - 2. Joints: ANSI/AWS D1.1, welded.
 - 3. Casing Polyurethane insulation with high density polyethylene jacket and heat shrink sleeves.
- 2.03 CHILLED WATER PIPING, ABOVE GRADE
 - B. Steel Pipe: ASTM A53 or A120, Schedule 40, black.
 - 3. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel welding type.
 - 4. Joints: Screwed for pipe 2 inch and under; ANSI/AWS D1.1 welded for pipe over 2 inch.

2.04 EQUIPMENT DRAINS AND OVERFLOWS

- A. Copper Tubing: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ANSI/ASME B16.23 cast brass, or ANSI/ASME B16.29 solder wrought copper.
 - 2. Joints: ASTM B32, solder, Grade 95TA.

2.05 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches (50 mm) and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; 1/16 inch thick preformed neoprene bonded to asbestos.
- C. Grooved and Shouldered Pipe End Couplings: Malleable iron housing clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; C-shape elastomer composition sealing gasket for operating temperature range from -30 degrees F to 230 degrees F; steel bolts, nuts, and washers; galvanized couplings for galvanized pipe.

2.06 ACCEPTABLE MANUFACTURERS - GATE VALVES

- A. Milwaukee.
- B. Stockham.
- C. Jenkins.
- D. Substitutions: Under provisions of section 01600.

2.07 GATE VALVES

- A. Up to 2 Inches: Bronze body, bronze trim, non-rising stem, handwheel, inside screw, double wedge or disc threaded ends.
- B. Over 2 Inches: Iron body, bronze trim, rising] stem, handwheel, OS&Y, double wedge, flanged or grooved ends.

2.08 ACCEPTABLE MANUFACTURERS - GLOBE VALVES

- A. Milwaukee.
- B. Stockham.
- C. Jenkins.
- D. Substitutions: Under provisions of section 01600.

2.09 ACCEPTABLE MANUFACTURERS - BALL VALVES

**Section 15510
HYDRONIC PIPING**

- A. Milwaukee.
- B. Stockham.
- C. Jenkins.
- D. Substitutions: Under provisions of section 01600.

2.10 BALL VALVES

- A. Up to 2 Inches: Stainless steel two piece body, stainless steel ball, teflon seats and stuffing box ring, lever handle, and balancing stops, threaded ends.
- B. Over 2 Inches: Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle, flanged.

2.11 ACCEPTABLE MANUFACTURERS - BUTTERFLY VALVES

- A. Milwaukee.
- B. Stockham.
- C. Jenkins.
- D. Substitutions: Under provisions of section 01600.

2.12 BUTTERFLY VALVES

- A. Iron body, bronze disc, resilient replaceable seat for service to 250 degrees F, wafer or lug ends, extended neck, 10 position lever handle.

2.13 ACCEPTABLE MANUFACTURERS - SWING CHECK VALVES

- A. Milwaukee.
- B. Stockham.
- C. Jenkins.
- D. Substitutions: Under provisions of section 01600.

2.14 SWING CHECK VALVES

- A. Up to 2 Inches: Bronze 45 degree swing disc, screwed ends.
- B. Over 2 Inches: Iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

2.15 ACCEPTABLE MANUFACTURERS - SPRING LOADED CHECK VALVES

- A. Milwaukee.

- B. Stockham.
- C. Jenkins.
- D. Substitutions: Under provisions of section 01600.

2.16 SPRING LOADED CHECK VALVES

- A. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer or flanged ends.

PART 3 - EXECUTION

3.01 PREPARATION

- B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment with flanges or unions.
- E. After completion, fill, clean, and treat systems.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- B. Install piping to conserve building space, and not interfere with use of space and other work.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 15121.
- E. Provide clearance for installation of insulation, and access to valves and fittings.
- F. Provide access where valves and fittings are not exposed.
- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Refer to Section 09900.
- J. Install valves with stems upright or horizontal, not inverted.

3.03 APPLICATION

863

Section 15510
HYDRONIC PIPING

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install butterfly valves for throttling, bypass, or manual flow control services.
- E. Provide spring loaded check valves on discharge of condenser water pumps.
- F. Use butterfly valves interchangeably with gate and globe valves.
- G. Use only butterfly valves in chilled and condenser water systems for throttling and isolation service.
- H. Use lug end butterfly valves to isolate equipment.
- I. Provide 3/4 inch ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest drain.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Expansion tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Pump suction fittings.
- F. Combination fittings.
- G. Flow indicators, controls, meters.
- H. Relief valves.

1.02 RELATED WORK

- A. Section 15510 - Hydronic Piping.

1.03 REFERENCES

- A. ANSI/ASME - Boilers and Pressure Vessels Code.

1.04 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME Boilers and Pressure Vessels Code Section 8D for manufacture of tanks.

1.05 QUALITY ASSURANCE

- A. Manufacturer: For each product specified, provide components by same manufacturer throughout.

1.06 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Submit product data for manufactured products and assemblies required for this project.
- C. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.

**SECTION 15515
HYDRONIC SPECIALTIES**

- B. Include installation instruction, assembly views, lubrication instructions, and replacement parts list.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS - DIAPHRAGM-TYPE COMPRESSION TANKS**

- A. TACO.
- B. Bell & Gossett.
- C. Amtrol
- D. Substitutions: Under provisions of section 01600.

2.02 DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Construction: Welded steel, tested and stamped in accordance with Section 8D of ANSI/ASME Code; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- B. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psig.

2.03 ACCEPTABLE MANUFACTURERS - AIR VENTS

- A. Bell & Gossett.
- B. Substitutions: Under provisions of section 01600.

2.04 AIR VENTS

- A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- B. Float Type: Brass or semi-steel body, copper float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

2.05 ACCEPTABLE MANUFACTURERS - AIR SEPARATORS

- A. Bell & Gossett.
- B. Substitutions: Under provisions of section 01600.

2.06 AIR SEPARATORS**866**

- A. Dip Tube Fitting: For 125 psig operating pressure; to prevent free air collected in boiler from rising into system.
- B. In-line Air Separators: Cast iron for sizes 1-1/2 inch and smaller, or steel for sizes 2 inch and larger; tested and stamped in accordance with Section 8D of ANSI/ASME Code; for 125 psig operating pressure.
- C. Air Elimination Valve: Bronze, float operated, for 125 psig operating pressure.

2.07 ACCEPTABLE MANUFACTURERS - STRAINERS

- A. Armstrong
- B. Mueller
- C. Stockham
- D. Jenkins
- E. Substitutions: Under provisions of section 01600.

2.08 STRAINERS

- A. Size 2 inch and Under: Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- B. Size 2-1/2 inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

2.09 ACCEPTABLE MANUFACTURERS - PUMP SUCTION FITTINGS

- A. TACO.
- B. Bell & Gossett.
- C. PACO.
- D. Substitutions: Under provisions of section 01600.

2.10 PUMP SUCTION FITTINGS

- A. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psig working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable fine mesh strainer to fit over cylinder strainer, and permanent magnet located in flow stream and removable for cleaning.
- B. Accessories: Adjustable foot support, blowdown tapping in bottom, gage tapping in side.

2.11 ACCEPTABLE MANUFACTURERS - COMBINATION PUMP DISCHARGE VALVES

- A. TACO.

**SECTION 15515
HYDRONIC SPECIALTIES**

- B. Ebl & Gossett.
- C. PACO.
- D. Substitutions: Under provisions of section 01600.

2.12 COMBINATION PUMP DISCHARGE VALVES

- A. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psig operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

2.13 ACCEPTABLE MANUFACTURERS - FLOW CONTROLS

- A. Armstrong.
- B. Griswold.
- C. Flow Design, Inc.
- D. Substitutions: Under provisions of section 01600.

2.14 FLOW CONTROLS

- E. Construction: Brass or bronze body with union on inlet temperature and pressure test plug on inlet and outlet.
- F. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psig.
- G. Control Mechanism: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.
- H. Accessories: In-line strainer on inlet and ball valve on outlet.

2.15 ACCEPTABLE MANUFACTURERS - RELIEF VALVES

- A. Watts.
- B. Hoffman.
- C. Bell & Gossett.
- D. Substitutions: Under provisions of section 01600.

2.16 RELIEF VALVES

- A. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 - EXECUTION

**SECTION 15515
HYDRONIC SPECIALTIES****3.01 INSTALLATION AND APPLICATION**

- A. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- B. Support tanks inside building from building structure in accordance with manufacturer's instructions.
- C. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- D. Provide manual air vents at system high points and as indicated.
- E. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- F. Provide air separator on suction side of system circulation pump.
- G. Provide valved drain and hose connection on strainer blow down connection.
- H. Provide pump suction fitting on suction side of base mounted centrifugal pumps. Remove temporary strainers after cleaning systems.
- I. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps.
- J. Support pump fittings with floor mounted pipe and flange supports.
- K. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
- L. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- M. Pipe relief valve outlet to nearest floor drain.

END OF SECTION

**SECTION 15540
HVAC PUMPS****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Base mounted pumps.

1.02 RELATED WORK

- A. Section 15170 - Motors.
- B. Section 15242 - Vibration Isolation.
- C. Section 15260 - Piping Insulation.
- D. Section 15280 - Equipment Insulation.
- E. Section 15510 - Hydronic Piping.
- F. Section 15515 - Hydronic Specialties.

1.03 REFERENCES

- A. ANSI/UL 778 - Motor Operated Water Pumps.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture, assembly, and field performance of pumps with minimum three years experience.
- B. Alignment: Base mounted pumps shall be aligned by qualified millwright and alignment certified.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.

1.08 EXTRA PARTS

- A. Provide one extra set of mechanical seals for pumps under provisions of Section 01700.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. PACO.
- B. TACO.
- C. Bell & Gossett.
- D. Substitutions: Under provisions of Section 01600.

2.02 GENERAL CONSTRUCTION REQUIREMENTS

- A. Balance: Rotating parts, statically and dynamically.
- B. Construction: To permit servicing without breaking piping or motor connections.
- C. Pump Motors: Operate at 1750 rpm unless specified otherwise. Refer to Section 15170.
- D. Pump Connections: Flanged.

2.03 BASE MOUNTED PUMPS

- A. Type: Horizontal shaft, single stage, direct connected, radially split casing, for 125 psig maximum working pressure.
- B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze, fully enclosed, keyed to shaft.
- D. Bearings: Grease lubricated roller or ball bearings.
- E. Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.
- F. Seal: Carbon rotating against a stationary ceramic seat, viton fitted, 225 degrees F maximum continuous operating temperature.
- G. Drive: Flexible coupling with coupling guard.
- H. Baseplate: Cast iron or fabricated steel with integral drain rim.

PART 3 - EXECUTION**3.09 INSTALLATION**

- A. Install pumps in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- C. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- D. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For close coupled or base mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches (102 mm) and over. [Refer to Section 15242.]
- E. Provide air cock and drain connection on horizontal pump casings.
- F. Provide drains for bases and seals, piped to and discharging into floor drains.
- G. Lubricate pumps before start-up.
- H. Install base mounted pumps on concrete base, with anchor bolts, set and level, and grout in place.
- I. Qualified millwright shall check, align, and certify base mounted pumps prior to start-up.

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Boilers.
- B. Controls and boiler trim.
- C. Hot water connections.
- D. Fuel burning system and connection.

1.02 RELATED SECTIONS

- A. Section 15170 - Motors.
- B. Section 16180 - Equipment Wiring Systems.

1.03 REFERENCES

- A. AGA - Directory of Certified Appliances and Accessories.
- B. ANSI/AGA Z21.13 - Gas-Fired Low-Pressure Steam and Hot Water Boilers.
- C. ANSI/AGA Z223.1 - National Fuel Gas Code.
- D. ANSI/ASME SEC4 - Boiler and Pressure Vessels Code - Rules for Construction of Heating Boilers.
- E. ANSI/ASME SEC8D - Boilers and Pressure Vessels Code - Rules for Construction of Pressure Vessels.
- F. ANSI/NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Submit product data indicating general assembly, components, controls, safety controls, and wiring diagrams, and service connections.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.
- D. Submit manufacturer's field reports under provisions of Section 01400.
- E. Submit reports indicating condition and operation at start-up.
- F. Submit test reports under provisions of Section 01400.
- G. Submit reports indicating specified performance and efficiency is met or exceeded.

**SECTION 15561
FIRE TUBE BOILERS****1.05 OPERATION AND MAINTENANCE DATA**

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME SEC4 and SEC8D for construction of boilers.
- B. Units: AGA certified, UL labeled.
- C. Conform to applicable code for internal wiring of factory wired equipment.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Protect boilers from damage by leaving factory inspection openings and shipping packaging in place until final installation.

1.09 WARRANTY

- A. Provide three year manufacturer's warranty under provisions of Section 01700.
- B. Warranty: Include coverage of entire package.

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

- A. PVI.
- B. Substitutions: Under provisions of Section 01600.

2.02 MANUFACTURED UNITS

- A. Provide factory assembled, factory fire-tested, self-contained, readily transported unit ready for automatic operation except for connection of water, fuel, electrical, and vent services.
- B. Unit: Mount on integral structural steel frame base and include integral forced draft burner, burner controls, boiler trim, refractory, insulation and jacket.

2.03 BOILER SHELL

- A. Construct applicable ANSI/ASME Boiler and Pressure Vessels Code for allowable working pressure of 125 psi water.
- B. Provide two lifting eyes on top of boiler.
- C. Provide observation ports at each end of boiler.
- D. Provide handholes and armholes for boiler inspection and cleaning.
- E. Insulate casing with readily removable, glass fiber blanket insulation covered by sectional preformed sheet metal jacket.
- F. Factory paint boiler, base, and other components.
- G. Water entering hot water boiler thoroughly mixed with hot boiler water through jet induced circulation.
- H. Provide thermometer, 3-1/2 inch diameter, black letters on white background, bi-metal type.
- I. Provide with Fire power burner and turbo power module.
- J. Provide with solid state electronic flame safeguard.

2.04 HOT WATER BOILER TRIM

- A. Provide pressure gage and thermometer and ASME rated pressure relief valves.
- B. Provide low water cut-off with manual reset to automatically prevent burner operation whenever boiler water falls below safe level.
- C. Provide operating temperature controller to control burner operation to maintain boiler water temperature.
- D. Limit temperature controller to control burner to prevent boiler water temperature from exceeding safe system water temperature.

2.05 FUEL BURNING SYSTEM

- A. General: Forced draft automatic burner integral with front head of boiler designed to burn natural gas. Burner operation modulating with low fire ignition position.
- B. Gas Burner: Forced draft, premix, power burner with gas-electric ignition and gas pressure regulator.
- C. Blower: Statically and dynamically balanced to supply combustion air. Equipment with inlet silencer and outlet air dampers. Direct connected to motor.
- D. Natural Gas Burner Piping: Include on unit complete FM gas train including pressure reducing valve or valves.

**SECTION 15561
FIRE TUBE BOILERS****2.06 PERFORMANCE**

- A. Minimum efficiency, verified by factory and site tests shall be minimum 83 percent from 30 to 100 percent of full load firing rate.
- B. Provide 1 boiler for producing hot water, with gross input 800,000 Btu/hr, gross output 664,000 Btu/hr, at sea level. PVI model 1000N 250A-TP.

2.07 SOURCE QUALITY CONTROL

- A. Provide factory tests to check construction, controls, and operation of unit.

PART 3 - EXECUTION**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service. Refer to Section 16180.
- C. Provide connection of gas service in accordance with ANSI/AGA Z223.1.
- D. Pipe relief valves to nearest floor drain.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 01600.
- B. Provide field representative for starting unit and training operator.
- C. Provide combustion test and submit report. Test shall include boiler firing rate, overfire draft, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Chiller package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Chilled water connections.
- E. Starters.
- F. Electrical power connections.

1.02 RELATED SECTIONS

- A. Section 15170 - Motors
- B. Section 15510 - Hydronic Piping.
- C. Section 15540 - HVAC Pumps.
- D. Section 15990 - Testing, Adjusting, and Balancing.
- E. Section 16180 - Equipment Wiring Systems.

1.03 REFERENCES

- A. ANSI/ARI 550 - Water - Chilling Packages.
- B. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- C. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.
- D. ANSI/ASME SEC 8 - Boiler and Pressure Vessel Code
- E. ANSI/NEMA MG 1 - Motors and Generators.

1.04 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300.
- B. Submit shop drawings indicating components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate valves, strainers, and thermostatic valves required for complete system.
- C. Submit product data under provisions of Section 01300.
- D. Submit product data indicating rated capacities, weights, specialties and accessories,

**SECTION 15682
AIR COOLED WATER CHILLERS**

electrical requirements and wiring diagrams.

- E. Submit written certification that components of package not furnished by manufacturer have been selected in accordance with manufacturers requirements.
- F. Submit manufacturer's installation instructions under provisions of Section 01300.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operations data under provisions of Section 01700.
- B. Include start-up instructions, maintenance data, parts lists, controls, and accessories. Include trouble-shooting guide.
- C. Submit maintenance data under provisions of Section 01700.

1.06 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ARI 550 code for testing and rating of water chillers.
- B. Conform to ANSI/ASME SEC 8 Boiler and Pressure Vessel Code for construction and testing of reciprocating water chillers.
- C. Conform to ANSI/ASHRAE 15 code for construction and operation of reciprocating water chillers.
- D. Provide certification of inspection for conforming authority having jurisdiction approval.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- D. Protect units on site from physical damage.

1.08 WARRANTY

- A. Provide five year warranty under provisions of Section 01700.
- B. Warranty: Include coverage for compressor complete assembly including materials and labor.

1.09 MAINTENANCE SERVICE

- A. Furnish service and maintenance of complete assembly for one year from Date of Substantial Completion.

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

- A. Trane, Model RTAA 110.
- B. York.
- C. McQuay.
- D. Substitutions: Under provisions of Section 01600.

2.02 MANUFACTURED UNITS

- A. Provide factory assembled and tested outdoor air cooled liquid chillers consisting of rotary screw compressors, condenser, evaporator, thermal expansion valve, refrigeration accessories, and control panel. Construction and ratings shall be in accordance with ANSI/ARI 550.
- B. Provide 1 air cooled water chiller, having minimum capacity of 99 tons of refrigeration when delivering 235 gpm of chilled water at 42 degrees F. No less than 0.0005 fouling factor, with air entering condenser at 105 degrees F and power input of 135.4 kW. Water head loss thru evaporator 10 feet maximum.

2.03 COMPRESSORS

- A. Construct semi-hermetic rotary screw compressors with capacity control slide valve, rolling element bearings. Motor should be suction gas cooled.
- B. Statically and dynamically balance rotating parts and mount on vibration isolators.
- C. Provide reversible, positive displacement, oil pump lubrication system with oil charging valve, oil level sight glass, oil filter, and magnetic plug on strainer, arranged to ensure adequate lubrication during starting, stopping, and normal operation.
- D. Provide constant speed 3600 rpm compressor motor, suction gas cooled with solid state sensor and electronic winding overheating protection, designed for across-the-line starting. Furnish with integral starter.
- E. Provide crankcase heater to evaporate refrigerant returning to crankcase during shut down. Energize heater when compressor is not operating.

2.04 EVAPORATOR

- A. Provide shell and tube type evaporator, seamless or welded steel construction with cast iron or fabricated steel heads, seamless copper tubes or red brass tubes with integral fins, rolled or silver brazed into tube sheets.
- B. Design, test, and stamp refrigerant side for 300 psig working pressure and water side for 215 psig working pressure, in accordance with ANSI/ASME SEC 8.

SECTION 15682
AIR COOLED WATER CHILLERS

- C. Insulate with 0.75 inch minimum thick flexible polyurethane foam insulation with maximum K value of 0.26. Provide heat tape to protect evaporator to -20 degrees F.
- D. Provide water drain connection and thermometer wells for temperature controller and low temperature cutout.

2.05 CONDENSERS

- A. Construct condenser coils of aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits with liquid accumulators. Air test under water to 506 psig.
- B. Provide vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Equip with permanently lubricated ball bearings. Provide factory mounted, louvered, galvanized steel coil guard panels.
- C. Provide fan motors with permanently lubricated ball bearings and built-in current and overload protection. Refer to Section 15170.

2.06 ENCLOSURES

- A. House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.
- B. Mount starters and disconnects in weatherproof panel provided with full opening access doors. Provide mechanical interlock to disconnect power when door is opened.

2.07 REFRIGERANT CIRCUIT

- A. Provide two refrigerant circuits, factory supplied and piped.
- B. Provide for each refrigerant circuit:
 - 1. Liquid line solenoid valve.
 - 2. Filter dryer (replaceable core type).
 - 3. Liquid line sight glass and moisture indicator.
 - 4. Electronic expansion valve sized for maximum operating pressure.
 - 5. Charging valve.
 - 6. Insulated suction line.
 - 7. Discharge line check valve.
 - 8. Compressor suction and discharge service valve.
 - 9. Condenser pressure relief valve.

2.08 CONTROLS

- A. On chiller, mount weatherproof steel control panel, containing starters power and control wiring, factory wired with single point power connection.
- B. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection.
- C. Provide the following safety controls arranged so that operating any one will shut down

machine and require manual reset:

1. Low refrigerant temperature switch.
 2. High condensing temperature switch for each compressor.
 3. Low suction pressure switch for each compressor.
 4. Oil pressure switch.
 5. Motor current overload.
 6. Flow switch in chilled water line.
 7. Phase loss, reversal or imbalance.
 8. Evaporator freeze protection.
 9. Loss of refrigerant.
 10. High refrigerant pressure.
 11. Reverse rotation.
- D. Provide a menu driven digital display to indicate operating data points including:
1. Chilled water setpoint.
 2. Current limit setpoint.
 3. Leaving chilled water temperature.
 4. Evaporator and condenser refrigerant pressures and temperatures.
 5. Diagnostic message.
- E. Micro computer controls to provide all control functions including:
1. Start up and shut down.
 2. Leaving chilled water temperature control.
 3. Compressor and electronic expansion valve modulation.
 4. Fan sequencing.
 5. Anti recycle logic.
 6. Lead/lag compressor starting.
 7. Load limiting.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Align chiller package on steel or concrete foundations.
- C. Connect to electrical service. Refer to Section 16180.
- D. Connect to chilled water piping. Refer to Section 15510. On inlet, provide thermometer well for temperature controller, thermometer well for temperature limit controller, flow switch, flexible pipe connector, and shut-off valve. On outlet, provide flexible pipe connector and shut-off valve.
- E. Arrange piping for easy dismantling to permit tube cleaning.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 01600.
- B. Supply service of factory trained representative for a minimum period of 2 days to supervise

testing, dehydration and charging of machine, start-up, and instruction on operation and maintenance to Owner.

- C. Supply initial charge of refrigerant and oil.

3.03 DEMONSTRATION

- A. Provide systems demonstration under provisions of Section 15994.
- B. Demonstrate system operation and verify specified performance.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Packaged roof top make up air unit.
- B. Unit controls.
- C. Roof mounting frame and base.

1.02 RELATED SECTIONS

- A. Section 15290 - Ductwork Insulation.
- B. Section 16180 - Equipment Wiring Systems: Electrical supply to units.

1.03 REFERENCES

- A. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- B. ARI 270 - Sound Rating of Outdoor Unitary Equipment.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Submit product data for manufactured products and assemblies required for this project.
- C. Indicate electrical service and duct connections on product data.
- D. Submit manufacturer's installation instructions under provisions of Section 01300.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Protect units from physical damage by storing off site until roof mounting frames are in place, ready for immediate installation of units.

1.07 WARRANTY

- A. Provide eighteen month manufacturer's warranty under provisions of Section 01700.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Semco
- B. Aeon
- C. Govern Aire

2.02 MANUFACTURED UNITS

- A. Provide roof-mounted units.
- B. Unit shall be self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, exhaust fan, total energy and sensible heat wheels, controls, air filters, chilled water cooling coil, hot water heating coil, roof curb.

2.03 FABRICATION

- A. **CASING** - Standard panels shall consist of dual wall 18 gauge galvanized solid exterior skins and 22 gauge galvanized steel solid interior skins enclosing 2 inch thick 3 pcf mineral wool insulation with a U-factor of 0.10 BTU/(hr-sq. ft.-deg.). Removable panels shall be provided for energy recovery wheels, heating and cooling coils. The housing shall be supported by an all-welded epoxy-painted structural base. Lifting lugs shall be welded to the base.
- B. **OUTDOOR INSTALLATION** units shall have a factory-installed, 22 gauge galvanized steel sheet metal roof. Outdoor air intake and exhaust air discharge openings have galvanized steel sheet metal hoods with openings covered with bird screen. Hoods may ship loose for field installation depending on shipping width restrictions.
- C. **ACCESS** - Access shall be provided through large hinged, tightly sealed doors or easily removable access panels. Access doors shall be constructed of the same materials as the unit casing and use standard hardware. Each door shall be provided with two cam type handles and two heavy duty hinges to achieve maximum sealing. Handles are to be internal and external for opening from the inside or outside of the unit. All doors shall be air pressure closing.
- D. **PLENUM FANS** -
 - 1. Fan ratings are based on tests made in accordance with AMCA Standard 210 and shall bear the AMCA seal. Fans shall be of the centrifugal PLENUM TYPE, designed with a scroll type housing. Fans shall incorporate a wheel, heavy gauge reinforced steel inlet plate with removable spun inlet cone, structural steel frame, and shaft and bearings in the AMCA Arrangement 3 configuration to form a heavy duty integral unit. All fan wheels shall be tapered spun wheel cone or shrouds providing stable flow and high rigidity. The wheels shall be non-overloading type. The blades shall be continuously welded, die-formed backward curved (16" and smaller) or airfoil (18" and larger) type, designed for maximum efficiency and quiet operation. Impellers shall be statically and dynamically balanced and the complete fan assembly is test balanced at the operating speed prior to shipment.

2. Shafts shall be AISI rolled steel accurately turned, ground, polished and ring gauged for accuracy. Shafts shall be sized for first critical speed of at least 1.43 times the maximum speed for the class. Bearings shall be heavy duty, grease lubricated, anti-friction ball or roller, self-aligning, pillow block type and selected for minimum average bearing life (AFBMA L-50) in excess of 200,000 hours at the maximum class RPM. Fans shall be mounted on vibration bases with adjustable motor bases, V-belt drives, spring isolators, and flexible connections. Belts shall be designed for a minimum of 1.4 service factor. Drives shall be fixed pitch. Motors shall be standard NEMA frame, high efficiency, with 1.15 service factor and open drip-proof enclosures.

E. ENTHALPY RECOVERY WHEEL -

1. The rotor media shall be of aluminum which is coated to prohibit corrosion, etched or oxidized surfaces are not acceptable. All media surfaces shall be coated with a non-migrating solid adsorbent layer prior to being formed into the honeycomb media structure to insure that all surfaces are coated and that adequate latent capacity is provided. Desiccant coatings that are sprayed on or dip coated, or desiccants that must be reapplied over time are not acceptable.
2. The desiccant shall be specifically developed for the selective adsorption of water vapor. Verification in writing shall be presented from the desiccant manufacturer confirming that the internal pore diameter distribution inherent in the desiccant being provided limits adsorption to materials not larger than the critical diameter of a water molecule (2.8 angstroms). The desiccant must be inorganic. The desiccant utilized shall be a 3A molecular sieve.
3. Equal sensible and latent recovery performance and pressure loss data must be clearly documented through an independent test certification program conducted in accordance with the ASHRAE 84 standard. The data resulting from this test program shall be submitted for comparison with that specified in the bid documents. The test data presentation format shall conform with ASHRAE 84 guidelines, including design conditions, and provided over the full capacity range of 400-1000 ft/min face velocities. Independent wheel testing to document that the desiccant material utilized does not transfer pollutants typically encountered in the indoor air environment shall be provided from a credible test laboratory. The cross-examination and performance certification reports shall be provided for engineering review as part of the submittals for this project.
4. The media shall be cleanable with low temperature steam, hot water or light detergent, without degrading the latent recovery. Dry particles up to 800 microns shall freely pass through the media.

F. SENSIBLE RECOVERY WHEEL -

1. The rotor media shall be made of aluminum which is coated to prohibit corrosion. The media must have a flame spread of less than 25 and a smoke developed of less than 50 when rated in accordance with ASTM E87.
2. Purge Sector - The unit shall be provided with a factory set, field adjustable purge sector designed to limit cross contamination to less than .04 percent of that of the exhaust airstream concentration when operated under appropriate conditions.

3. Rotor Seals - The rotor shall be supplied with labyrinth seals only, which at no time are required to make contact with any rotating surface of the exchanger rotor face. These multi-pass seals shall utilize four labyrinth stages for optimum performance.
4. Rotor Support System - The rotor medial shall be provided in segmented fashion to allow for field erection or replacement of one section at a time without requiring side access. The media shall be rigidly held by a structural spoke system made of extruded aluminum.
5. Rotor Housing - The rotor housing shall be a structural framework which limits the deflection of the rotor due to air pressure loss to less than 1/32". The housing shall be made of galvanized steel to prevent corrosion. The rotor shall be supported by two pillow block bearings which can be maintained or replaced without the removal of the rotor from its casing or the media from its spoke system.
6. Drive System - The rotor shall be driven by a self adjusting belt system. A/C motors are utilized for both constant and variable speed applications.
7. Temperature Control Panel - Where variable speed control is required, it must be accomplished by the use of an A/C inverter. The inverter shall be an Allen Bradley Model 13095, including local start/stop control, manual speed pot and all digital programming. A speed adjustment pot shall be mounted on the front of the enclosure. The drive system shall allow for a turndown ratio of 80:1 (20 rpm to ¼ rpm). The control system shall include four linearized thermistor sensors as follows: (1) Proportional temperature controller mounted in the supply airstream. (2) Differential summer/winter changeover sensors mounted in the outdoor and return airstreams. (3) Frost prevention sensor located in the exhaust airstream. (4) Digital readout of the temperature readings recorded by these sensors and control setpoints shall be displayed by the control panel.
8. Digital Performance Display Module - Digital read out confirming the effectiveness of the energy wheel via temperature readings recorded by these sensors and control set points shall be displayed by the control panel.

G. PRE-FILTERS -

1. Filters shall be Farr type 30/30. Air filters shall be 2" thick, pleated, disposable type. Each filter will consist of a non-woven cotton and synthetic fabric media, media support grid and enclosing frame. The filter media shall have an average efficiency of 25-30% on ASHRAE Test Standard.
2. The filter shall be listed by Underwriters' Laboratories as Class 2. A bank of galvanized universal holding frames shall be arranged for upstream access. Provisions shall be made on the downstream side of the frames to prevent filter blowout.

H. CHILLED WATER COIL -

1. Primary surface shall be round seamless 5/8" O.D. by .020" thick copper tube on 1.5" centers, staggered in the direction of airflow. All joints shall be brazed.

2. Secondary surface shall consist of .0075" rippled aluminum plate fins for higher capacity and structural strength. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Bare copper tube shall not be visible between fins and the fins shall have no openings punched in them. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates.
3. Casings shall be constructed of continuous galvanized steel. Coil side plates shall be of reinforced flange type.
4. Coils shall have equal pressure drop through all circuits. Coils shall be circuited for counterflow heat transfer to provide the maximum mean effective temperature difference for maximum heat transfer rates.
5. Headers on coils shall be seamless copper tubing. The headers shall have intruded tube holes to provide a large brazing surface for maximum strength and inherent flexibility. Supply and return connections shall be steel with male pipe threads.
6. The complete coil core shall be tested with 315 psig air pressure under warm water and be suitable for operation at 250 psig working pressures. Individual tube test and core tests before installation of headers shall not be considered satisfactory. Water cooling coils shall be circuited for drainability. Use of internal restrictive devices to obtain turbulent flow shall not be acceptable. Vents and drains shall be furnished on all coils. Coils shall be rated in accordance with ARI.
7. Coils shall be mounted in galvanized holding racks. Water coil supply and return connections shall be extended to the unit exterior. Water coil drain and vent connections shall be accessible inside the unit. Cooling coils shall be mounted in an insulated, 304 stainless steel condensate pan.

I. HOT WATER COIL -

1. Primary surface shall be round seamless 5/8" O.D. by .020" thick copper tube on 1.5" centers, staggered in the direction of airflow. All joints shall be brazed.
2. Secondary surface shall consist of .075" rippled aluminum plate fins for higher capacity and structural strength. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Bare copper tube shall not be visible between fins and the fins shall have no openings punched in them. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates.
3. Coils shall have equal pressure drop through all circuits. Coils shall be circuited to provide the maximum mean effective temperature difference for maximum heat transfer rates. Headers on coils shall be seamless copper tubing. The headers shall have intruded tube holes to provide a large brazing surface for maximum strength and inherent flexibility. Supply and return connections shall be steel with male pipe threads.

4. The complete coil core shall be tested with 315 psig air pressure under warm water and be suitable for operation at 250 psig working pressures. Coils shall be circuited for drainability. Internal restrictive devices to obtain turbulent flow shall not be used. Vents and drains shall be furnished on all coils. Coils will be rated in accordance with ARI.
 5. Coils shall be mounted in galvanized holding racks. Water coil supply and return connections shall be extended to the unit exterior. Water coil drain and vent connections are accessible inside the unit and are not extended.
- J. OUTDOOR AIR DAMPERS - Dampers shall have galvanized steel frames and blades, with blade jamb seals for low leakage performance. Dampers shall have two-position 24V electric actuators with an integral limit switch. The switch shall be wired through the fan coil.
- K. EXHAUST AIR DAMPERS - Dampers shall be gravity operated backdraft type. Dampers shall have aluminum frames and blades, with blade seals for low leakage performance.
- L. ELECTRICAL -
1. Unit shall require a single 460 volt 3 phase 60 cycle power connection.
 2. The starter panel shall consist of non-fused disconnect, fused IEC full voltage starter for each fan and constant speed wheel, control power transformer and HOA switch for the unit.
 3. All 120 volt and higher wiring shall be run in MC cable for wire sizes up to #8. #6 and larger wire is run in EMT. Fan motors wired with EMT shall have a 2' length of sealtight at the motor junction box. Damper actuators and damper limit switches shall be 24 volt AC and wired using plenum cable, not in conduit. Starter coils shall be 24 volt AC for contactors rated at 75 amps and smaller and 120 volt AC for contactors rated at greater than 75 amps.
- 2.04 ROOF MOUNTING FRAME
- A. 14 inches high galvanized steel, insulated channel frame with gaskets, nailer strips.
- PART 3 - EXECUTION**
- 3.01 EXAMINATION
- A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.
- 3.02 INSTALLATION
- A. Install in accordance with manufacturer's instructions.

- B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting frame level. All utility connections shall be below roof inside roof mounting frame.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Provide initial start-up and shut-down during first year of operation, including routine servicing and check-out.

3.04 SCHEDULE

Designation	Make-up Air Unit
Supply CFM	6220
Supply Ext. S.P., inch W.G.	0.375
Supply Fan HP	10
Exhaust CFM	6220
Exhaust Ext. S.P., inch W.G.	0.375
Exhaust Fan Hp	10
Electrical Characteristics	480/3/60 (Single point power connection).
Cooling Coil Data	
Max. Velocity, FPM	475
Total Capacity, MBH	242.5
Sensible Capacity, MBH	142.2
GPM	46.3
EWT/LWT, °F	44/54
Hot Water Coil Data	
Total Capacity, MBH	173
GPM	18
EWT/LWT, °F	180/160
Unit Design Conditions	
Cooling	
EAT, DB/WB, °F	150/74
LAT, DB/WB, °F	74/61
Heating	
EAT, DB, °F	25
LAT, DB, °F	75
Manufacturer	Semco
Model	EPO-9

END OF SECTION

SECTION 15855
AIR HANDLING UNITS**PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Packaged air handling units.
- B. Heating coils
- C. Filter sections..
- D. Cooling coils.

1.02 RELATED WORK

- A. Section 15121 - Expansion Compensation.
- B. Section 15170 - Motors.
- C. Section 15242 - Vibration Isolation.
- D. Section 15290 - Ductwork Insulation.
- E. Section 15510 - HVAC Piping: Equipment drains.
- F. Section 15890 - Ductwork.
- G. Section 15910 - Ductwork Accessories: Flexible duct connections.
- H. Section 16180 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.03 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AFBMA 11 - Load Rating and Fatigue Life for Roller Bearings.
- C. AMCA 99 - Standards Handbook.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- E. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- F. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.
- G. AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
- H. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- I. ARI 430 - Central-Station Air-Handling Units.
- J. ARI 435 - Application of Central-Station Air-Handling Units.

**SECTION 15855
AIR HANDLING UNITS**

- K. NEMA MGI - Motors and Generators.
 - L. NFPA 70 - National Electrical Code.
 - M. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
 - N. UL 900 - Test Performance of Air Filter Units.
- 1.04 SUBMITTALS
- A. Submit under provisions of Section 01300.
 - B. Shop drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements.
 - C. Product data:
 - 1. Provide literature which indicates dimensions, weights, capacities, ratings, fan performance, gages and finishes of materials, and electrical characteristics and connection requirements.
 - 2. Provide data of filter media, filter performance data, filter assembly, and filter frames.
 - 3. Provide fan curves with specified operating point clearly plotted.
 - 4. Submit sound power level data for both fan outlet and casing radiation at rated capacity.
 - 5. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
 - D. Manufacturer's Installation Instructions.
- 1.05 OPERATION AND MAINTENANCE DATA
- A. Submit under provisions of Section 01700.
 - B. Maintenance Data: Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.
- 1.06 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience, who issues complete catalog data on total product.
- 1.07 DELIVERY, STORAGE, AND HANDLING
- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
 - B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
 - C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

SECTION 15855
AIR HANDLING UNITS

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.09 EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.
- B. Provide one set for each unit of fan belts and filters.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Trane.
- B. McQuay.
- C. York.
- D. Substitutions: Under provisions of Section 01600.

2.02 GENERAL DESCRIPTION

- A. Configuration: Fabricate with fan plus accessories, including,
 - 1. Heating coil.
 - 2. Filter section.
 - 3. Cooling coil section.
- B. Performance Base: Project conditions.
- C. Fabrication: Conform to AMCA 99 and ARI 430.

2.03 CASING

- A. Construction: Fabricate on channel base of welded steel coated externally with manufacturers standard paint finish. Assemble sections with gaskets and bolts.
 - 1. Outside Casing:
 - a. Galvanized Steel: 20 gage
 - 2. Inside Casing:
 - a. Galvanized Steel: 20 gage
- B. Insulation: 1 inch thick, 1-1/2 lbs per cu ft density, glass fiber insulation, "K" value at 75 degrees F maximum 0.26 Btu/inch/sq ft/degrees F/hr. Insulation shall be installed between inner and outer casing.
- C. Finish: Standard manufacturers galvanized steel finish.
- D. Access Doors: Full size inch of galvanized steel for flush mounting, with gasket, latch, and handle assembly.

**SECTION 15855
AIR HANDLING UNITS**

- E. Drain Pans: Construct from double thickness galvanized steel with insulation between layers with welded corners. Cross break and pitch to drain connection. Provide drain pans under cooling coil section.
- F. Strength: Provide structure to brace casings for negative pressure of 4 inch wg and positive pressure of 6 inch wg, with maximum deflection of 1 in 200.

2.04 FANS

- A. Type: Forward curved, double width, double inlet, centrifugal type fan.
- B. Performance Ratings: Conform to A121 430-89.
- C. Bearings: Self-aligning, grease lubricated, ball or roller bearings with lubrication fittings extended to exterior of casing with copper tube and grease fitting rigidly attached to casing.
- D. Mounting: Locate fan and motor internally on welded steel base coated with corrosion resistant paint. Factory mount motor on slide rails. Provide access to motor, drive, and bearings through removable casing panels or hinged access doors. Mount base on vibration isolators.

2.05 BEARINGS AND DRIVES

- A. Bearings: AFBMA 9, L-50 life at 200,000 hours, heavy duty pillow block type, self-aligning, grease-lubricated ball bearings, or AFBMA 11.
- B. Shafts: Solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil. Do not exceed 75% of first critical speed.
- C. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Variable and adjustable pitch sheaves for motors 15 hp and under selected so required rpm is obtained with sheaves set at mid-position; matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.
- D. Belt Guard: Fabricate to SMACNA Standard; 12 gage, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation, with provision for adjustment of belt tension, lubrication, and use of tachometer with guard in place.

2.06 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Electrical Characteristics:
 - 1. As scheduled.
 - 2. Refer to Section 16180.
- B. Motor: Open drip proof, high efficiency. Refer to Section 15170.
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

SECTION 15855
AIR HANDLING UNITS

2.07 COILS

- A. Casing: Provide access to both sides of coils. Enclose coils with headers and return bends fully contained within casing. Slide coils into casing through removable end panel.
- B. Drain pans: 24 inch downstream of cooling coil.
- C. Air Coils: Certify capacities, pressure drops, and selection procedures in accordance with ARI 410.
- D. Fabrication:
 - 1. Tubes: 5/8 inch OD seamless copper expanded into fins, brazed joints.
 - 2. Fins: Aluminum.
 - 3. Casing: Die formed channel frame of galvanized steel.
- E. Water Heating Coils:
 - 1. Headers: Cast iron, seamless copper tube, or prime coated steel pipe with brazed joints.
 - 2. Configuration: Drainable, with threaded plugs for drain and vent; serpentine type with return bends on smaller sizes and return headers on larger sizes.
- C. Water Cooling Coils
 - 1. Headers: Cast iron or seamless copper tube with brazed joints.
 - 2. Configuration: Drainable, with threaded plugs for drain and vent; threaded plugs in return bends and in headers opposite each tube.

2.08 FILTERS

- A. Filter Box: Section with filter guides, access doors from both sides, for side loading.
- B. Filter Media: UL 900 listed, Class I or Class II, approved by local authorities.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in conformance with ARI 435.
- C. Assemble high pressure units by bolting sections together.
- D. Install assembled unit on vibration isolators. Refer to Section 15242.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Roof exhausters.

1.02 RELATED WORK

- A. Section 15890 - Ductwork.
- B. Section 15910 - Duct Accessories: Backdraft dampers.

1.03 REFERENCES

- A. AMCA 99 - Standards Handbook.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal.
- D. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- E. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.
- F. NEMA MG1 - Motors and Generators.
- G. NFPA 70 - National Electrical Code.
- H. NFPA 96 - Installation of Equipment for the Removal of Smoke and Grease Vapors from Commercial cooking Equipment.
- I. UL 705 - Power Ventilators.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide product data on fans and accessories including fan curves with specified operating point clearly plotted, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.06 EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.
- B. Provide two sets of belts for each fan.

PART 2 - PRODUCTS

2.01 POWER ROOF VENTILATORS

- A. MANUFACTURERS
 - 1. Greenheck
 - 2. Acme
 - 3. ILG
 - 4. Cook
- B. Product Requirements:
 - 1. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
 - 2. Sound Ratings: AMCA 301, tested to AMCA 300 and bear AMCA Certified Sound Rating Seal.
 - 3. Fabrication: Conform to AMCA 99.
 - 4. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- C. Fan Unit: V-belt or direct driven as indicated with spun aluminum or upblast spun aluminum with grease tray housing as scheduled; resilient mounted motor; 1/2 inch mesh, 16 gage aluminum birdscreen; square base to suit roof curb with continuous curb gaskets.
- E. Roof Curb: 12 inch high of galvanized steel with continuously welded seams, built in cant strips ventilated double wall where required, and factory installed nailer strip. Provide ventilated double wall hood for Kitchen Hood Exhaust Fan.
- F. Electrical Characteristics and Components:
 - 1. Electrical Characteristics: as scheduled.
 - 2. Motor: NEMA MG1, high efficiency.
 - 3. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
 - 4. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- G. Backdraft Damper: Gravity activated, aluminum multiple blade construction, felt edged with nylon bearings. Do not provide backdraft damper for Kitchen Equipment Exhaust Fan.
- H. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 - EXECUTION**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with stainless steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
- D. Install flexible connections specified in Section 15910 between fan inlet and ductwork. Ensure metal banks of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- E. Provide sheaves required for final air balance.
- F. Install backdraft dampers on inlet to roof and wall exhausters.
- G. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.
- H. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Low pressure ducts.
- B. Duct cleaning.

1.02 RELATED WORK

- A. Section 15140 - Supports and Anchors: Sleeves.
- B. Section 15290 - Duct Insulation.
- C. Section 15910 - Ductwork Accessories.
- D. Section 15936 - Air inlets and Outlets.
- E. Section 15990 - Testing, Adjusting and Balancing.

1.03 REFERENCES

- A. ASHRAE - Handbook 1981 Fundamentals; Chapter 33 - Duct Design.
- B. ASHRAE - Handbook 1983 Equipment; Chapter 1 - Duct Construction.
- C. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- D. ASTM A 167 - Stainless and Heat-Resisting Chromium- Nickel Steel Plate, Sheet, and Strip.
- E. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- F. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- G. NFPA 96 - Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooling Equipment.
- H. SMACNA - Low Pressure Duct Construction Standards.
- I. UL 181 - Factory-made Air Ducts and Connections.

1.04 DEFINITIONS

- A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.
- B. Low Pressure: Three pressure classifications: 1/2 inch WG positive or negative static pressure and velocities less than 2,000 fpm; 1 inch WG positive or negative static pressure and velocities less than 2,500 fpm and 2 inch WG positive or negative static pressure and velocities less than 2,500 fpm.

**SECTION 15890
DUCTWORK****1.05 REGULATORY REQUIREMENTS**

- A. Construct ductwork to NFPA 90A and NFPA 96 standards.

1.06 SUBMITTALS

- A. Submit product data under provisions of Section 01345.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 01605.
- B. Store and protect products under provisions of Section 01605.

PART 2 - PRODUCTS**2.01 MATERIALS**

- A. General: Non-combustible or conforming to requirements for Class 1 air duct materials, or UL 181.
- B. Steel Ducts: ASTM A525 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per sq ft for each side in conformance with ASTM A90.
- C. Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 degrees F.
- D. Fasteners: Rivets, bolts, or sheet metal screws.
- E. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
- F. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.02 LOW PRESSURE DUCTWORK

- A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
- E. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.
- F. Connect flexible ducts to metal ducts with stainless steel draw bands.
- G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- H. Use double nuts and lock washers on threaded rod supports.

2.03 INSULATED FLEXIBLE DUCTWORK

- A. Duct construction shall consist of an foil scrim vapor barrier filled internally with fiberglass insulation. Interior surfaces shall be lined with coated glass fabric and supported on corrosion-resistant steel spiral.
- B. Provide factory preshaped oval ends for connections to oval inlets or outlets as required. Attach flexible connections to equipment collars and matching duct or sheet metal fittings with a minimum of a 4-inch slip type connector. Coat equipment collars and duct with liquid duct sealant just prior to joining. Secure the flexible connections to both the duct and the equipment collar with a 1/2" wide stainless steel factory preformed locking-type worm screw clamping band pulled up tight to result in air tight connections.
- C. Flexible duct shall be UL listed as Class 1 air duct and shall also comply with latest NFPA Bulletin 90A.

2.04 MANUFACTURERS

- A. Flexmaster
- B. United McGill Corporation
- C. Thermaflex
- D. Clevaflex

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- B. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

SECTION 15890
DUCTWORK

- C. Connect diffusers to low pressure ducts with 6 feet maximum length of flexible duct. Hold in place with stainless steel draw band.
- D. All ductwork shall be field or shop fabricated in accordance with recommendations of the Sheet Metal and Air Conditioning Contractors National Association, Inc.
- E. All ducts shall be of inside size indicated on Drawings. In no case shall the Contractor change the indicated sizes of ductwork without written approval.
- F. All seams in ductwork to be locked and hammered flat and made absolutely tight against air leakage with joint sealant. Joints to be lapped with inside lap in direction of air travel. Sufficient slip joints shall be installed in ducts to take care of expansion and contraction. Longitudinal joints other than at corners of duct will not be accepted.
- G. Turns in ducts to be constructed with "easy turns" and transitions and in no circumstances shall a curve be made having an inside radius less than the width of duct unless otherwise indicated.
- H. Wherever shown on Drawings, or wherever it is impossible to obtain the above specified radius on turns the turns shall be made using double-bladed vanes, installed in the duct, as recommended by the manufacturer and approved by the Owner's Representative. The right angle turns shall provide right angle deflection of air uniformly over the entire duct area even in a transition elbow.
- I. Wherever it is necessary to change the shape of the duct, it shall be done gradually and the full area retained. Angle shall not exceed 30 degrees for any side of transitions.
- J. The Contractor shall furnish and install air tight access doors, of size indicated, and where shown on plans, or wherever necessary to obtain access to volume dampers, fire dampers, coils, controls, etc. Access doors shall be permanently stenciled to indicate their use.
- K. All ducts shall be properly braced, stiffened and/or cross broken such that no pulsation or rattling will occur. Bracing and stiffening material or galvanized duct shall be of galvanized steel.

3.04 DUCTWORK APPLICATION SCHEDULE

<u>AIR SYSTEM</u>	<u>MATERIAL</u>
Low Pressure Supply and Return	Steel
General Exhaust	Steel
Outside Air Supply	Steel

3.05 ADJUSTING AND CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Volume control dampers.
- B. Fire dampers.
- C. Combination Fire and Smoke Dampers
- D. Air turning devices.
- E. Duct access doors.
- F. Duct test holes.

1.02 RELATED WORK

- A. Section 15242 - Vibration Isolation.
- B. Section 15890 - Ductwork.

1.03 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- B. SMACNA - Low Pressure Duct Construction Standards.
- C. UL 33 - Heat Responsive Links for Fire-Protection Service.
- D. UL 555 - Fire Dampers and Ceiling Dampers.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01345.
- B. Submit manufacturer's installation instructions under provisions of Section 01345, for fire dampers.

PART 2 - PRODUCTS**2.01 VOLUME CONTROL DAMPERS**

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.
- B. Fabricate splitter dampers of material two gages heavier than duct.
- C. Fabricate splitter dampers of double thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/4 inch diameter rod in self aligning, universal joint action flanged bushing with set screw.

- D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil- impregnated nylon or sintered bronze bearings.
- F. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends.
- G. On insulated ducts mount quadrant regulators on stand- off mounting brackets, bases, or adapters.

2.02 ACCEPTABLE MANUFACTURERS - FIRE DAMPERS & COMBINATION FIRE AND SMOKE DAMPERS

- A. Ruskin.
- B. Prefco.
- C. Air Balance.

2.03 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- B. Fabricate ceiling firestop flaps of galvanized steel, 22 gage frame and 16 gage flap, two layers 0.125 inch ceramic fiber on top side, and one layer on bottom side for round flaps, with locking clip.
- C. Fabricate ceiling dampers of galvanized steel, 22 gage frame, stainless steel closure spring, and light weight, heat retardant non-asbestos fabric blanket closure.
- D. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream.
- E. Fabricate multiple blade fire dampers with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- F. Fusible links, UL 33, shall separate at 160 degrees F.
- G. Dampers shall be type B for low velocity ductwork.

2.04 COMBINATION FIRE AND SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

- B. Provide factory sleeve for each damper. Install damper operator on exterior of sleeve and link to damper operating shaft.
- C. Fabricate with multiple blades with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
- D. Operators shall be electric type suitable to operate on 120 V AC, 60 cycle. Operators shall be UL listed and labeled.

2.05 ACCEPTABLE MANUFACTURERS - AIR TURNING DEVICES

- A. Barber Coleman.
- B. Carnes.
- C. Tuttle and Bailey.

2.06 AIR TURNING DEVICES

- A. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with push-pull operator strap.

2.07 ACCEPTABLE MANUFACTURERS - DUCT ACCESS DOORS

- A. Ruskin.
- B. Air Balance.
- C. Cesco.

2.08 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.
- B. Review locations prior to fabrication.
- C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.
- D. Access doors smaller than 12 inches square may be secured with sash locks.
- E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide an additional hinge for larger sizes.
- F. Access doors with sheet metal screw fasteners are not acceptable.

2.09 DUCT TEST HOLES

- A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.
- C. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- D. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.
- E. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- F. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- G. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.
- H. Provide duct test holes where indicated and required for testing and balancing purposes.

3.02 MANUAL DAMPERS

- A. Manual dampers shall be installed where shown on Drawings or where required to adjust and balance air flow. Dampers shall be mounted level and true with operators accessible to the side of the duct. Dampers shall be attached with 1/4" cadmium-plated bolts. The 1/16 flat neoprene gaskets shall be mounted between ductwork and damper frame.
- B. Splitter dampers shall be attached in a plumb position with the operator on top of the duct. The end of the rod shall be cut as to not extend over 3/8" beneath the outer surface of the ductwork.

3.03 FIRE DAMPERS AND COMBINATION FIRE AND SMOKE DAMPERS

- A. Furnish and install UL labeled 160 degree dampers or combination fire and smoke dampers where shown on the Drawings and as required by the applicable codes, and as required by NFPA 90A, 1978.
- B. Adjacent to each fire damper or combination fire and smoke dampers in rectangular ducts, install Ventlok access door as manufactured by Vent-Fabrics., Inc., or approved equal. Door to be insulated type in insulated ducts.

3.04 TURNING VANES

- A. Turning vanes shall be installed where shown on drawings or where radius turns are not possible.
- B. Turning vanes shall be installed such that the air passing over them makes a uniform turn filling the entire duct with a laminar flow.

3.05 VOLUME EXTRACTORS

- A. Volume extractors shall be installed at all branch ducts in low pressure supply system where shown on the Drawings.
- B. Runners shall be provided on the bottom or sides of the ductwork for support.
- C. Operators shall extend through the top of the sides of the duct.
- D. Air volume extractors shall be provided at branch duct adjacent to square or rectangular neck diffuser drops connect into the bottom of supply ducts. Also, where indicated near grilles and as otherwise shown.

3.06 EQUIPMENT CONNECTION

- A. Ducts connecting top motorized equipment shall be connected using flexible fabric connectors manufactured specifically for this purpose.

END OF SECTION

SECTION 15936
AIR OUTLETS AND INLETS**PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Diffusers.
- B. Registers/grilles.

1.02 REFERENCES

- A. ADC 1062 - Certification, Rating and Test Manual.
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- D. ARI 650 - Air Outlets and Inlets.
- E. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- F. SMACNA - Low Pressure Duct Construction Standard.

1.03 QUALITY ASSURANCE

- A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate performance of louvers in accordance with AMCA 500.

1.04 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 90A.

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01345.
- B. Provide product data for items required for this project.
- C. Submit schedule of outlets and inlets indicating type, size, location, application, and noise level.
- D. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.
- E. Submit manufacturer's installation instructions under provisions of Section 01345.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS - CEILING DIFFUSERS**

907

SECTION 15936
AIR OUTLETS AND INLETS

VOL 0095 PAGE 908

- A. Carnes.
- B. Anemostat.
- C. Krueger.
- D. Metal * Aire.
- E. Hart & Cooley.

2.02 RECTANGULAR CEILING DIFFUSERS

- A. Rectangular, stamped, multicore type diffuser to discharge air in 360 degree pattern with sectorizing baffles where indicated.
- B. Provide surface mount, snap-in, inverted T-bar or spline type frame. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabricate of steel with baked enamel off-white finish.
- D. Provide multi-louvered equalizing grid.

2.03 ACCEPTABLE MANUFACTURERS - CEILING REGISTERS/GRILLES

- A. Carnes.
- B. Anemostat.
- C. Krueger.
- D. Metal * Aire.
- E. Hart & Cooley.

2.04 CEILING SUPPLY REGISTERS/GRILLES

- A. Streamlined and individually adjustable curved blades to discharge air along face of grille.
- B. Fabricate 1-1/4 inch margin frame with countersunk screw mounting and gasket.
- C. Fabricate of aluminum extrusions with factory baked enamel off-white finish.
- D. Provide integral, gang-operated opposed blade dampers with removable key operator, operable from face where scheduled.

2.05 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Streamlined blades, depth of which exceeds 3/4 inch spacing, with spring or other device to set blades, vertical face.

- B. Fabricate 1-1/4 inch margin frame with countersunk screw mounting.
- C. Fabricate of steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory baked enamel off-white finish.

2.06 CEILING GRID CORE EXHAUST AND RETURN REGISTERS/GRILLES

- A. Fixed grilles of 1/2 x 1/2 x 1/2 inch louvers.
- B. Fabricate 1-1/4 inch margin frame with countersunk screw mounting or lay-in frame for suspended grid ceilings.
- C. Fabricate of aluminum with factory baked enamel off-white finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturers' instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.

3.02 SCHEDULE

- A. Refer to Air Device Schedule on plans.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Pressure gages and pressure gage taps.
- B. Thermometers and thermometer wells.
- C. Static pressure and filter gages.

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15510 - Hydronic Piping: Installation of thermometer wells and pressure gage tapings.

1.03 REFERENCES

- A. ASME B40.1 - Gages - Pressure Indicating Dial Type -Elastic Element.
- B. ASTM E1 - Specification for ASTM Thermometers
- C. ASTM E77 - Verification and Calibration of Liquid-in-Glass Thermometers.
- D. FS-GG-G-76 - Gages, Pressure and Vacuum, Dial Indicating (for Air, Steam, Oil, Water, Ammonia, Chloro-Flourhydrocarbon Gases, and Compressed Gases).

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Include list which indicates use, operating range, total range and location for manufactured components.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700.
- B. Accurately record actual locations of instrumentation.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 - PRODUCTS**2.01 MANUFACTURERS**

- A. Ernst.

- B. Terice.
- C. Substitutions: Under provisions of Section 01600.

2.02 PRESSURE GAGES

- A. ASME B40.1, 3-1/2 inch diameter drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background, one percent mid-scale accuracy, scale calibrated in psi.

2.03 PRESSURE GAGE TAPS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psig
- B. Needle Valve: Brass for maximum 125 psig.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

2.04 STEM TYPE THERMOMETERS

- A. ASTM E1, 7 inch scale, red appearing mercury, lens front tube, cast aluminum case with enamel finish and clear glass or polycarbonate window, brass stem, 2 percent of scale accuracy scale calibrated in degrees.

2.05 DIAL THERMOMETERS

- A. ASTM E1, 3-1/2 inch diameter dial in stainless steel case, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed Lexan lens, stainless steel stem, one percent of full scale accuracy, calibrated in degrees F.

2.06 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
- B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.07 TEST PLUGS

- A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.
- B. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gages, one gage adapter with 1/8 inch probes, two one inch dial thermometers.

2.08 STATIC PRESSURE GAGES

- A. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment with tubing, static pressure tips.

PART 3 - EXECUTION**3.01 INSTALLATION**

- B. Install in accordance with manufacturer's instructions.
- C. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.
- D. Install pressure gages with pulsation dampers. Provide needle valve to isolate each gage.
- E. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets.
- F. Locate duct mounted thermometers minimum 10 feet downstream of mixing dampers, coils, or other devices causing air turbulence.
- F. Coil and conceal excess capillary on remote element instruments.
- G. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- H. Install gages and thermometers in locations where they are easily read from normal operating level.
- I. Locate test plugs adjacent to thermometers and thermometer sockets, pressure gages and pressure gage taps.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

1.02 RELATED SECTIONS

- A. Section 01205 - Quality Control.
- B. Section 15242 - Vibration Isolation.
- C. Section 15890 - Ductwork.
- D. Section 15910 - Ductwork Accessories.
- E. Section 15936 - Air Outlets and Inlets.

1.03 REFERENCES

- A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.
- B. ASHRAE - 1984 Systems Handbook: Chapter 37, Testing, Adjusting and Balancing.
- C. NEBB - Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.04 SUBMITTALS

- A. Submit test reports as a submittal under provisions of Section 01345.
- B. Submit test reports under provisions of Section 01205.
- C. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- E. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.05 REPORT FORMS

- A. Submit reports on NEBB or other acceptable forms.
- B. Forms shall include the following information:
 - 1. Title Page:

SECTION 15990
TESTING, ADJUSTING & BALANCING

VOL 0095 PAGE 3 **914**

- a. Company name.
 - b. Company address.
 - c. Company telephone number.
 - d. Project name.
 - e. Project location.
 - f. Project Architect.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Project altitude.
2. Instrument List:
 - a. Instrument.
 - b. Manufacturer.
 - c. Model.
 - d. Serial number.
 - e. Range.
 - f. Calibration date.
3. Air Moving Equipment:
 - a. Location.
 - b. Manufacturer.
 - c. Model.
 - d. Air flow, specified and actual.
 - e. Return air flow, specified and actual.
 - f. Outside air flow, specified and actual.
 - g. Total static pressure (total external), specified and actual.
 - h. Inlet pressure.
 - i. Discharge pressure.
 - j. Fan RPM.
4. Return Air/Outside Air Data:
 - a. Identification/location.
 - b. Design air flow.
 - c. Actual air flow.
 - d. Design return air flow.
 - e. Actual return air flow.
 - f. Design outside air flow.
 - g. Actual outside air flow.
 - h. Return air temperature.
 - i. Outside air temperature.
 - j. Required mixed air temperature.
 - k. Actual mixed air temperature.
 - l. Design outside/return air ratio.
 - m. Actual outside/return air ratio.
5. Duct Traverse:
 - a. System zone/branch.
 - b. Duct size.
 - c. Area.
 - d. Design velocity.
 - e. Design air flow.

914

- f. Test velocity.
 - g. Test air flow.
 - h. Duct static pressure.
 - i. Air temperature.
 - j. Air correction factor.
6. Pump Data:
- a. Identification/number.
 - b. Manufacturer.
 - c. Size/model.
 - d. Impeller.
 - e. Service.
 - f. Design flow rate, pressure drop, BHP.
 - g. Actual flow rate, pressure drop, BHP.
 - h. Discharge pressure.
 - i. Suction pressure.
 - j. Total operating head pressure.
 - k. Shut off, discharge and suction pressures.
 - l. Shut off, total head pressure.
7. Duct Leak Test:
- a. Description of ductwork under test.
 - b. Duct design operating pressure.
 - c. Duct design test static pressure.
 - d. Duct capacity, air flow.
8. Chillers:
- a. Identification/number.
 - b. Manufacturer.
 - c. Capacity.
 - d. Model.
 - e. Evaporator entering water temperature, design and actual.
9. Cooling Coil Data:
- a. Identification/number.
 - b. Location.
 - c. Service.
 - d. Manufacturer.
 - e. Air flow, design and actual.
 - f. Entering air DB temperature, design and actual.
 - g. Entering air WB temperature, design and actual.
 - h. Leaving air DB temperature, design and actual.
 - i. Leaving air WB temperature, design and actual.
 - j. Water flow, design and actual.
 - k. Water pressure drop, design and actual.
 - l. Entering water temperature, design and actual.
 - m. Leaving water temperature, design and actual.
 - n. Air pressure drop, design and actual.
10. Heating Coil Data:
- a. Identification/number.

SECTION 15990
TESTING, ADJUSTING & BALANCING

VOL 0095 PAGE 916

- b. Location.
- c. Service.
- d. Manufacturer.
- e. Air flow, design and actual.
- f. Water flow, design and actual.
- g. Water pressure drop, design and actual.
- h. Entering water temperature, design and actual.
- i. Leaving water temperature, design and actual.
- j. Entering air temperature, design and actual.
- k. Leaving air temperature, design and actual.
- l. Air pressure drop, design and actual.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01705.

1.07 QUALITY ASSURANCE

- A. Total system balance shall be performed in accordance with NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- B. Total system balance shall be performed by independent air balance agency.
- C. Agency shall be company specializing in the adjusting and balancing of systems specified in this Section with minimum three years documented experience. Perform work under supervision of NEBB Certified Testing, Balancing and Adjusting Supervisor.

1.08 SEQUENCING AND SCHEDULING

- A. Sequence work to commence after completion of systems and all generation construction work, and schedule completion of work before Substantial Completion of Project.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Before commencing work, verify that systems are complete and operable. Ensure the following:
 - 1. Equipment is operable and in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Correct fan rotation.

7. Fire and volume dampers are in place and open.
8. Coil fins have been cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage has been minimized.

- B. Report any defects or deficiencies noted during performance of services to Architect/Engineer.
- C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.
- D. If, for design reasons, system cannot be properly balanced, report as soon as observed.
- E. Beginning of work means acceptance of existing conditions.

3.02 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

3.03 INSTALLATION TOLERANCES

- A. Adjust air handling systems to plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01600.
- B. Recorded data shall represent actually measured, or observed condition.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- B. Measure air quantities at air inlets and outlets.

- C. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- D. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- F. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

3.07 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.07	SCHEDULE		
	Equipment	Air Balance	Hydronic Balance
	Air Handling Units	X	X
	Chilled Water Pumps		X
	Hot Water Pumps		X
	Chiller		X
	Boiler		X

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDES**

- A. Plumbing Contractor, Heating Contractor and Ventilating Contractor and Sprinkler Contractor shall demonstrate the use and operation of all items and systems they constructed as a result of this Contract.

1.02 RELATED WORK

- A. Division 1 - General Requirements.
- B. Division 15 - Mechanical.

1.03 SUBMITTALS

- A. Maintenance manuals and operating instructions shall be supplied to the Owner's Representative at the demonstration meeting.
- B. Maintenance manuals shall contain items as listed in the individual specifications.
- C. Four sets of keys or special tools required for operating equipment shall be supplied.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION**3.01 DEMONSTRATION FOR OWNER'S REPRESENTATIVE**

- A. Plumbing Systems and Special Piping Demonstrations:
 - 1. The workability of each fixture, valve and connection shall be demonstrated under simulated operating conditions.
 - 2. Service requirements as listed in "operating instructions" of each type of fixture shall be discussed.
- B. Heating and Cooling System (Including Controls) Demonstration:
 - 1. The operation of each piece of equipment under each possible seasonal requirement shall be demonstrated under simulated operating conditions.
 - 2. Service requirements as listed in the "operating instructions" for each piece of equipment shall be discussed.
- C. Sprinkler System Demonstrations:
 - 1. The operation of each piece of equipment shall be demonstrated.

2. Service requirements as listed in the "operating instructions" for each piece of equipment shall be discussed.

3.02 INSTRUCTION

- A. Each Contractor shall instruct the Owner's Representative in the operation and maintenance of these systems. This service shall include the following:
- | <u>Specification Section</u> | <u>Hours</u> | <u>Min.</u>
<u>Trips</u> |
|------------------------------|--------------|-----------------------------|
| Plumbing Systems | 3 | 2 |
| HVAC Systems | 3 | 2 |
| Sprinkler Systems | 2 | 1 |
- B. Instructional trips shall be arranged at the convenience of the Owner.
- C. Hereinafter specified instructional time by manufacturer's representatives for specific systems shall be in addition to above specified instructional time.
- D. Each Contractor shall submit a letter prepared by the Contractor and signed by the Owner and the contractor, certifying that the above instruction has been satisfactorily completed.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Basic Electrical Requirements specifically applicable to Division 16 Sections, in addition to Division 1 - General Conditions.

1.02 GENERAL CONDITIONS

- A. All requirements incorporated under this section shall comply with General Conditions of the Contract for Construction, AIA Document A201, latest form and amendments including any Supplementary General Condition and Provisions.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. All other sections of Division 16.
- B. All other divisions of the contract documents. Refer to each division's specifications and drawings for all requirements.

1.04 REFERENCES

- A. IEEE - Institute of Electrical and Electronic Engineers
- B. AMCA - Air Moving and Conditioning Association
- C. ASA - American Standard Association
- D. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers
- E. ASME - American Society of Mechanical Engineers
- F. ASTM - American Society of Testing Materials
- G. AWWA - American Water Works Association
- H. CS - Commercial Standards
- I. NEC - National Electrical Code
- J. NEMA - National Electrical Manufacturers' Association
- K. NFPA - National Fire Protection Association
- L. UL - Underwriters' Laboratories
- M. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
- N. SBC - Standard Building Code

1.05 SUBMITTALS AND SHOP DRAWINGS

- A. Submit under provisions of Division 01 and Division 16. If conflict exists between Division 01 and 16 adhere to the more stringent of the two. If a contradiction occurs follow Division 01.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Contractor shall, within 21 calendar days after issuance of work order, submit to Owner and Engineer, eight (8) brochures of equipment and materials to be furnished. Non-fabricated items such as wire, insulation, etc., will be listed with manufacturer and type, correlating information submitted to particular items designated on drawings or in specifications. Each set of submittal shall be initialed by contractor to indicate his

knowledge of contents and as certification that he has checked it in detail for compliance with contract documents.

- D. Brochures shall be specific and complete in detail with dimensional drawings on items of equipment as listed in each section of specifications. Specific items that are being submitted on shall be clearly defined with pertinent data underlined in ink or highlighted on all copies. Information shall be initialed by contractor to indicate his knowledge of contents and as certification that he has checked it in detail for compliance with correct documents. Information shall be presented so a line-by-line comparison may be made with drawings and specifications. Deviations from drawings and specifications shall be enumerated. Data of a general nature will not be acceptable.
- E. Submittals shall be compiled from official manufacturer's brochures with all information necessary to prove equipment submitted is equal to or greater than that specified. Typed form letter altering equipment published values will not be accepted unless accompanied with test results from an independent lab.
- F. Shop drawings shall be submitted whenever materials and equipment proposed varies in physical size and arrangement from that shown on the drawings, thus causing rearrangement of equipment space; where tight spaces require extreme coordination between ductwork, piping, and other equipment, and where specifically requested by Architect, shop drawings shall be made at no additional charge to Owner. Required shop drawings, except as hereinafter specified, shall be prepared by contractor at a scale no smaller than 1/4 inch = 1 foot. Submit one each blueline print and reproducible sepia of each shop drawing for approval.
- G. Submit shop drawings in sufficient time so no delay or changes in construction are necessitated due to lack of information. Contractor's failure to comply with this shall render him liable for expense of all delays occasioned by failure on his part to provide the necessary information and/or drawings. The Architect and Engineer reserve the right to go directly to manufacturer to secure details deemed necessary, charging the contractor for costs incurred.
- H. Approval rendered on shop drawings or submittals is not a guarantee of measurements or building conditions. When approved, said approval does not mean drawings have been checked in detail and does not relieve contractor from his responsibility or necessity of furnishing material or performing work as required by Contract drawings and specifications.
- I. Replace items which are rejected for failure to comply with specifications and drawings with an acceptable item. If no satisfactory item is submitted, Architect and Engineer reserve the right to notify contractor as to type and make of materials to be provided.
- J. Contractors shall submit all necessary manufacturer's shop drawings and wiring diagrams for any equipment which is to be purchased or fabricated as required, specified or indicated on the electrical drawings. The contractor shall submit all necessary drawings before purchasing any equipment and before any fabrication is to be undertaken. Each contractor shall first submit eight (8) copies of all drawings to the Owner and Engineer for approval. When drawings are reviewed, the Engineer will mark his comments and/or approval on eight (8) copies, retaining one for his files and returning

the balance to the contractors. Only after receipt of approved drawings, shall the contractor proceed with the purchasing of equipment and fabrication.

- K. The approval of shop drawings by the Engineer shall not release the contractor from the intent of the plans and specifications.

1.06 REGULATORY REQUIREMENTS AND CODES

- A. The entire electrical system installation shall comply with all regulations applying to the latest edition of National Electrical Code and its local amendments, where such standards and regulations do not conflict with Municipal and State Building and Fire Safety Codes, including any regulations of the Local Public Utility Company and Municipal Water Department.
- B. Material furnished and work installed shall comply with National Fire Code of the NFPA; with requirements of local utility companies; and with requirements of governmental departments having jurisdiction.
- C. In addition to state and local ordinances, the following industry standards apply, where applicable, except where requirements of specifications are more stringent than the following standards:
- A. IEEE - Institute of Electrical and Electronic Engineers
 - B. AMCA - Air Moving and Conditioning Association
 - C. ASA - American Standard Association
 - D. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
 - E. ASME - American Society of Electrical Engineers
 - F. ASTM - American Society of Testing Materials
 - G. AWWA - American Water Works Association
 - H. CS - Commercial Standards
 - I. NEC - National Electrical Code
 - J. NEMA - National Electrical Manufacturers' Association
 - K. NFPA - National Fire Protection Association
 - L. UL - Underwriters' Laboratories
 - M. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
 - N. SBC - Standard Building Code
 - O. ADA - Americans with Disabilities Act

1.07 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings, unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of Owner before proceeding.
- C. The contractor under this section is invited to visit the site before submitting his bid so that he will become thoroughly familiar with all conditions present directly related to his work. No allowance will be made due to the lack of full knowledge of existing conditions.

SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

Each contractor shall verify all dimensions in the field prior to submitting his base bid or starting any phase of his work.

- D. Locations of existing utilities, where shown, were established from best available information. Assume that this information is approximate. Contractor shall verify exact locations and depths before starting work. Should conditions be found different than indicated during the course of the work, notify the Architect immediately. Use extreme caution so as not to damage or break lines that are in use. If breakage does occur, Contractor shall be responsible for all resulting damages and repairs. All unusual conditions with respect to existing facilities shall be brought to the Architect's attention immediately.

1.08 SEQUENCING AND SCHEDULING

- A. Construct work in sequence under provisions of Division 01.

1.09 GENERAL CONTRACTOR AND SUBCONTRACTOR

- A. The terminology "General Contractor" shall be interpreted as being the person or persons, partnership, corporation or other business enterprises, under contract, and engaged with building structure complete with all electrical systems including all site utility work with all structures and improvements thereon.
- B. The terminology "Subcontractor" shall be interpreted as being the person or persons, partnership, corporation or other business, under contract, and engaged with the sole responsibility of erecting particular phases of the construction work and shall be directly responsible to the "General Contractor."
- C. The Electrical Contractors shall be interpreted as being "Subcontractors" to the "General Contractor."
- D. Throughout the Electrical General Requirements Division 16010, and Electrical Specifications Section 16, the words "Contractor", "Contractors", and "Electrical Contractor" shall be construed as being the subcontractors to the general contractor.
- E. The General Requirements for the electrical work mentioned under this section shall be related and correlated as applying in its entirety only to the specific part of the work to be performed by each contractor as indicated in "The Scope of Work" and as further described in the specifications of Division 16 for the electrical work.

1.10 COMPENSATION

- A. Upon the installation by the contractor and acceptance of the electrical work by the owner and Engineers during the various stages and progress of the construction project, the general contractor upon receiving payment due for the installed and approved work shall promptly pay the electrical contractors and any subcontractors for the installation and use of their materials, equipment, labor, business administration, overhead and profit.

1.11 DEFINITIONS AND TERMINOLOGY

- A. As Directed: As directed by Owner, Engineer or his authorized representative.

- B. Concealed: Inside building above grade and located within walls, furred spaces, crawl spaces, attics, above suspended ceilings, etc. In general, any item not visible or directly accessible.
- C. Connect: Complete hook-up of item with required services, including conduit, wires, and other accessories.
- D. Exposed: Either visible or subject to mechanical or weather damage, indoors or outdoors, including areas such as mechanical and storage rooms. In general, any item that is directly accessible without removing panels, walls, ceiling, or other parts of structure.
- E. Furnish: Supply and deliver complete.
- F. Install: Place, secure, and connect as required to make fully operational.
- G. Provide: Furnish and install as defined above.
- H. Underground: Buried in ground, including under building slabs; below grade.
- I. Use (verb): Furnish and install as defined above.
- J. Wiring: Electrical raceway, conductors, and connections.

1.12 DRAWINGS AND SPECIFICATIONS

- A. All Specifications, including General Conditions, Special Conditions, Supplements issued thereto, Information to Bidders, and other pertinent documents issued by Owner, are a part of these specifications with accompanying electrical and electrical drawings, and shall be complied with in every respect. Above is included herewith, and shall be examined by all bidders. Failure to comply shall NOT relieve contractor of responsibility or be used as basis for additional compensation due to omission of architectural and/or structural details from electrical and electrical drawings.
- B. The drawings and specifications do not undertake to illustrate or set forth every item necessary for the work as it is assumed that the contractor is expert in the trade and is capable of interpreting them. Small details not usually shown or specified but necessary for this proper installation and finishing, shall be included in the contractor's estimate, the same as if herein specified or shown on plans. The drawings and specifications are complementary each to the other and what is called for by one shall be as binding as if called for by both.
- C. In every case where equipment is referred to in the specifications it shall be furnished and installed in complete operating order. The contractor shall install, adjust, and leave in safe operating condition all controls, supplies, appliances, and all necessary mechanical and electrical connections to the equipment to the complete satisfaction of the Architect and Engineer.
- D. The contractors are to consider all drawings as schematic or diagrammatical serving only the sole purpose of indicating to the contractor the work expected from him. The final

layout of all work shall be subject to the approval of the Architect and Engineer. The contractor shall be responsible for the proper installation and coordination of all the work under the various divisions and sections of the specifications without any increase in contract price.

- E. Interrelating of the specifications, drawings, and schedule, is as follows: Specifications determine nature and setting of materials; drawings establish quantities, dimensions and details; and schedules give performance characteristics.
- F. Should drawings disagree in themselves or with specifications, the better quality or greater quantity of work or materials shall be estimated upon, unless otherwise ordered by Architect, in writing. Figures given on drawings govern small scale drawings.
- G. When mechanical and electrical drawings do not give exact details as to elevation of pipe, conduit, and ducts, physically arrange the systems to fit in space available at elevations intended, with proper grades for functioning of systems involved.
- H. Exact locations of all outlets, fixtures, and equipment items shall be determined by reference to general plans and to detail drawings, equipment drawings, rough-in drawings, etc. Minor relocations necessitated by conditions at the site or directed by the Architect shall be made without additional cost to the Owner.

1.13 INTENT

- A. Intent of mechanical and electrical drawings and specifications is to provide an installation complete in every respect. If additional details or special conditions are required, it is the responsibility of contractor to furnish same, as well as provide material and equipment usually furnished with such systems or required to complete installation, whether mentioned or not.
- B. Scope of work under Division 16 of specifications shall include complete electrical systems as shown on drawings and as specified herein. The work to be done under these specifications shall include the furnishing of all necessary labor and materials required to complete and leave ready for operation in accordance with these specifications, and the accompanying drawings. The order is not necessarily as it appears in this specification.
- C. Minor details necessary for proper installation and operation shall be included in work as if herein specified or shown.

1.14 TEMPORARY ELECTRICAL FACILITIES - GENERAL CONTRACTOR AND CONTRACTORS

- A. The electrical contractor shall include in his bid the costs for the installation of a temporary lighting and power service to the construction site. The temporary service shall be large enough to operate welding equipment and all machinery to be utilized by the various trades. The electrical contractor shall also install all temporary lighting to all construction sheds or temporary construction facilities and structures on the site as required. In addition to the foregoing, the electrical lighting on the construction site grounds and within the building structure for the proper illumination of all areas within the building including corridors and stairwells for the safe passage and installation of all work under various construction trades. The lighting outlets shall provide for a minimum

illumination level of 10 foot candles and shall be increased when directed by the general contractor in order to comply with safety requirements throughout the building.

- B. The existing electrical service is to be retained and expanded, and may be used for temporary/construction power.
- C. The electrical contractor shall confer with the local utility power company regarding the safe installation of this temporary light band power service.
- D. Before submitting his base bid, the electrical contractor shall refer to Section 15010, entitled "Temporary Facilities and Controls" and he shall discuss the method of payment for this work between the electrical contractor and the general contractor so as not to impede the progress of any phase of this construction work and testing of equipment including the costs for metering facilities and consumption of electrical energy.
- E. The minimum size temporary service shall be rated for 200 amperes for single phase and three phase power tools with voltages as required. Confirm with general contractor on temporary electrical service size prior to submitting bid concerning possible larger size and locations of termination. The electrical contractor shall also make the required arrangements with the local power company for the installation of the permanent facilities as shown.
- F. The costs for all of the foregoing items as described in each of the foregoing items shall be included in the base bid.

1.15 RULES, PERMITS, FEES AND INSPECTIONS

- A. Contractor shall give notices, obtain permits and pay fees, government sales taxes, and other costs, including utility connections or extensions in connection with his work; file necessary plans, prepare documents and obtain necessary approvals of governmental departments having jurisdiction; obtain required certificates of inspection for his work and deliver same to Architect before request for acceptance and final payment.
- B. The contractor shall obtain for his phase of the work all permits and inspections required by the municipal ordinances and after completion of the work shall furnish to the Engineer and the Architect a final inspection certificate and certificate of occupancy from the Inspector of the Building Department.
- C. The contractor shall assume all expenses for permits, tests, and inspections, and he shall include all these costs in his base bid.
- D. Contractor shall include, without extra cost to Owner, any labor, materials, services, apparatus, drawings, in order to comply with applicable codes, laws, ordinances, rules, and regulations, whether or not shown on drawings and/or specified.

1.16 ACCEPTANCE OF WORK

- A. No work shall be concealed until after inspection and approval by proper authorities. If work is concealed without inspection and approval, the Contractor shall be responsible for all work required to open and restore the concealed areas in addition to all required modifications.

SECTION 16010
BASIC ELECTRICAL REQUIREMENTS

- B. Upon completion of the work, at a time to be designated by the Owner, the Contractor shall demonstrate for the Owner the operation of the electrical installation, including any and all special items installed by him or installed under his supervision.

1.17 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work as required.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Materials and apparatus, except as specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected, and finished in every detail, and shall be selected and arranged to fit properly into building spaces. Where no specific kind or quality is given, furnish a first-class standard article approved by Architect and Engineer.
- B. Material and equipment for electrical work shall bear approval label, or shall be listed by Underwriters' Laboratories, and shall be a manufactured item in the United States of America.
- C. All materials shall be new except where noted to be reused, and shall conform with the latest approved standards of the IEEE, NEMA and Underwriters' Laboratories, Inc. in every case where such a standard for the particular type of material or equipment has been established.
- D. Intent of these specifications is to establish quality standards of material and equipment installed.
- E. All materials and equipment shall be approved by the Architect and Engineer before purchasing and installing by this contractor. Where the phrases "an approved equal" or "or equal" occur in the plans or specifications for materials or equipment, the equivalent shall be decided by the Engineer. A print of all equipment and wiring diagrams shall be turned over to the Engineer for his permanent records.
- F. Materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number and such designation will establish standards of desired quality and style, which will be basis of bid.
- G. Where a definite product is specified, it is not intended to discriminate against other products, but rather to set a definite standard and indicate quality and capacity of equipment within class found satisfactory for the Owner's use. Products not mentioned by name, or not complying with detailed descriptions in specifications will require approval ten (10) days prior to bid date. Bidders will be notified of approval prior to date of bid opening. Present sufficient written information at initiation of request for approval

to enable rendering an expeditious decision. Written request should be initiated with Engineer.

- H. Where a substitute item alters the design or space requirements indicated on drawings, contractor shall include items of cost for revised design and construction, including cost of allied trades involved.
- I. Acceptance or rejection of proposed substitutions shall be subjected to Architect and Engineer's approval. If Architect and Engineer so request, contractor shall submit samples of specified and substitute items for inspection.
- J. Equipment installed on project shall have local representation, local factory-authorized service and local stock repair parts within a radius of 300 miles from the building construction site.

2.02 EQUIPMENT DEVIATIONS

- A. Where contractor proposes to use an item of equipment other than that specified or detailed on drawings, which requires redesign of structure, partitions, foundations, piping, wiring or other parts of the electrical, electrical or architectural layout, such redesign, new drawings and detailing required shall be prepared by contractor at his expense and submitted to Architect and Engineer for approval.
- B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, over-current protection, wiring, conduit or equipment, from that specified or indicated on drawings, contractor shall provide such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and other additional equipment required by system, shall be provided and installed at no additional cost to Owner.

PART 3 - EXECUTION

3.01 COOPERATION WITH OTHER TRADES

- A. Contractor shall give full cooperation to other trades. Furnish in writing, to allied trades with copies to Architect information necessary to permit work of all trades to be installed satisfactorily, with minimum of interference and/or delay.
- B. Where work will be installed in close proximity to, or will interfere with work of other trades, contractor shall assist in working out space conditions to make a satisfactory adjustment. Plan work sufficiently in advance of construction so any conflict can be ascertained and remedial procedures initiated. If adequate solutions can be reached by sleeving or casting into building members, these methods shall be cleared with Architect. If directed by Architect, contractor shall prepare composite working drawings and sections, at scale no less than 1/4 inch = 1 foot, clearly showing how his work is to be installed in relation to work of other trades. If contractor installs his work before coordinating with other trades, causing any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.

- C. Contractor shall furnish, as required, necessary templates, patterns, setting plans and shop details for proper installation of work and for purpose of coordinating adjacent work.
- D. Each contractor shall cooperate with all sections of the entire specification so that installing of the work shall not interfere or delay the work of other sections nor the progress of the project. Any cutting or repairing made necessary due to negligence or improper workmanship by the contractor or his employees shall be paid for by the contractor. No cutting into the structural parts of the building likely to impair its strength shall be done without the approval of the Architect and Structural Engineer.
- E. The contractor, before installing any of the work, shall check to determine that the work to be installed does not interfere with the clearances required for finished partitions, pilasters, walls, columns, ceilings and ceiling beams, work of the other trades, both at the site and from the architectural and structural drawings including details. Any work installed by the contractor which later develops into any difficulties so that the architectural design cannot be followed shall be removed and replaced by the contractor at his own expense. He shall make such changes in his work as directed by the Architect so that the architectural work can be installed as shown on plans and details.

3.02 COORDINATION OF PIPING, CONDUIT AND DUCTWORK

- A. Piping, conduit and ductwork interference's shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, following order of precedence shall generally be observed unless otherwise directed by the Architect and Engineer and installed for accessibility:
 - 1. Building lines.
 - 2. Structural members.
 - 3. Electrical conduit raceways with accessible out- lets, junction boxes and pull boxes.
 - 4. Soil, waste, vent piping with accessible cleanouts.
 - 5. Storm and drainage water piping with accessible cleanouts.
 - 6. Water piping for heating and cooling with accessible valves and pipe fittings.
 - 7. Domestic hot water and portable cold water piping with accessible valves and fittings.
- B. The plumbing, heating, ventilating and air conditioning contractors, including the electrical contractor shall, with the general contractor, plan the installation of all piping, conduit, and ductwork prior to the installation of any system in order to properly coordinate the work of the various trades and to avoid any conflict of same throughout this project. Where possible, install all service pipes above and out of the way of all ductwork with future accessibility and maintenance of all piping and conduit systems in mind. Redirect all ductwork and piping or conduit systems as directed by the Architect and Engineer without any additional cost to the Owner.

3.03 WORKMANSHIP AND INSTALLATION

- A. Each contractor shall furnish the services of an experienced superintendent in charge of the installation for his phase of the work together with the manufacturer's trained engineering representative to start-up, operate and test out each system and if required with the help of additional personnel.
- B. Unless otherwise indicated in specifications or drawings, equipment and material shall be installed with approval of Architect and Engineer in accordance with recommendations of the manufacturer. This includes such tests as manufacturer recommends.
- C. All equipment indicated on plans and in the specifications shall be furnished and installed in complete operating order. The contractor shall install, adjust and leave in safe operating condition all controls, supplies, appliances and all necessary mechanical and electrical connections to the equipment to the complete satisfaction of the Architect and Engineer.
- D. Equipment shall be installed in a manner to permit access to all surfaces. Clearances shall be as required by NEC or other applicable code.
- E. Size of electrical equipment shown on drawings is based on dimension of a particular manufacturer. While other manufacturers will be acceptable, it is the responsibility of the contractor to determine if equipment he proposes to furnish will fit in the space. Shop drawings shall be prepared when required by the Architect/ Engineer or Owner to indicate a substitute arrangement.
- F. All conduit raceways shall be installed concealed throughout this project. All electrical equipment shall be flush mounted unless otherwise directed by the Architect and Engineer. If the building construction such as in existing structures or structures to be altered does not permit flush or semi-flush mounting of equipment, the Architect and Engineer shall notify the general contractor and contractors by letter form as to the exact areas and methods to be employed for the installation of any exposed materials or equipment under this contract without any additional cost to the Owners.

3.04 TEST AND BALANCE

- A. Each contractor shall perform any tests required by the Engineer, Architect, and Building Department for any phase of the work as requested.
- B. The contractors shall see that all required tests and inspections are made rapidly and accurately throughout. The Engineer shall be notified of all tests one day in advance in order to witness all tests.
- C. Contractor shall furnish all necessary labor, materials, testing apparatus and temporary power for such tests.

3.05 SLEEVES, INSERTS AND PLATES

- A. The electrical contractor shall provide and locate sleeves and inserts required before floors, roofs and walls are built, or contractor shall be responsible for cost of cutting and patching required to insert conduit where sleeves and inserts are not installed or where

**SECTION 16010
BASIC ELECTRICAL REQUIREMENTS**

incorrectly located. The contractors may not drill and install mechanical expansion pressure bolts to properly support equipment to be furnished and installed under their contract. When drilling, avoid cutting structural steel rods in concrete ceilings, walls, floors and columns. The type and location of expansion bolt shields shall be approved by the architect, engineer and structural engineer and shall be designed to safely carry and support the intended load.

- B. Sleeves above grade and dry locations shall be constructed from 20 to 22-gauge galvanized steel and flush on both sides of surfaces. Sleeves on or below grade and/or moist locations shall be constructed of Schedule 40 galvanized steel.
- C. Where sleeves are placed in exterior walls below grade, pack space between conduit and sleeves with oakum and lead to make completely watertight.
- D. In each finished space, furnish a chromium plated sectional escutcheon on each conduit penetrating a wall, floor or ceiling. Escutcheons shall be sized to fit snugly to lines. Where required, these plates shall be provided with set screws so that they fit snugly against the finished surface. Equipment rooms are classified as exposed areas.

3.06 EQUIPMENT AND MATERIALS PROTECTION

- A. Contractor shall protect work and material from damage by his work or workmen, and is liable for damage caused by his neglect.
- B. Contractor is responsible for work and equipment, until finally inspected, tested and accepted. He shall protect work against theft, injury or damage and shall carefully store materials and equipment received which are not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

3.07 MECHANICAL PLUMBING CONTRACTOR - MOTOR, CONTROLS AND WIRING

- A. Unless shown on electrical drawing to be provided by electrical contractor, the plumbing contractor shall furnish and install all motors and magnetic contactors and controls for the safe operation and proper performance of all plumbing motorized equipment to be furnished under this contract with correct voltage and phase ratings.
- B. All motors, magnetic controllers and control enclosures shall be housed in enclosures suitable to the areas in which they are to be installed such as dry locations, dust laden atmospheres, damp and wet locations, hazardous locations and outdoors as required by the NEC.
- C. All magnetic motor controllers shall contain thermal overload protection for each phase conductor and/or each ungrounded conductor of the electrical system as directed.
- D. The electrical contractor shall furnish and install all required raceways and conductors to properly wire up all plumbing equipment and controls in complete operating order only in accordance with approved equipment manufacturer's wiring diagram.
- E. Where required by local power company requirements, the plumbing contractor shall furnish reduced voltage starting equipment for large motors to comply with their starting

current motor load requirements. The plumbing contractor shall confer with local power company to determine if reduced voltage starting equipment is required on any equipment to be furnished under his contract before submitting his base bid.

3.08 MECHANICAL HEATING, VENTILATION, AND AIR CONDITIONING CONTRACTOR - MOTOR AND CONTROLS, INCLUDING TEMPERATURE CONTROLS AND WIRING

- A. Unless shown on electrical drawing to be provided by electrical contractor, the heating, ventilating and air conditioning contractor shall furnish and install all motors, magnetic controllers, and controls for the safe operation and proper performance of all HVAC motorized equipment to be furnished under his contract with the correct voltage and phase ratings.
- B. All motors, magnetic controllers and control enclosures shall be housed in enclosures suitable to the areas in which they are to be installed such as dry locations, dust-laden atmospheres, damp and wet locations, hazardous locations and outdoors as required by the NEC. Manual controllers and remote push button stations shall be provided with pilot lights when remote mounted from equipment to the controller.
- C. All magnetic motor controllers shall contain thermal overload protection for each phase conductor and/or each ungrounded conductor of the electrical system as directed.
- D. The electrical contractor shall furnish and install all required raceways and conductors to properly wire up all mechanical equipment and controls in complete operating order only in accordance with approved equipment manufacturer's wiring diagrams.
- E. Where required by local power company requirements, the HVAC contractor shall furnish reduced voltage starting equipment for large motors to comply with their starting current motor load requirements. HVAC contractor shall confer with local power company to determine if reduced voltage starting equipment is required on any equipment to be furnished under his contract before submitting his base bid.
- F. The HVAC contractor shall furnish all required area temperature controls, time clocks and relays as required.

3.09 TEMPERATURE CONTROLS

- A. Refer to Controls and Instrumentation Section of Division 15 for information. Electrical contractor is to properly wire up all Temperature Controls.

3.10 MOTORS

- A. Motors shall meet requirements of latest motor standards of ASA, AIEE and NEMA. They shall be fully coordinated with equipment serviced and of sizes and electrical characteristics scheduled. Acceptable manufacturers are: Baldor, Allis-Chalmers, Century, Westinghouse, Wagner or same manufacturer as equipment which they serve. Base motor selection on availability of local reputable repair facilities specializing in repair of motor manufacturer selected.
- B. In general, motors 3/4 HP and larger shall be three-phase motors, voltage as indicated, and shall be squirrel cage induction type with standard NEMA frame sizes. Motors 3/4 HP and larger shall have integral frames. Enclosures shall be open drip-proof type with

service factor of 1.15; insulation rated at 40°C temperature rise above room ambient conditions at full load, unless otherwise noted. If totally enclosed motors are indicated, they shall be designated for service factor of 1.00, and 55°C maximum temperature rise above room ambient at full load.

- C. Generally, motors less than 3/4 HP shall be single-phase, capacitor start-induction run, 115 volt, 60 hertz with drip-proof enclosures, except as hereinafter specified. Motors shall have built-in thermal overload protection with automatic reset and rated for temperature rise as previously specified for three-phase motors. Where motors do not have built-in thermal over-load protection, furnish controller with thermal over- load protection or manual starter with thermal overload protection as required.
- D. Motors shall be designed for normal starting torque, unless the driven machine requires high starting torque, and shall be selected for quiet operation, free from magnetic hum.
- E. Bearings shall be ball or roller type, double-shield with continuous grease relief to accommodate excessive pressure caused by thermal expansion or over lubrication. Motor bearings shall be factory prepacked with non-washing lubricant. Provide with lubrication fitting arranged to provide easy access when installed on driven apparatus except as noted hereinafter. Permanently lubricated factory-sealed motors may be provided in fractional HP sizes where they are an integral part of an approved apparatus.
- F. Provide motors with adequately-sized electrical connection box and line terminals for attachment of flexible conduit and cables, sized in accordance with NEC. Where motors are connected to driven equipment by V-belt drive, furnish adjustable rails and/or adjustable pulleys.
- G. Provide motors 5 HP and larger with frame grounding lug.
- H. Provide motors with proper starting equipment. Starting equipment shall be provided by trade furnishing motor, unless hereinafter specified otherwise. Motor starting equipment provided by one trade shall be of same manufacturer unless it is an integral part of equipment on which it is mounted.
- I. Motor starters shall conform to NEMA for industrial control #IC-1, latest issue, and shall be housed in NEMA standard enclosures. Control voltage shall be line voltage unless indicated otherwise. Manual starters for fractional horsepower single phase motors shall be "ON-OFF" snap switch type, combined with thermal over- load device operated on soldered ratchet held closed under a sustained motor overload.

3.11 SURVEYS AND MEASUREMENTS - GENERAL CONTRACTOR AND CONTRACTORS

- A. The general contractor shall be responsible for the establishment of all lines and levels throughout this project. He shall relate the exact horizontal and vertical measurements to each electrical contractor for the correct and proper installation of all materials and equipment under their contract.
- B. Contractor shall base measurements, both horizontal and vertical, from established bench marks. Work shall agree with these established lines and levels. Verify measurements at site and check correctness of same as related work, prior to fabrication of shop-made item or ordering of factory-made items.

- C. Should contractor discover a discrepancy between actual measurements and those indicated, which prevents following good practice or intent of drawings and specifications, he shall notify architect and shall not proceed with work until he has received instructions from architect.
- D. Each electrical contractor will be responsible for all on site field measurements.

3.12 ACCESSIBILITY: GENERAL CONTRACTOR AND CONTRACTORS

- A. The general contractor shall be responsible for the proper construction and sizes of all shafts and chases, including increasing of all wall thicknesses as required to properly install all electrical conduits and equipment, especially panelboards and any other recessed electrical equipment without additional cost to the owner.
- B. Each contractor shall be certain that the minimum building space has been allotted and left open to properly install any equipment installed under his contract. If required, he shall order his equipment in sections sized to fit the openings and space planned by the Architect.
- C. The contractors shall inform the general contractor of sufficiency of size of shafts and chases and adequate clearance in double partitions and hung ceilings, for proper installation of his work. Contractor shall cooperate with other contractors working in the same space. Advise general contractor of reworking in the same space. Advise general contractor of requirements and keep spaces and clearances to minimum sizes required.
- D. Locate equipment which must be serviced, operated or maintained, in fully accessible positions. Furnish access doors if required. Minor deviations from drawings may be made to allow for better accessibility; however, changes must be approved prior to installation.
- E. Provide general contractor with exact location of access panels for each concealed device requiring service or access. Access panels will be provided by general contractor and as specified in the architectural specifications, unless noted otherwise. Location of panels shall be submitted for approval in sufficient time to be installed in the normal course of the work.

3.13 FOUNDATIONS, SUPPORTS, PIERS, ATTACHMENTS

- A. Each subcontractor shall be responsible for the installation of all required foundations, supports (for structural strength), foundations and points of attachment for materials and equipment to be installed by the contractor.
- B. Each subcontractor shall include all costs for this work in the base bid.
- C. All necessary steel angles or channel iron, anchor bolts, washers, templates, etc., shall be furnished by each contractor. Bolts shall be built into the foundations with proper sized sleeves. Bases for all equipment shall be satisfactorily isolated from building structure by approved isolation methods.
- D. Provide necessary foundations, supports, pads, bases, and piers, as required and shown on drawings for equipment furnished under this contract. Submit drawings to Engineer for approval before purchase, fabrication, or construction.

**SECTION 16010
BASIC ELECTRICAL REQUIREMENTS**

- E. For machinery and equipment where foundations are indicated, provide concrete pads as shown. Extend pads 6 inches beyond machine base in all directions; chamfer top edge. Inset 6-inch steel dowel rods into floors to anchor pads. Submit shop drawings of foundation and pads to Architect and Engineer for approval before constructing, if required.
- F. Where foundations, supports, pads, bases and piers are mounted on floor, construction shall be same material and quality of finish as adjacent flooring material.
- G. Securely attach equipment to building structure in approved manner, unless shown otherwise. Attachments shall be strong and durable and if not considered so by the engineer, contractor shall replace as directed without additional cost to the owner.

3.14 SCAFFOLDING, RIGGING, HOISTING - GENERAL CONTRACTOR AND CONTRACTOR

- A. Each subcontractor shall furnish all required mechanical equipment including operator to properly hoist all electrical equipment into place on roofs, penthouses, electrical and mechanical rooms, as any other spaces as required.
- B. Each subcontractor shall also furnish, install and erect all required scaffolding and rigging as required to properly install all electrical work above an eight (8) foot working height, above the finished floor line.
- C. Each contractor shall remove all their mechanical equipment, hoisting equipment rigging and also scaffolds from the premises when no longer required so as not to interfere with the construction progress of other trades.
- D. Each contractor shall furnish their own ladders to install electrical equipment up to an eight (8) foot working height.

3.15 CUTTING AND PATCHING

- A. The electrical subcontractor shall be responsible for the cutting and patching of all floors, walls, ceilings, roofs as required for the proper installation of all electrical work under this contract.
- B. No cutting and patching shall be done by the contractors which in any way will impair the structural strength of the building structure including any joist, walls or structural supporting members.
- C. The contractors shall not drill any holes or cut into any existing or new structural members.
- D. Any cutting and patching that is required shall be done only after permission is granted by the architect and structural engineer.

3.16 EXCAVATION AND BACKFILLING

- A. The contractor shall furnish and install all required mechanical equipment, devices, tools, explosives, mats, materials and all required labor for all excavation and backfilling for the

installation of any electrical lines which are to be installed by the contractors as applicable to their part of the electrical work. The contractor shall include all required costs under his bid to accomplish such work regardless of the type of materials encountered in excavation.

- B. Trenches for underground conduit shall be excavated to required depths. Banks of trenches shall be kept as nearly vertical as practicable and where required, shall be properly formed and braced. Trenches shall be not less than 12 inches wider than outside diameter of pipe to be laid therein. Bottoms of trenches shall be tamped hard and graded to secure maximum fall. Bell holes shall be excavated to assure the pipes resting for its entire length on solid ground. Should rock be encountered, it shall be filled with pea gravel thoroughly tamped. Pipe laid in trenches dug in fill shall be supported down to load bearing undisturbed soil. After approval by inspecting authorities, trenches shall be backfilled.
- C. Trenches shall be carefully backfilled with pea gravel to a depth of 6 inches above top of pipe. Next layer and subsequent layers of backfill may be excavated materials if of earth, loam, sand or gravel free of large clods and rocks no larger than 1-1/2" in diameter. Backfill shall be installed in layers 12 inches deep, adequately tamped, wetted down and water flushed before second layer of earth is laid in place. Additional material required for backfilling shall be furnished and excess material shall be provided as hereinafter specified or shown on the drawings. All trenches under slabs shall be properly compacted to a 95% proctor.
- D. Excavating and backfilling shall be done in a manner so as not to disturb structures and any shoring required shall be provided by the contractor.
- E. The contractors shall inform and give the General Contractor all data as to size and depth of trench and locations of required trenches in order to properly install all electrical and telephone service utility liens. Including any electrical lines to and between buildings in order to complete their phase of the construction work.
- F. Where there is no exact survey data available to the contractor as the exact location of any municipal or utility street lines, the contractor shall make all required exploratory tests to located all or any lines to establish its exact location without additional costs to the owner.
- G. Before excavating for any municipal or utility street lines, the contractor shall obtain all required permits for this work and he shall notify all municipal and utility authorities of his intent to excavate in order to install all service line to the building site.
- H. The contractor shall carefully perform all excavation work so as not to damage any municipal or utility street lines including any underground or aerial lines on the premises. The contractor will be held responsible for damage to any lines while performing any phase of the work in order for the contractors to install all required electrical work. The contractor shall pay all costs to repair any damaged municipal or utility service lines without any additional costs to the owner.

3.17 PAINTING - GENERAL CONTRACTOR AND CONTRACTOR

**SECTION 16010
BASIC ELECTRICAL REQUIREMENTS**

- A. The general contractor shall be responsible for the painting of any electrical equipment other than touch up of colors which are furnished as standard by the equipment manufacturer which shall be the subcontractors responsibility. The contractors shall place their bid on the use of standard colors shall be approved by the Architect before the contractors purchase the equipment. The contractors shall furnish specific finishes of any equipment when so noted in the specifications or on the drawings.

3.18 STREET BARRIERS, DETOUR SIGNS, BARRIER SIGNAL LIGHTS

- A. The contractor shall be responsible for the erection of all street barriers, detour signs and barrier signal flashing lights in order to properly fence off his work from traffic and pedestrians and for the safe passage of same. The contractor shall install all of the foregoing mentioned barriers and equipment to comply with all town, municipal and state requirements and regulations.
- B. Any ground openings wherein work is being performed shall be properly supported and covered with 3/4" or 1" steel plate as required when work is suspended so as not to impede the flow of traffic or safe travelway of pedestrians.
- C. When required, the contractor shall furnish all costs for labor required to control the flow of traffic and safe travelway for all pedestrians.
- D. The contractor shall include all costs in his base bid to perform and carry out all of the items mentioned above "only as required" in order for the contractor for the electrical work including any work to be done under his section of the specification documents for this project.

3.19 OPERATING INSTRUCTIONS

- A. The contractors shall furnish trained operators at no additional expense to the Owner or Architect, to give any required operating instructions to the plant personnel or owner after a final completion and acceptance of the work has been granted under this contract.
- B. Upon completion of work and tests, instruct Owner (or his representative) in operation, adjustment and maintenance of equipment. Give at least forty-eight (48) hours notice.
- C. Furnish two complete bound sets to Architect, of typewritten or blueprinted instructions for operating and maintaining systems and equipment included in this contract. Submit instructions in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalog data will not be acceptable as operating and maintenance instructions.
- D. Include in the above manuals, maintenance schedule for equipment furnished under this contract.

3.20 RECORDS FOR THE OWNER

- A. The electrical contractor shall turn over to the General Contractor, Architect and Engineer all approved equipment manufacturer's drawings for the entire project, including Equipment Manufacturer's Guarantee, Electrical Contractor's Guarantee and Service Contract Brochure, which is to be turned over to the owners.

- B. Turn over to the General Contractor, at time of request, for pre-final inspection, two approved bound volumes containing the following information and drawings. Binding to be such that material can be removed.
1. Certificates of acceptance from inspecting authorities.
 2. Warranties, guarantees and manufacturer's directions on equipment and materials covered by the contract. Letter from each contractor with blanks for date of acceptance and date of expiration of warranties and guarantees.
 3. Approved submittal data.
 4. Approved light fixture brochures, including manufacturer's name, catalog number, ballast type and size lamp, plus ordering data, wiring diagrams and control diagrams.
 5. Approved shop drawings.
 6. Other data and drawings required during construction.
 7. Repair parts list on major equipment.
 8. "As-built" drawings showing routing of underground outside utilities or conduits, with actual dimensions from buildings, in reproducible form.
- C. Contractor shall accumulate and retain this data and information in neat form during course of project; submit to Architect and Engineer for approval and transmit to Owner to bound volume.

3.21 GUARANTEES

- A. The contractor shall furnish to the Engineer, Architect, General Contractor and Owner a guarantee for all equipment and materials installed by each contractor against any defects in workmanship or materials extending for a period of five years from the date of substantial completion. Any equipment to be removed and replaced during this guarantee period shall be done at the contractor's expense. Equipment manufacturer's guarantee shall accompany each submittal for approval, including all equipment manufacturer's whose guarantees extend beyond the five year period.
- B. Contractor shall amend and make good, at his own expense, any defects, settlements or other faults in the work, arising from defective or improper materials and/or workmanship which may appear within five years after completion and final acceptance of work. Suppliers of equipment shall furnish to the Architect or Engineer, through the contractor and General Contractor a written acceptance and guarantees of equipment furnished. Date of start of warranty shall be the date of final payment, or date the building is accepted by the owners as directed by the Architects.
- C. The guarantee shall be typewritten on stationery indicating the firm's letterhead and personally signed by the President or other responsible authority of the firm and sealed with the corporate seal.

**SECTION 16010
BASIC ELECTRICAL REQUIREMENTS****3.22 SERVICE CONTRACT**

- A. Upon completion and acceptance of the project by the owners, the electrical contractor under this section shall furnish to the Engineer, Architect, General Contractor and Owners a one year service contract to properly service all equipment and materials purchased, fabricated and installed by him. The service contract shall also bind the equipment manufacturers and suppliers as part of the service contract. All costs for this service shall be included in the base bid by the electrical contractors.
- B. Contractor shall include in the service contract the necessary service to effect repairs to electrical systems, such as mechanical repair of equipment or other work requiring specialized training, for a period of one year, concurrent with guarantee period specified above.
- C. The service contract shall be typewritten on stationery indicating the firm's letterhead and personally signed by the President or other responsible authority of the electrical contractor's firm and sealed with the corporate seal.

3.23 TESTING

- A. The owner reserves the right to engage an outside testing agency for the purpose of testing the electrical installation. All costs related to the initial testing will be borne by the owner. Costs for retesting, due to initial failure of the electrical system by the testing agency, will be the responsibility of the contractor.

END OF SECTION

PART 1 - GENERAL**1.01 SCOPE OF WORK**

- A. Provide and install a complete conduit system as shown on drawings and as hereinafter specified.

1.02 SECTION INCLUDES

- A. Metal conduit.
- B. Flexible metal conduit.
- C. Liquid-tight flexible metal conduit
- D. Electrical metallic tubing.
- E. Nonmetallic (PVC) conduit
- F. Fittings and conduit bodies.
- G. Electrical nonmetallic tubing
- H. Flexible nonmetallic conduit.

1.03 RELATED SECTIONS

- A. Section 16130 - Boxes.
- B. Section 16170 - Grounding and Bonding.
- C. Section 16190 - Supporting Devices.
- D. Section 16195 - Electrical Identification.

1.04 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- C. ANSI C80.5 - Rigid Aluminum Conduit.
- D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable assemblies.
- E. ANSI/NFPA 70 - National Electrical Code.
- F. NECA "Standard of Installation."
- G. NEMA RN 1 - Polyvinyl chloride (PVC) externally coated galvanized rigid steel conduit and intermediate metal conduit.

**SECTION 16111
CONDUIT**

- H. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- I. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

1.05 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70.

1.06 SUBMITTALS

- A. Submit under provisions of Section and Section 16010.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquid-tight flexible metal conduit, electrical metallic tubing, nonmetallic conduit, flexible nonmetallic conduit, fittings and conduit bodies.

1.07 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01705.
- B. Accurately record actual routing of conduits larger than 2 inches and conduits of all sizes beyond building walls.

1.08 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.09 FIELD SAMPLES

- A. Provide under provisions of Section 01205.
- B. Provide, upon request from Architect/Engineer, field sample of conduit one each at 2 feet long.
- C. Provide, upon request from Architect/Engineer, field sample of expansion/deflection fitting one each.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle Products to site under provisions of Section 01605.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

1.11 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.

- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS**2.01 CONDUIT REQUIREMENTS**

- A. Minimum Size: 3/4 inch unless otherwise specified.
- B. Dry Locations:
 - 1. Concealed: Use electrical metallic tubing.
 - 2. Exposed: Use rigid steel and aluminum conduit.
- C. Underground Installations:
 - 1. More than five feet from foundation wall: Use PVC conduit, 3/4 inch minimum size.
 - 2. Within Five Feet from Foundation Wall: Use rigid steel conduit, 3/4 inch minimum size.
 - 3. In or Under Slab on Grade: Use PVC conduit rigid steel elbows, 3/4 inch minimum size. Do not install conduit to come into contact with re-bar or post tension cables.
- D. Outdoor locations, above grade: Use rigid steel or aluminum conduit, 3/4 inch minimum size.
- E. In slab above grade
 - 1. Use rigid steel conduit with a minimum size of 3/4 inch.
 - 2. Maximum size conduit in slab: 3/4 inch; 1/2 inch for conduits crossing each other.
- F. Wet and damp locations: Use rigid steel and aluminum conduit.
- G. Dry locations:
 - 1. Concealed: Use electrical metallic tubing
 - 2. Exposed: Use rigid steel and aluminum conduit.

2.02 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1. Rigid, threaded, thick wall; galvanized inside and outside.
- B. Rigid Aluminum Conduit: ANSI C80.5.
- C. Intermediate Metal Conduit (IMC): ANSI C80.2 Rigid, threaded, thinwall; galvanized inside and outside.

**SECTION 16111
CONDUIT**

- D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit. Use all steel fittings.

2.03 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction.
- B. Fittings: ANSI/NEMA FB 1.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction with PVC jacket
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.05 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression type.

2.06 NONMETALLIC CONDUIT

- A. Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 - EXECUTION**3.01 INSTALLATION**

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 16190.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.

- J. Route conduit parallel and perpendicular to walls.
- K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- L. Route conduit in and under slab from point-to-point.
- M. Do not cross conduits in slab.
- N. Maintain adequate clearance between conduit and piping.
- O. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- P. Cut conduit square using saw or pipecutter; de-burr cut ends.
- Q. Bring conduit to shoulder of fittings; fasten securely.
- R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted into fitting. Turn conduit fitting 1/2 turn for seating. Allow joint to cure for 20 minutes minimum.
- S. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
- T. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch size.
- U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints.
- W. Provide suitable pull string in each empty conduit except sleeves and nipples.
- X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Y. Ground and bond conduit under provisions of Section 16170.
- Z. Identify conduit under provisions of Section 16195.
- AA. Conduits for telephone system shall have a minimum bending radius of 36 inches for all conduits 1 1/4 inch size and larger.
- AB. Conduits shall be installed such that the fitting covers and pull boxes are easily accessible.
- AC. Conduit ends shall be capped or plugged immediately after installation by suitable means to exclude foreign matter.
- AD. PVC conduit installed underground shall be terminated with PVC coated rigid steel elbows extending up through the grade elevation or slab.
- AE. Support conduit runs on each side of bends, and not greater than 8'-0" on centers.

- AF. Conduit sizes shall be as indicated on plans, or as required by N.E.C. for quantity and size of conductors installed.
- AG. Concealed conduits shall be run in a direct line with long sweep bends and offsets. Exposed conduits shall be run parallel to and at right angles to building lines. Conduits shall be concealed unless otherwise noted or shown on the drawings.
- AH. Conceal conduit in all areas excluding mechanical, electrical and other unfinished rooms, connections to motors, and connections to surface cabinets, unless noted otherwise.
- AI. Conduit terminals at cabinets and boxes shall be rigidly secured with locknuts and bushings as required by NEC. On all conduit 1.25 inch trade size and larger, insulated bushings shall be installed.
- AJ. Install complete raceway system before conductors are pulled in.
- AK. Sealing locknuts shall be used on boxes and cabinets which are other than NEMA 1 construction.
- AL. Exercise extreme care in laying out electrical work to insure that ceiling outlets are locations symmetrically within areas and with respect to air conditioning, heating and ventilating outlets, tile patterns, finishes, etc.
- AM. Install UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints. Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended ceilings.
- AN. Flexible conduit shall be used for connection to all motor terminal boxes. Where motors are mounted on sliding bases, the flexible connection shall be of sufficient length (minimum 18 inches; maximum 6 feet) to allow full travel of motor on base.
- AO. Flexible steel conduit shall be used for connection of control equipment requiring piping, such as solenoid valves, pressure controls, aquastats, pneumatic-electric relays, etc.
- AP. Provide grounding conductor in all flexible conduit.
- AQ. Allow minimum 12 inch clearance of flues, steam pipes, and heat source.
- AR. Do not mount conduit on same rack with pipes.
- AS. Seal conduit with oakum or fiberglass where conduits leave heated area and enter unheated area.
- AT. Where rigid conduit is installed in cabinet, junction box, pull box, or outlet box, protect conductors with insulating plastic bushing with locknut on both sides of enclosure.
- AU. Fire rated walls, partitions, floors, ceilings, penetrations: Sealed in accordance with NEC 300-21.

3.02 UNDERGROUND CONDUIT INSTALLATION

- A. Ground shall be excavated in open trenches, with width, depth, and construction necessary for proper installation of underground work.

- B. Where called for on plans, conduits shall be encased in concrete with a minimum thickness of 2 inches at any point.
- C. Multiple runs shall have manufactured spacers installed on minimum of one per ten feet of run.
- D. Multiple runs shall have joints staggered one foot apart minimum.
- E. Conduit shall be installed a minimum of 24 inches below finished grade.
- F. Minimum spacing between conduits for multiple runs shall be two inches.
- G. Conduit shall be bedded firmly and continuously on sand or pea gravel and provide a minimum of 6 inches of covering of sand or pea gravel on all sides of conduit.
- H. Maintain all trenches and excavations free of standing water.
- I. Backfill all trenches in 8 inch layers and compact by tamping and puddling. Backfill material shall be clean dirt, free of solid material (rocks, concrete, brick, or other debris) and shall not be frozen. Installation shall be approved by Architect/Engineer prior to backfilling.
- J. PVC conduit installed underground shall be terminated with PVC coated rigid steel elbows extending up through the grade elevation or slab.
- K. Provide adequate barricades, signs, lights, etc. while excavations are open.
- L. Provide warning tape at 12 inch depth.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Section 07270.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.
- C. Conduit sleeves shall be installed so that proper position and alignment will be maintained during construction of forms, pouring of concrete and setting of masonry.
- D. Electrical Contractor shall lay out and installed his work in advance of the installation of floors, walls, ceilings and roofs. Coordinate with structural engineer for penetration of structural members.
- E. Install sleeves as required for conduit runs.
- F. Install inserts and pack sleeves with packing to maintain fire rating of building.
- G. Sleeves and conduit that pass through exterior walls and through floor on grade shall be watertight.

3.04 FIELD TEST AND QUALITY CONTROL

**SECTION 16111
CONDUIT**

- A. Conduit systems shall form a complete system of positive low-resistance ground paths for installation of wiring.
- B. Entire system shall be tested for resistance to ground and shall not exceed 25 ohms.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Building wire and cable.
- B. Wiring connectors and connections.

1.02 RELATED SECTIONS

- A. Section 16111 - Conduit.
- B. Section 16130 - Boxes.
- C. Section 16195 - Electrical Identification.

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01345 and Section 16010.
- B. Product Data: Provide for each cable assembly type.
- C. Test Reports: Indicate procedures and values obtained.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.07 FIELD SAMPLES

- A. Provide under provisions of section 01400
- B. Submit two lengths, each 18 inches of cable assembly from each reel upon request from Architect/Engineer.
- C. Select each length to include complete set of manufacturer's markings.

- D. Attach tag indicating cable size and application information.

1.08 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Conductor sizes are based on copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.09 COORDINATION

- A. Coordinate Work under provisions of Section 01205.
- B. Determine required separation between cable and other work.
- C. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - BUILDING WIRE AND CABLE

- A. Anaconda.
- B. Rome.
- C. Triangle.
- D. Phelps-Dodge.
- E. Simplex.
- F. Substitutions: Under provisions of Section 01605 and Section 16010.

2.02 BUILDING WIRE AND CABLE

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper 98% conductivity.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.

- C. Electrical contractor shall verify conductor sizes and quantities on plans to comply with NEC and local codes prior to bid. If any discrepancies exist, inform Architect/Engineer immediately.

3.02 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.03 WIRING METHODS

- A. Concealed Dry Interior Locations: Use only Type THW and THHN/THWN insulation in raceway.
- B. Exposed Dry Interior Locations: Use only Type THW, THHN/THWN and XHHW insulation in raceway.
- C. Above Accessible Ceilings: Use only Type THW, THHN/THWN and XHHW insulation in raceway.
- D. Wet or Damp Interior Locations: Use only Type THW, THWN and XHHW insulation in raceway.
- E. Exterior Locations: Use only Type THW, THWN and XHHW insulation in raceway.
- F. Underground Installations: Use only Type THW, THWN and XHHW insulation in raceway.

3.04 INSTALLATION

- A. Install products in accordance with manufacturers instructions.
- B. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- C. Use stranded conductors for control circuits.
- D. Use conductor not smaller than 12 AWG for power and lighting circuits.
- E. Use conductor not smaller than 14 AWG for control circuits.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 100 feet and for 20 ampere, 277 volt branch circuits longer than 200.
- G. Pull all conductors into raceway at same time.
- H. Use suitable wire pulling lubricant, approved by wire manufacturer, for building wire 4 AWG and larger.
- I. Protect exposed cable from damage.
- J. Use suitable cable fittings and connectors.

SECTION 16123
BUILDING WIRE AND CABLE

- K. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- L. Clean conductor surfaces before installing lugs and connectors.
- M. Make splices, taps, and termination's to carry full ampacity of conductors with no perceptible temperature rise.
- N. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- O. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- P. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- Q. All wire and cable shall be color coded as follows unless local building codes require otherwise (voltage as applicable):

<u>Phase</u>	<u>Color</u>	
	<u>208Y/120V</u>	<u>480Y/277V</u>
A or 1	Red	Brown
B or 2	Black	Orange
C or 3	Blue	Yellow
Neutral	White	Gray
Equipment Ground	Green	Green

- R. Where color coding is not practicable, such as for short runs of feeder cables, apply color coded pressure sensitive tape, half lapped, covering a minimum of 2" of cable. Where two different voltage systems are run in the same raceway use gray or white with a stripe (not green) for one of the neutrals.
- S. When utilizing the raceways of continuous row lighting fixture installations, the contractor shall install a minimum #12 AWG, copper, type THWN rated for a temperature of 194° F, and color coded in dry locations only, 600 VAC.
- T. For boiler room and mechanical equipment rooms, furnish and install type THWN insulated copper conductors of the required capacity, rated 600 VAC and color coded.
- U. All wiring between control equipment on boilers and etc., shall be high temperature insulated copper conductors with type AF asbestos-covered heat resistant insulation and color coded with maximum operating insulation and color coded with maximum operating temperature of 150 degrees C. or 302 degrees F.
- V. The use of non-metallic sheath cable or "Romex" shall not be allowed on this project.

3.05 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 16195.

- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01205.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

1.02 RELATED SECTIONS

- A. Section 16141 - Wiring Devices: Mounting heights of wiring device outlets.
- B. Section 16180 - Equipment Wiring Systems.
- C. Section 16195 - Electrical Identification.

1.03 REFERENCES

- A. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- B. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- C. ANSI/NFPA 70 - National Electrical Code.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.04 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01705.
- B. Accurately record actual locations and mounting heights of outlet, pull and junction boxes.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.06 PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.
- B. Verify locations of floor boxes and outlets prior to rough-in.
- C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

PART 2 - PRODUCTS

**SECTION 16130
BOXES****2.01 OUTLET BOXES**

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Concrete ceiling boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Cast boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.02 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Surface-Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface-mounted junction box.
 - 1. Material: Galvanized cast iron.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 - EXECUTION**3.01 INSTALLATION**

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- E. Install boxes to preserve fire resistance rating of partitions and other elements.
- F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- G. Use flush mounting outlet boxes in finished areas.

- H. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch separation. Provide minimum 24 inches separation in acoustic rated walls.
- I. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- J. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- L. Use adjustable steel channel fasteners for hung ceiling outlet box.
- M. Do not fasten boxes to ceiling support wires.
- N. Support boxes independently of conduit.
- O. Use gang box where more than one device is mounted together. Do not use sectional box.
- P. Use gang box with plaster ring for single device outlets.
- Q. Use cast outlet box in exterior locations and wet locations.
- R. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.
- S. Set floor boxes level.
- T. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
 - 1. Interior Dry Locations: Use hinged enclosure under provisions of Section 16160.
 - 2. Other Locations: Use surface-mounted cast metal box.
- U. Do not install flush mounted floor boxes in areas such as Kitchen, Laundry, Toilets, etc.
- V. Ceiling and wall outlet boxes shall be not less than 4" square by 2-1/8" deep unless otherwise directed, and shall be installed to exactly fit the device for which it is intended, particularly where no furring out or plastering of wall or ceiling occurs.
- W. Ceiling or Wall outlet boxes shall be not less than 4" square by 2-1/8" deep unless otherwise directed, with plaster covers to fit the devices intended only where the furring of walls and ceilings occurs.
- X. Where larger volume size box is required for ceiling and wall outlet boxes, increase sizes to 4-11/16 in. square by 2-1/8 in. deep with cover to fit the device.
- Y. Wherever walls or ceilings will not receive a 2-1/8" deep box, furnish and install a 1-1/2" box with cover to fit the intended devices.

**SECTION 16130
BOXES**

VOL 0095 PAGE 958

- Z. All ceiling and wall outlets which are to support fixtures shall contain a 3/8" fixture stud within and, wherever possible, shall be securely supported with bar-type hangers.
- AA. All ceiling and wall outlets shall not be set back on the finished surface more than 1/4". Outlets over doors shall be set symmetrical with door.
- AB. Increase in size all required outlet boxes or junction boxes to accommodate required splices and conductors to conform with cubic-inch requirements established by National Electrical code.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations and sizes of required access doors.
- B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- C. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.
- D. Position outlet boxes to locate luminaires as shown on reflected ceiling plan.
- E. Coordinate with general contractor for blocking for future ceiling fans.

3.03 ADJUSTING

- A. Adjust floor box flush with finish flooring material.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closure in unused box opening.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Device plates and decorative box covers.

1.02 RELATED SECTIONS

- A. Section 16130 - Boxes.

1.03 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices.
- B. NEMA WD 6 - Wiring Device Configurations.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01345.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
 - 1. Manufacturer's Instructions:
 - a. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
 - b. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 WALL SWITCHES

959

**SECTION 16141
WIRING DEVICES**

- A. Manufacturers:
 - 1. Leviton.
 - 2. Hubbell.
 - 3. Bryant.
 - 4. Arrow Hart.
 - 5. Pass & Seymour.
 - 6. Substitutions: Under provisions of Section 01605 and 16010.
- B. Description: NEMA WD 1, general duty, AC only general- use snap switch.
- C. Device Body: Ivory plastic with toggle handle (lighted handle where indicated).
- D. Indicator Light: Separate pilot strap; red color lens (glows when on.)
- E. Locator Light: Lighted handle type switch; ivory color handle (glows when off.)
- F. Voltage Rating: 120-277 volts, AC.
- G. Current Rating: 20 amperes.
- H. Ratings: Match branch circuit and load characteristics.

2.02 WALL DIMMERS

- A. Manufacturers:
 - 1. Lutron.
 - 2. Prescolite.
 - 3. Lightolier.
 - 4. Substitutions: Under provisions of Section 01605 and 16010.
- B. Description: NEMA WD 1, semiconductor dimmer for incandescent lamps and also rated for use with electronic ballasts for fluorescent lamps. Type as indicated on Drawings.
- C. Device Body: Ivory plastic with linear slide.
- D. Voltage: 120 volts.
- E. Power rating: Match load shown on Drawings; 600 watts minimum.

2.03 RECEPTACLES**960**

- A. Manufacturers:
 - 1. Leviton.
 - 2. Hubbell.
 - 3. Bryant.
 - 4. Arrow Hart.
 - 5. Pass & Seymour.
 - 6. Substitutions: Under provisions of Section 01605 and 16010.
- B. Description: NEMA WD 1; general duty, general use receptacle.
- C. Device Body: Ivory plastic
- D. Configuration: NEMA WD 6; type as specified and indicated.
- E. Convenience Receptacle: Type 5-20.
- F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.04 WALL PLATES

- A. Decorative Cover Plate: Ivory colored noryl.
- B. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device cover.
- C. All devices shown in one common location and height shall be installed under one common face plate.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify conditions under provisions of Section 01205.
- B. Verify outlet boxes are installed at proper height.
- C. Verify wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify branch circuit wiring installed is completed, tested, and ready for connection to wiring devices.
- E. Verify openings in access floor are in proper locations.
- F. All receptacles other than 120V., 20A duplex receptacles need to be verified for the correct NEMA configuration prior to ordering and installation.

**SECTION 16141
WIRING DEVICES**

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to outlet box with bonding jumper.
- F. Install decorative plates on switch, receptacle, and blank outlets in finished areas as directed by Architect.
- G. Connect wiring devices by wrapping conductor around screw terminal.
- H. Use jumbo size plates for outlets installed in masonry walls.
- I. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights specified and indicated on Drawings.
- B. Install wall switch 46 inches above finished floor.
- C. Install convenience receptacle 24 inches above finished floor.
- D. Install convenience receptacle horizontally 4 inches above counter or backsplash of counter.
- E. Install dimmer 46 inches above finished floor.
- F. Install telephone jack 24 inches above finished floor.
- G. Install telephone jack for wall telephone 48 inches above finished floor.

3.05 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.

- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. Verify that each telephone jack is properly connected and circuit is operational.

3.06 ADJUSTING AND CLEANING

- A. Adjust devices and wall plates to be flush and level.
- B. Inspect and clean all wall plates upon completion of project, replace all damaged wall plates.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDES:**

- A. Grounding electrodes and conductors
- B. Equipment grounding conductors
- C. Bonding

1.02 RELATED WORK:

- A. Section 02781 - Site Grounding.
- B. Section 03300 - Cast-in-Place Concrete
- C. Section 03200 - Concrete Reinforcement

1.03 REFERENCES:

- A. ANSI/NFPA 70 - National Electrical Code

1.04 GROUNDING ELECTRODE SYSTEM

- A. Metal underground water pipe
- B. Metal frame of the building
- C. Concrete -encased electrode
- D. Ground ring specified in Section 02781
- E. Rod electrode.

1.05 SYSTEM GROUND RESISTANCE REQUIREMENTS:

- A. Three phase systems: 5 ohms maximum.

1.06 SUBMITTALS

- A. Test reports: Indicate overall resistance to ground.

1.07 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of grounding electrodes.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

**SECTION 16170
GROUNDING AND BONDING****1.09 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS**2.01 ROD ELECTRODE**

- A. Material: Copper
- B. Diameter: 3/4 inch
- C. Length: 10 feet

2.02 MECHANICAL CONNECTORS

- A. Material: Bronze.

2.03 EXOTHERMIC CONNECTIONS

- A. Provide where surrounded by concrete or earth.

2.04 WIRE

- A. Material: Stranded Copper
- B. Foundation Electrodes: 4/0 AWG.
- C. Grounding electrode conductor: Size to meet NFPA 70 requirements.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Verify that final backfill and compaction has been complete before driving rod electrodes.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install rod electrodes at locations indicated. Install additional rod electrodes as required achieve specified resistance to ground.
- C. Provide bonding to meet Regulatory Requirements.
- D. Bond each above ground portion of gas piping system upstream of the equipment shut-off valve to the grounding electrode system.
- E. Bond together metal siding not attached to grounded structure; bond to ground.

- F. Bond together reinforcing steel and metal accessories in structures.
- G. Provide insulated grounding conductor for isolated ground circuits.
- H. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Interface with site grounding system installed under Section 02781.
- B. Interface with lightning protection system installed under Section 16670.

3.04 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Use suitable test instrument to measure resistance to ground of system. Perform testing accordance with test instrument manufacturer's recommendations using the fail-of potential method.

END OF SECTION

SECTION 16180
EQUIPMENT WIRING SYSTEMS**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Electrical connections to equipment specified under other Divisions.

1.02 RELATED SECTIONS

- A. Section 15450 - Plumbing Equipment.
- B. Section 15540 - HVAC Pumps
- C. Section 15682 - Air Cooled Water Chillers
- D. Section 15855 - Air Handling Units
- E. Section 15870 - Power Ventilators
- F. Section 16111 - Conduit.
- G. Section 16123 - Wire and Cable.
- H. Section 16130 - Boxes.

1.03 REFERENCES

- A. FS W-C-596 - Electrical Power Connector, Plug, Receptacle and Cable Outlets.
- B. NEMA WD 1 - General Purpose Wiring Devices..
- C. NEMA WD 6 - Wiring Device Configurations.
- D. ANSI/NFPA 70 - National Electrical Code.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.05 COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.
- C. Determine connection locations and requirements.
- D. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
- E. Sequence electrical connections to coordinate with start-up schedule for equipment.

**SECTION 16180
EQUIPMENT WIRING SYSTEMS****PART 2 - PRODUCTS****2.01 CORDS AND CAPS**

- A. Attachment Plug Construction: Conform to NEMA WD 1.
- B. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
- C. Cord Construction: ANSI/NFPA 70, Oil-Resistant thermoset insulated Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations
- D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Verify conditions under provisions of Section 01039.
- B. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.
- D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated.
- E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- F. Install disconnect switches, controllers, control stations, and control devices as indicated.
- G. Modify equipment control wiring with terminal block jumpers as indicated.
- H. Provide interconnecting conduit and wiring between devices and equipment where indicated.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDES

- A. Conduit and equipment supports
- B. Anchors and fasteners

1.02 REFERENCES

- A. NECA - National Electrical Contractors Association
- B. ANSI/NFPA 70 - National Electrical Code

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.
- C. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Use precast insert system, expansion anchors.
 - 2. Steel Structural Elements: Use beam clamps, and welded fasteners.
 - 3. Concrete surfaces: Use expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.

**SECTION 16190
SUPPORTING DEVICES**

5. Solid Masonry Walls: Use expansion anchors and preset inserts.
6. Sheet Metal: Use sheet metal screws.
7. Wood Elements: Use wood screws.

2.02 STEEL CHANNEL

- A. Manufacturer:
 1. Super Strut
 2. Unistrut
 3. Beeline
- B. Description: Galvanized steel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation."
- C. Do not fasten supports to pipes, ducts, mechanical equipment or conduit.
- D. Do not use spring steel clips and clamps.
- E. Do not drill or cut structural members.
- F. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- G. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- H. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- I. In wet and damp locations, use steel channel supports to stand cabinets and panelboards one inch off wall.
- J. Use sheet metal channel to bridge steel studs above and below cabinets and panelboards recessed in hollow partitions.
- K. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using beam clamps.

- L. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
- M. In wet locations and mechanical spaces install free standing electrical equipment on concrete pads.
- N. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- O. Wall mounted transformers shall be provided and installed using wall brackets specifically designed for transformers. Use all available mounting points to secure all transformers. Coordinate with General Contractor for any required blocking.
- P. Floor or pad mounted transformers shall be mounted with all available mounting points using bolts, flat washers and lock washers to firmly secure the transformer to the floor or pad. Transformers exposed to the weather (outdoor) shall use stainless steel mounting hardware.
- Q. All lay-in grid mounted lighting fixtures shall be suspended from structure above independent from the grid. Installation shall comply with Article 410 Section D of the NEC.
- R. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.
- S. All boxes and cabinets shall be rigidly mounted and secured. Conduit shall not be used as a means of support.
- T. Use all available mounting points to secure all cabinets, boxes and panels.
- U. Raceways, shall be supported independently from the building structure and not from any water piping, mechanical ductwork, etc. unless both the equipment being supported and the equipment device structure are specifically designed to be joined to one another.
- V. In brick or concrete block, inserts shall be near the center of the brick or concrete block, not near the edges or in the mortar joints.
- W. Where conduit is to be installed in poured concrete floors or walls, provide concrete-tight conduit inserts securely fastened to forms to prevent conduit misplacement.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.

1.02 RELATED SECTIONS

- A. Section 09900 - Painting.

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01345.
- B. Product Data: Provide catalog data for nameplates, labels, and markers.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS**2.01 NAMEPLATES AND LABELS**

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- B. Locations:
 - 1. Each electrical distribution and control equipment enclosure.(switchboards, panel-boards, transformers, motor control centers, etc.)
 - 2. Communication cabinets.
- C. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual voltage and source.
 - 2. Use 1/4 inch letters for identifying equipment designation.

**SECTION 16195
ELECTRICAL IDENTIFICATION**

3. Use 1/8 inch letters for identifying individual circuit breakers, switches and motor starters in panelboards, switchboards, adjustable speed drives and motor control centers. Identify circuit and load served, including location.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches, and receptacles, and control device stations.

2.02 WIRE MARKERS

- A. Description: Cloth, tape, split sleeve or tubing type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and at each load connection.
- C. Legend:
 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
 2. Control Circuits: Control wire number indicated on shop drawings.

2.03 CONDUIT MARKERS

- A. Conduit systems shall be color coded using dots, strips or word labels to identify different systems. This includes labeling of boxes. Labels are not required on runs down to switches, receptacles or where use is readily known.
- B. Location: Furnish markers for each conduit run longer than 6 feet.
- C. Color:
 1. 208 Volt Systems: Black
 2. 480 Volt Systems: Brown
 3. Fire Alarm Systems: Red.
 4. Telephone Systems: Pink.
 5. Low Voltage Systems: Blue.

2.04 UNDERGROUND WARNING TAPE

- A. Description: 4 inch wide plastic tape, colored yellow with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws, rivets or adhesive.
- C. Secure nameplate to inside surface of door on panel- board that is recessed in finished locations.
- D. Identify conduit using field painting under provisions of Section 09900.
- E. Paint colored band on each conduit longer than 6 feet.
- F. Paint bands 30 feet on center.
- G. Identify underground conduits using underground warning tape. Install one tape per trench at 12 inches below finished grade.

END OF SECTION

PART 1 - GENERAL**1.01 SCOPE OF WORK**

- A. Arrange with the Utility Company for permanent electric service.
- B. Underground service entrance.

1.02 SYSTEM DESCRIPTION:

- A. System Voltage: 480/277 volts, three phase, four wire, 60 Hertz.

1.03 RELATED SECTIONS

- A. Section 16130 - Boxes.
- B. Section 16170 - Grounding and Bonding.
- C. Section 16190 - Supporting Devices.
- D. Section 16195 - Electrical Identification.

1.04 SUBMITTALS

- A. Submit under provisions of Section and Section 16010.
- B. Submit Utility Company prepared drawings.

PART 2 - PRODUCTS**2.01 TRANSFORMER PAD**

- A. Provide transformer pad in accordance with the drawings, and Utility Company requirements.

PART 3 - EXECUTION**3.01 INSTALLATION**

- A. Make arrangements with the Utility Company to obtain permanent electric service to the Project. Contractor shall pay all Utility Company fees required to provide permanent electrical service to the project.
- B. Contractor shall contact the Utility Company for inspection of the installation before pouring and backfilling any trench or slabs.
- C. Contractor shall furnish and install transformer slabs, conduit, pull boxes, service boxes, junction boxes and a #36 nylon pull string in empty conduits.
- D. Contractor shall install 2/0 bare copper ground from building ground buss into the secondary compartment of each transformer. Bare copper ground shall not be installed in conduit and shall not be spliced.
- E. Customer service point shall be at the secondary compartment of the transformer.

975

- F. The Utility Company shall furnish and make all connections in transformers. The Utility Company shall furnish and install all primary cable.
- G. Plastic conduits shall be terminated with bell ends in pull boxes and service boxes. Vertical conduit shall be terminated 2" above transformer slabs with insulating bushings. Conduit shall be terminated 1" above other slabs with bell ends.
- H. Primary conduit and secondary conduit to customer service box or pull box shall be sized as noted on the drawings with only 2-90 degree bends permitted in each primary or secondary conduit run.
- I. All conduit stubbed up at pole risers shall be rigid steel.
- J. Any utilities shown are approximate. Contractor shall verify exact locations in the field with Utility Company personnel.
- K. Metering shall be in accordance with Utility Company standards.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Main and distribution switchboards.

1.02 RELATED WORK

- A. Section 16420 - Electric Service.

1.03 REFERENCES

- A. ANSI C12 - Code for Electricity Metering.
- B. ANSI C39.1 - Requirements for Electrical Analog Indicating Instruments.
- C. ANSI C57.13 - Requirements for Instrument Transformers.
- D. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.
- E. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses).
- F. FS W-S-865 - Enclosed Knife Switch.
- G. NEMA AB 1 - Molded Case Circuit Breakers.
- H. NEMA KS 1 - Enclosed Switches.
- I. NEMA PB 2 - Dead Front Distribution Switchboards.
- J. NEMA PB 2.1 - Instructions for Safe Handling, Installation, Operation and Maintenance of Deadfront Switchboards Rated 600 Volts or Less.

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Include front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; switchboard instrument details; instructions for handling and installation of switchboard; and electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.
- C. Submit manufacturers' instructions under provisions of Section 01300.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

977

**SECTION 16425
SWITCHBOARDS****1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to the site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with NEMA PB2.1 and manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.07 SPARE PARTS

- A. Keys: Furnish three each to Owner.
- B. Fuses: Furnish to Owner one full set spare fuses of each type and rating installed.
- C. Fuse Pullers: Furnish one fuse puller to Owner.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURERS**

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Siemens.
- E. Substitutions: Under provisions of Section 01600.

2.02 SWITCHBOARD CONSTRUCTION AND RATINGS

- A. Factory-assembled, dead front, metal-enclosed, and self-supporting switchboard assembly conforming to NEMA PB2, and complete from incoming line terminals to load-side terminations.
- B. Switchboard electrical ratings and configurations as shown on Drawings.
- C. Line and Load Terminations: Accessible from the front only of the switchboard, suitable for the conductor materials used.
- D. Distribution Section Devices: Panel mounted or Individually mounted.
- E. Bus Material: Copper, sized in accordance with NEMA PB 2.
- F. Bus Connections: Bolted, accessible from front only for maintenance.

- G. Provide a one x ¼ copper ground bus through the length of the switchboard.
- H. Enclosure shall be NEMA PB 2 Type 3R - General Purpose. Sections shall align at front and rear.
- I. Switchboard Height: NEMA PB2; excluding floor sills, lifting members and pull boxes.
- J. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.
- K. Future Provisions: Fully equip spaces for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents. Continuous current rating as indicated on Drawings.

2.03 SWITCHING AND OVERCURRENT PROTECTIVE DEVICES

- A. Fusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R fuses, type as specified.
- B. Fusible Switch Assemblies, 800 Amperes and Larger: Bolted pressure contact switches. Fuse Clips: Designed to accommodate Class L fuses.
- C. Molded Case Circuit Breakers: NEMA AB 1; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole.

2.04 ACCEPTABLE MANUFACTURERS - FUSES

- A. Bussman.
- B. Shawmut.
- C. Littlefuse.
- D. Substitutions: Under provisions of Section 01600.

2.05 FUSES

- A. Fuses 600 Amperes and Less: Dual element, current limiting, time delay, one-time fuse, 600 volt, UL Class as scheduled.
- B. Fuses 601 Amperes and Larger: Current limiting, time delay one time fuse, 600 volt, UL Class L.
- C. Interrupting Rating: 200,000 rms amperes.

**SECTION 16425
SWITCHBOARDS**

2.06 INSTRUMENTS AND SENSORS

- A. Ammeters: ANSI C39.1; indicating ammeter with 4.5 inch square recessed case and 250 degree scale, white dial with black figures and pointer, 5 ampere, 60 Hertz movement, one percent accuracy.
- B. Voltmeters: ANSI C39.1; indicating voltmeter with 4.5 inch square recessed case and 250 degree scale, white dial with black figures and pointer, 120 volt, 60 Hertz movement, one percent accuracy.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install switchboard in locations shown on Drawings, in accordance with manufacturer's written instructions and NEMA PB 2.1.
- B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.
- C. Install fuses in each switch.

3.02 FIELD QUALITY CONTROL

- A. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure insulation resistance of each bus section phase to phase and phase to ground for one minute each. Test voltage shall be 1000 volts, and minimum acceptable value for insulation resistance is 2 megohms.
- C. Check tightness of accessible bolted bus joints using a calibrated torque wrench. Tightness shall be in accordance with manufacturer's recommended values.

3.03 ADJUSTING AND CLEANING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Touch up scratched or marred surfaces to match original finish.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Disconnect switches.
- B. Fuses.
- C. Enclosures.

1.02 REFERENCES

- A. ANSI/UL 198C - High-Intensity Capacity Fuses; Current Limiting Types.
- B. ANSI/UL 198E - Class R Fuses.
- C. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses).
- D. FS W-S-865 - Switch, Box, (Enclosed), Surface-Mounted.
- E. NEMA KS 1 - Enclosed Switches.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 01345.
- B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Siemens.
- E. Substitutions: Under provisions of Section 01600.

2.02 DISCONNECT SWITCHES

- A. Fusible Switch Assemblies: NEMA KS 1; Type HD (Heavy Duty); quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R or J fuses.

**SECTION 16440
DISCONNECT SWITCHES**

- B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD (Heavy Duty); quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- C. Enclosures: NEMA KS 1; Enclosures shall be suitable for this environment in which it is installed in accordance with NEC.

2.03 ACCEPTABLE MANUFACTURERS - FUSES

- A. Bussman.
- B. Shawmut.
- C. Little Fuse.
- D. Substitutions: Under provisions of Section 01605.

2.04 FUSES

- A. Fuses 600 Amperes and Less: As indicated on Drawings; dual element, current limiting, one-time fuse, 250 or 600 volt, as applicable.
- B. Fuses 601 Amperes and Larger: Current Limiting fast acting one time, 600 volt, UL Class L.

PART 3 - EXECUTION**3.01 INSTALLATION**

- A. Install disconnect switches where indicated on Drawings.
- B. Install fuses in fusible disconnect switches.
- C. Installation of disconnect switches on equipment in which the switch serves and shall be closely coordinated with the contractor and vendor of said equipment. Location and mounting shall conform to NEC and local codes.
- D. Install switch within six feet of equipment to be served by that switch unless otherwise noted on plans. Any other deviations shall be coordinated with Engineer.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Power system grounding.
- B. Communication system grounding.
- C. Electrical equipment and raceway grounding and bonding.

1.02 SYSTEM DESCRIPTION

- A. Ground the electrical service system neutral at service entrance equipment to grounding electrodes.
- B. Ground each separately-derived system neutral to nearest effectively grounded building structural steel member.
- C. Provide communications system grounding conductor at point of service entrance and connect to separate grounding electrode.
- D. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

1.03 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300.
- B. Indicate location of system grounding electrode connections, and routing of grounding electrode conductor.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Ground Rods: Copper-encased steel, 3/4 inch diameter, minimum length 10 feet.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide a separate, insulated equipment grounding conductor in feeder circuits. Terminate each end on a grounding lug, bus, or bushing.
- B. Connect grounding electrode conductors to metal water pipe using a suitable ground clamp. Make connections to flanged piping at street side of flange. Provide bonding jumper around water meter.
- C. Supplementary Grounding Electrode: Use driven ground rod on exterior of building. Install ground rod in suitable recessed well; fill with gravel after connection is made.

**SECTION 16450
SECONDARY GROUNDING**

- D. Use minimum 6 AWG copper conductor for communications service grounding conductor. Leave 10 feet slack conductor at terminal board.
- E. Isolated Grounding Systems: Use insulated equipment grounding conductor and connect only to service grounding electrode.
- F. Provide grounding and bonding at Utility Company's metering equipment and pad-mounted transformer in accordance with Section 16420.

3.02 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Dry type two winding transformers

1.02 RELATED SECTIONS

- A. Section 16111 - Conduit: Flexible conduit connections.
- B. Section 16170 - Grounding and Bonding
- C. Section 16190 - Supporting Devices

1.03 REFERENCES

- A. NEMA ST 1 - Specialty Transformers.
- B. NEMA ST 20 - Dry type Transformers for General Applications
- C. NFPA 70 - National Electrical Code

1.04 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Product Data: Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.
- C. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with NECA Standard of Installation.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL as suitable for purpose specified and shown.

**SECTION 16460
DRY TYPE TRANSFORMERS****1.08 DELIVERY, STORAGE AND HANDLING**

- A. Store, protect, and handle products to site under provisions of Section 01600.
- B. Deliver transformers individually wrapped for protection and mounted on shipping skids.
- C. Accept transformers on site. Inspect for damage.
- D. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 - PRODUCTS**2.01 TWO WINDING TRANSFORMERS**

- A. Manufacturers
 - 1. General Electric
 - 2. Square D
 - 3. Westinghouse
 - 4. Siemens
- B. Description: NEMA ST 20, factory assembled, air cooled dry type transformers, ratings as indicated on plans.
- C. Insulation system and average winding temperature rise for rated KVA as follows:
 - 1. 1-15 KVA; Class 185 with 150 degrees C rise.
 - 2. 16-500 KVA; Class 220 with 150 degrees C rise.
- D. Case Temperature: Do not exceed 35 degrees C rise above ambient at warmest point.
- E. Winding Taps:
 - 1. Transformers Less than 15 KVA: Two 5 percent below rated voltage, full capacity taps on primary winding.
 - 2. Transformers 15 KVA and Larger: NEMA ST 20
- F. Sound Levels: NEMA ST 20
- G. Basic Impulse Level: 10 KV
- H. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- I. Mounting: Suitable for trapeze mounting.

**SECTION 16460
DRY TYPE TRANSFORMERS**

- J. Coil Conductors: Continuous windings with termination's brazed or welded.
- K. Enclosure: NEMA ST 20; Type 1. Provide lifting eyes or brackets.
- L. Isolate core and coil from enclosure using vibration-absorbing mounts.
- M. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.02 SOURCE QUALITY CONTROL

- A. Provide production testing of each unit in accordance with NEMA ST 20.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Verify condition under provisions of Section 01039.
- B. Verify that surfaces are suitable for installing transformer supports.

3.02 INSTALLATION

- A. Install products in accordance with Manufacturer's instructions.
- B. Set transformer plumb and level.
- C. Use flexible conduit under the provisions of Section 16111, 2 ft. minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- D. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
- E. Provide seismic restraints.
- F. Provide grounding and bonding in accordance with Section 16170.

3.03 FIELD QUALITY CONTROL

- A. Check for damage and tight connections prior to energizing transformer.
- B. Measure primary and secondary voltages and make appropriate tap adjustments.

END OF SECTION

PART 1 - GENERAL**1.01 WORK INCLUDED**

- A. Service and distribution panelboards.
- B. Lighting and appliance branch circuit panelboards.

1.02 RELATED WORK

- A. Section 16195 - Electrical Identification.

1.03 REFERENCES

- A. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.
- B. FS W-F-870 - Fuseholders (For Plug and Enclosed Fuses).
- C. FS W-P-115 - Power Distribution Panel.
- D. FS W-S-865 - Enclosed Knife Switch.
- E. NEMA AB 1 - Molded Case Circuit Breakers.
- F. NEMA KS 1 - Enclosed Switches.
- G. NEMA PB 1 - Panelboards.
- H. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- I. NEMA PB 1.2 - Application Guide for Ground-fault Protective Devices for Equipment.

1.04 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Section 01345.
- B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.05 SPARE PARTS

- A. Keys: Furnish one each to Owner.
- B. Fuses: Furnish to Owner three spare fuses of each type and rating installed.
- C. Fuse Pullers: Furnish one fuse puller to Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PANELBOARDS

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Siemens.
- E. Substitutions: Under provisions of Section 01600.

2.02 MAIN AND DISTRIBUTION PANELBOARDS

- A. Panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB 1. Enclosures shall be suitable for the environment in which it is installed in accordance with NEC.
- C. Provide cabinet front with concealed trim clamps, and hinged door with flush lock. Finish in manufacturer's standard gray enamel.
- D. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
- E. Minimum Integrated Short circuit rating: As shown on Drawings.
- F. Molded Case Circuit Breakers: NEMA AB 1; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

2.03 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB 1; Enclosure shall be suitable for environment in which it is installed in accordance with NEC.
- C. Provide flush and/or surface cabinet, as required, front with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
- D. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
- E. Minimum Integrated Short Circuit Rating: As shown on Drawings.
- F. Molded Case Circuit Breakers: NEMA AB 1; bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type

SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.

- G. No handle ties are permitted for multi-pole circuit breakers.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install panelboards plumb in conformance with NEMA PB 1.1.
- B. Height: 6 ft.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- E. Stub 4 empty one inch conduits to accessible location above ceiling out of each recessed panelboard.

3.02 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.
- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Manual motor starters.
- B. Magnetic motor starters.
- C. Combination magnetic motor starters.
- D. Motor control centers.
- E. Adjustable speed drives.

1.02 RELATED WORK

- A. Section 16190 - Supporting Devices: Housekeeping pads.

1.03 REFERENCES

- A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- B. ANSI/IEEE 344 - Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
- C. ANSI/UL 198C - High-Intensity Capacity Fuses; Current-Limiting Types.
- D. ANSI/UL 198E - Class R Fuses.
- E. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service.
- F. FS W-P-115 - Power Distribution Panel.
- G. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses).
- H. FS W-S-865 - Switch, Box, (Enclosed), Surface-Mounted.
- I. NEMA AB 1 - Molded Case Circuit Breakers.
- J. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- K. NEMA KS 1 - Enclosed Switches.
- L. NEMA PB 1 - Panelboards.
- M. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.

SECTION 16480
MOTOR CONTROL

VOL 0095 PAGE 992

- B. Indicate on shop drawings, front and side views of motor control center enclosures with overall dimensions. Include conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, [neutral,] and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.
- C. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.
- D. Submit manufacturers' instructions under provisions of Section 01300.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700.
- B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

1.07 SPARE PARTS

- A. Keys: Furnish 2 each to Owner.
- B. Fuses: Furnish to Owner 6 spare fuses of each type and rating installed.
- C. Fuse Pullers: Furnish one fuse puller to Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - MOTOR STARTERS

- A. Square D.
- B. Westinghouse.
- C. General Electric.
- D. Substitutions: Under provisions of Section 01600.

SECTION 16480
MOTOR CONTROL

2.02 MANUAL MOTOR STARTERS

- A. Motor Starting Switch: NEMA ICS 2; AC general-purpose Class A manually operated 1 pole, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, and toggle operator.
- B. Enclosure: ANSI/NEMA ICS 6; Type 1.

2.03 MAGNETIC MOTOR STARTERS

- A. Magnetic Motor Starters: NEMA ICS 2; AC general-purpose Class A magnetic controller for induction motors rated in horsepower.
- B. Full Voltage Starting: Non-reversing type.
- C. Coil Operating Voltage: as required by control supplier.
- D. Size: NEMA ICS 2; size as shown on Drawings.
- E. Overload Relay: NEMA ICS 2; bimetal.
- F. Enclosure: NEMA ICS 6; Type 1.
- G. Combination Motor Starters: Combine motor starters with molded case circuit breaker disconnect in common enclosure.
- H. Auxiliary Contacts: NEMA ICS 2; two field convertible contacts in addition to seal-in contact.
- I. Indicating Lights: NEMA ICS 2; RUN: green in front cover.
- J. Selector Switches: NEMA ICS 2; HAND/OFF/AUTO in front cover.
- K. Relays: NEMA ICS 2.

2.04 ACCEPTABLE MANUFACTURERS - MOTOR CONTROL CENTER

- C. Square D.
- D. Westinghouse.
- E. General Electric.
- F. Substitutions: Under provisions of Section 01600.

2.05 MOTOR CONTROL CENTER

- A. Motor Control Centers: NEMA ICS 2; Class I, Type B.
- B. Main Overcurrent Protection: Molded case circuit breaker.
- C. Motor Starters: As scheduled.

SECTION 16480
MOTOR CONTROL

- D. Feeder Tap Units: Molded case thermal-magnetic circuit breakers.
- E. Voltage Rating: 480 volts, three phase, three wire, 60 Hertz.
- F. Horizontal Bussing: Copper, with a continuous current rating of 600 amperes. Include copper ground bus entire length of control center.
- G. Vertical Bussing: NEMA ICS 2; copper.
- H. Integrated Equipment Short Circuit Rating: 22K amperes rms symmetrical at 480 volts.
- I. Configuration: [Units front mounting only, accessible from the front only.
- J. Enclosure: ANSI/NEMA ICS 6; Type 1.
- K. Finish: Manufacturer's standard gray enamel.
- L. Control Transformer: Provide control transformer in motor control center to provide 120 volt control source for all motor starters in control center.

2.06 ACCEPTABLE MANUFACTURERS - ADJUSTABLE SPEED DRIVES.

- A. Graham 2001 Series.
- B. Square D.
- C. Westinghouse.
- D. Toshiba.
- E. Substitutions : Under provisions of Section 01600.

2.07 ADJUSTABLE SPEED DRIVES

- A. Furnish complete variable frequency drives as specified herein for the pumps designated on the drawings to be variable speed. All standard and optional features shall be included within the VFD enclosure, unless otherwise specified. VFD shall be housed in an all-steel hinged NEMA 1 enclosure.
- B. The VFD shall include a full-wave diode bridge rectifier. VFD shall maintain .95 displacement power factor regardless of speed or load.
- C. The inverter section of the VFD shall be sine-coded pulse width modulated (PWM). The VFD shall incorporate the use of IGBTs to reduce motor noise. VFD's incorporating Darlington transistors shall provide output line reactors to control audible motor noise.
- D. The VFD and options shall be tested to ANSI/UL Standard 508. The complete VFD, including all specified options, shall be listed by a nationally recognized testing agency such as UL, CUL, ETL or CSA.

SECTION 16480
MOTOR CONTROL

- E. Power line noise shall be limited to a voltage distortion factor and line notch depth as defined in IEEE Standard 519-1981, Guide for Harmonic Control and Reactive Compensation of Static Power Converters. The total voltage distortion shall not exceed 5%.
- F. Motor noise as a result of the VFD shall be limited to three dB over across the line operation, measured at three feet from the motor's center line.
- G. The VFD's full load amp rating shall meet or exceed NEC Table 430-150. The VFD shall have a continuous 110% overload rating and a 115% overload rating for 60 seconds.
- H. Protective Features:
 - 1. Individual motor overload protection for each motor controlled.
 - 2. Protection against input power undervoltage, overvoltage, and phase loss, output current overload and instantaneous overcurrent, over temperature within the VFD enclosure, over voltage on the DC bus, output short circuit and motor winding shorting to case faults.
 - 3. Protect VFD from sustained power or phase loss. The VFD shall incorporate a two second power loss ride through for control circuitry only to eliminate nuisance tripping.
 - 4. The VFD shall incorporate semiconductor rated fuses for the input. The fuses shall be UL/CSA listed and incorporated in the standard NEMA 1 enclosure. Fuses shall be rated for 200,000 amp interrupting capacity (AIC).
- I. Interface Features:
 - 1. Door mounted Hand/Off/Auto selector switch to start and stop the VFD. Provide open collector outputs for remote indication of Hand/Off/Auto.
 - 2. Digital manual speed control. Potentiometers not acceptable.
 - 3. Local/Remote selector switch to determine source speed reference.
 - 4. The VFD shall include the following door mounted status indicators: Power On, Drive Ready, Run, Hand/Off/Auto, Local, Remote, Keypad Lockout On and Reverse.
 - 5. The VFD shall be equipped with a door mounted panel to provide individual fault indications for the following: Undervoltage, High Line, Phase Loss, Bus Overvoltage, Overcurrent, Ground Fault, Overload, Overtemperature, External Fault and Output Open. Fault codes not acceptable.
 - 6. The VFD shall store in memory the previous three faults.
 - 7. Digital meter with selector switch to indicate the following: Percent Speed, Percent Load, Output Frequency, Input kW, Output Voltage and Output Current.
 - 8. A set of form-C, dry contacts to indicate when the VFD is in the fun and fault mode.
 - 9. A 4 to 20 mA output signal to vary in direct proportion to the controller's speed

(frequency) and controller's load (amps).

10. VFD to have terminal strip to accept N.C. safety contacts such as freezestats, smoke alarms, etc. VFD to safely shut down in drive or bypass mode when contacts open.
11. VFD to accept an additional N.C. contact to interface with the Hand-Off-Auto switch for remote Stop/Start control.
12. VFD shall accept a direct acting or reverse acting 4 to 20mA, 0 to 5Vdc or a 0 to 10Vdc signal.
13. The VFD shall have two programmable resonant frequency lockouts with adjustable frequency band widths.

J. Adjustments:

1. Maximum and minimum speed, independently adjustable from 10 to 100% base speed.
2. Acceleration and deceleration time, independently adjustable 2 to 300 seconds with override circuit to prevent nuisance trips if decel time is set too short.
3. Current limit, adjustable 0 to 115%.
4. Overload trip set point that is infinitely variable based upon motor amperage. The overloads in drive and bypass should be factory set for the connected load.
5. Preset speed, activated upon a contact closure.
7. If VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: Line undervoltage, Phase loss, line undervoltage, bus overvoltage, overcurrent, ground fault, overload, overtemperature, external fault, and motor open.
8. The automatic reset time shall be programmable.
9. The BFD shall provide a N.O. contact for enable or disable of reversing.

K. Service Conditions:

1. Ambient temperature, 32 to 104 degrees F.
2. 0 to 95% relative humidity, non-condensing.
3. Elevation to 3,300 feet without derating.
4. AC line voltage variation, -10 to +10% of nominal.

996

L. Special Features:

1. Provide a four position drive/off/line/test switch for complete manual bypass and

disconnect functions. The manual switch shall be door interlocked and padlockable in the off position. A motor starter shall be provided in the bypass circuit. Mount the bypass in a separate portion of the VFD enclosure with its own door. The VFD and bypass assembly shall carry the UL panel shop listing. Separate bypass panels that require field mounting and wiring are not acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Motor Starter Panelboard Installation: In conformance with NEMA PB 1.1.
- C. Install fuses in fusible switches.
- D. Select and install heater elements in motor starters to match installed motor characteristics.
- E. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

3.02 ADJUSTABLE SPEED DRIVE START-UP SERVICE

- A. The manufacturer shall provide start-up commissioning of the variable frequency drive and its optional circuits by a factory certified service technician who is experienced in start-up and repair services. The commissioning personnel shall be the same personnel that will provide the factory service and warranty repairs at the customer's site. Sales personnel and other agents who are not factory certified technicians for VFD field repair shall not be acceptable as commissioning agents.

Start-up services shall include checking for verification of proper operation and installation for the VFD, its options and its interface wiring to the building automation system. Start-up shall include customer training at the time of the equipment commissioning.

END OF SECTION

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Lighting contactors.

1.02 REFERENCES

- A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- B. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- C. ANSI/NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Include dimensions, size, voltage ratings and current ratings.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.04 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of each contactor and indicate circuits controlled.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include instructions for replacing and maintaining coil and contacts.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by [Underwriters Laboratories, Inc.] [testing firm acceptable to authority having jurisdiction] as suitable for purpose specified and shown.

PART 2 - PRODUCTS**2.01 MANUFACTURERS - GENERAL PURPOSE CONTACTORS**

**SECTION 16485
CONTACTORS**

- C. Square D.
- D. Westinghouse.
- E. General Electric.
- F. Substitutions: Under provisions of Section 01600.

2.02 GENERAL PURPOSE CONTACTORS

- A. Description: NEMA ICS 2, AC general purpose magnetic contactor.
- B. Coil Voltage: As indicated.
- C. Poles: As indicated.
- D. Size: As indicated.
- E. Enclosure: ANSI/NEMA ICS 6, Type as required to meet conditions of installation.
- F. Accessories: As shown.

2.03 MANUFACTURERS - LIGHTING CONTACTORS

- A. Square D.
- B. Westinghouse.
- C. General Electric.
- D. Substitutions: Under provisions of Section 01600.

2.04 LIGHTING CONTACTORS

- A. Description: NEMA ICS 2, magnetic lighting contactor.
- B. Configuration: Electrically held.
- C. Coil Voltage: As indicated.
- D. Poles: As indicated.
- E. Contact Rating: Match branch circuit overcurrent protection, considering derating for continuous loads.
- F. Enclosure: ANSI/NEMA ICS 6, Type as required to meet conditions of installations.
- G. Accessories: As shown.

999

PART 3 - EXECUTION

**SECTION 16485
CONTACTORS**

3 01 INSTALLATION

- A. Install in accordance with manufacturer's instructions

END OF SECTION

1000

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Interior luminaires and accessories.
- B. Exit signs.

1.02 RELATED SECTIONS

- A. Section 16130 - Boxes.

1.03 REFERENCES

- A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.
- B. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.
- C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).
- D. ANSI/NFPA 70 - National Electrical Code.
- E. ANSI/NFPA 101 - Life Safety Code.
- F. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01345 and 16010.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01705.
- B. Accurately record actual locations of each luminaire.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01705.
- B. Maintenance Data: Include replacement parts list.

1001

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

1.08 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Conform to requirements of NFPA 101.
- C. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 LUMINARIES

- A. Furnish products as scheduled on Drawings.
- B. Substitutions: Under provisions of Section 01605 and 16010.
- C. Install ballasts, lamps, and specified accessories at factory.

2.02 LAMPS

- A. Incandescent Lamp Manufacturers:
 - 1. PHILLIPS.
 - 2. GENERAL ELECTRIC.
 - 3. SYLVANIA.
 - 4. Substitutions: Under provisions of Section 01605 and 16010.
- B. Fluorescent Lamp Manufacturers:
 - 1. PHILLIPS.
 - 2. GENERAL ELECTRIC.
 - 3. SYLVANIA.
 - 4. Substitutions: Under provisions of Section 01605 and 16010.
- C. Low Voltage Lamp Manufacturers:
 - 1. PHILLIPS.
 - 2. GENERAL ELECTRIC.

1002

SECTION 16510
INTERIOR LUMINAIRES

- 3. OSRAM.
- 4. Substitutions: Under provisions of Section 01605 and 16010.
- D. Provide lamp type specified for luminaire.
- E. Reflector Lamp Beam Patterns: ANSI C78.379.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Examine substrate and supporting grids for luminaries.
- B. Examine each luminaire to determine suitability for lamps specified.

3.02 INSTALLATION

- A. Install in accordance with manufacturers instructions.
- B. Install suspended luminaries using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- C. Support luminaries in lay-in ceiling independent of ceiling framing at each corner.
- D. Locate recessed ceiling luminaries as indicated on reflected ceiling plan.
- E. Install surface mounted luminaries and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
- F. Exposed Grid Ceilings: Fasten surface mounted luminaries to ceiling T using bolts, screws, rivets, or suitable clips.
- G. Install recessed luminaries to permit removal from below.
- H. Install recessed luminaries using accessories and firestopping materials to meet regulatory requirements for fire rating.
- I. Install clips to secure recessed grid-supported luminaries in place.
- J. Install wall mounted luminaries, emergency lighting units and exit signs at height as indicated on Drawings.
- K. Install accessories furnished with each luminaire.
- L. Connect luminaries, emergency lighting units and exit signs to branch circuit outlets provided under Section 16130 using flexible conduit.
- M. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

1003

**SECTION 16510
INTERIOR LUMINAIRES**

VOL 0096 PAGE 006

- N. Bond products and metal accessories to branch circuit equipment grounding conductor.
- O. Install specified lamps in each luminaire, emergency lighting unit and exit sign.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Interface with air handling accessories furnished and installed under Section 15930.

3.04 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.05 ADJUSTING

- A. Adjust Work under provisions of Section 01705.
- B. Aim and adjust luminaires as directed.
- C. Adjust exit sign directional arrows as indicated.
- D. Relamp luminaires that have failed lamps at Substantial Completion.

3.06 CLEANING

- A. Clean Work under provisions of Section 01705.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.07 DEMONSTRATION

- A. Provide systems demonstration under provisions of Section 01650.
- B. Provide demonstration of luminaire operation as required by Owner.

END OF SECTION

1004

16510-4

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires and accessories.
- B. Poles.

1.02 RELATED SECTIONS

- A. Section 03300 - Cast-in-Place Concrete: Foundations for poles.

1.03 REFERENCES

- A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.
- B. ANSI C82.1 - Ballasts for Fluorescent Lamps-Specifications.
- C. ANSI C82.4 - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
- D. ANSI/NFPA 70 - National Electrical Code.
- E. ANSI/IES RP-20 - Lighting for Parking Facilities.

1.04 SYSTEM DESCRIPTION

- A. Parking area lighting.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate dimensions and components for each luminaire which is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of each luminaire.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include instructions for maintaining luminaires.

1005

**SECTION 16530
SITE LIGHTING**

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience.

1.09 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600.
- B. Accept products on site. Inspect for damage.
- C. Protect poles from finish damage by handling carefully.

1.11 COORDINATION

- A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.12 EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.

PART 2 - PRODUCTS

2.01 LUMINAIRES

- B. Furnish products as specified in schedule on Drawings.
- C. Substitutions: Under provisions of Section 01600.

2.02 LAMPS

- A. High Intensity Discharge (HID) Lamp Manufacturers:
 1. Philips.
 2. Sylvania.
 3. General Electric.
 4. Substitutions: Under provisions of Section 01600.
- B. Provide lamp type specified for luminaire.

PART 3 - EXECUTION

3.01 EXAMINATION

- B. Examine excavation and concrete foundation for lighting poles.

1006

SECTION 16530
SITE LIGHTING

- C. Examine each luminaire to determine suitability for lamps specified.

3.02 INSTALLATION

- A. Install in accordance with manufacturers' instructions.
- B. Install lighting poles at locations indicated.
- C. Install poles plumb. Provide double nuts to adjust plumb. Grout around each base.]
- D. Install lamps in each luminaire.
- E. Bond luminaires, metal accessories and metal poles to branch circuit equipment grounding conductor.

3.03 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Relamp luminaires which have failed lamps at Date of Substantial Completion.

3.05 CLEANING

- A. Clean work under provisions of Section 01700.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

END OF SECTION

1007

SECTION 16721
FIRE ALARM AND SMOKE DETECTION SYSTEMS**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Fire alarm system.

1.02 RELATED SECTIONS

- A. Section 16120 - Wire and Cable.

1.03 REFERENCES

- A. NFPA 71 - Installation Maintenance and Use of Signalling Systems for Central Station Service.
- B. NFPA 72 - National Fire Alarm Code.
- C. NFPA 101 - Life Safety Code.

1.04 REGULATORY REQUIREMENTS

- A. System: UL and/or FM listed.
- B. Conform to requirements of NFPA 101.
- C. Conform to 1988 Uniform Fire Code.

1.05 SYSTEM DESCRIPTION

- A. Fire Alarm System: NFPA 72; automatic and manual fire alarm system.
- B. Alarm Sequence of Operation: Actuation of manual fire alarm station or automatic initiating device causes system to enter ALARM, which includes the following operations:
 - 1. Sound and display local fire alarm signaling devices with non-coded signal.
 - 2. Signal elevator controllers to go into emergency recall mode of operation.
 - 3. Indicate alarm zone on fire alarm control panel.
 - 4. Transmit signal to building mechanical systems to initiate shutdown of fans and damper operation.
 - 5. Operate an alarm circuit for transmission of the alarm signal to the Fire Department.
- C. Activation of automatic detector in Elevator Equipment Room or Elevator Shaft with cause elevator power short trip breakers to trip.
- D. Alarm Reset: Key-accessible RESET function resets alarm system out of ALARM if alarm initiating circuits have cleared.

**SECTION 16721
FIRE ALARM AND SMOKE DETECTION SYSTEMS**

- E. Trouble Sequence of Operation: System trouble, including grounding or open circuit of supervised circuits, or power or system failure causes system to enter TROUBLE mode, including the following operations:
 - 1. Visual and audible trouble alarm by zone at control panel.
 - 2. Manual ACKNOWLEDGE function at control panel silences audible trouble alarm; visual alarm is displayed until initiating trouble is cleared.
 - 3. Transmit trouble signal to Central Station.
- F. Lamp Test: Manual LAMP TEST function causes alarm indication at each zone at fire alarm control panel.
- G. Zoning:
 - Zone 1 First Floor AHU Duct Detectors
 - Zone 2 Second Floor AHU Duct Detectors
 - Zone 3 First Floor Manual Pull Stations
 - Zone 4 First Floor Ceiling Smoke Detectors
 - Zone 5 Second Floor Manual Pull Stations
 - Zone 6 Second Floor Ceiling Smoke Detectors
 - Zone 7 Elevator Lobby Smoke Detectors
 - Zone 8 Elevator Equipment Room Smoke Detectors

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in smoke detection and fire alarm systems with five years documented experience.
- B. Installer: Company specializing in smoke detection and fire alarm systems with five years documented experience, certified by Texas State Fire Marshal as fire alarm installing contractor.

1.07 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Provide wiring diagrams, data sheets, and equipment ratings, layout, dimensions, stand-by battery calculations, and finishes.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

- D. Submit manufacturer's certificate under provisions of Section 01400 that system meets or exceeds specified requirements.

1.08 PROJECT RECORD DRAWINGS

- A. Submit documents under the provisions of Section 01700.
- B. Include location of end-of-line devices.

1.09 OPERATION AND MAINTENANCE DATA

- A. Submit data under provisions of Section 01700.
- B. Include operating instructions, and maintenance and repair procedures.
- C. Include manufacturer representative's letter stating that system is operational.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.

1.11 EXTRA MATERIALS

- A. Provide spare parts under provisions of Section 01700.
- B. Provide ten manual station break-glass rods.
- C. Provide two keys of each type.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Simplex 4001 Fire Alarm System with Simplex 2080 Digital Communicator.
- B. Autocall MDK Fire Alarm System with Radionics D2071 Digital Communicator.
- C. All initiating and signalling devices shall be compatible with the fire alarm system control panel.
- D. Substitutions: Under provisions of Section 01600.

2.02 FIRE ALARM AND SMOKE DETECTION CONTROL PANEL

- A. Control Panel: Modular construction with surface wall-mounted enclosure.
- B. Power Supply: Adequate to serve control panel modules, relays, and alarm signaling devices. Include battery-operated emergency power supply with capacity for operating system in standby mode for 24 hours followed by alarm mode for 5 minutes.

- C. Detection Circuits: Supervised zone module with alarm and trouble indication.
- D. Signal Circuits: Supervised signal module, sufficient for signal devices connected to system.
- E. Remote Station Signal Transmitter: Electrically supervised, capable of transmitting alarm and trouble signals over telephone lines to remote station receiver.
- F. Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts to provide accessory functions specified.
- G. Provide TROUBLE ACKNOWLEDGE, DRILL, and ALARM SILENCE switch.

2.03 INITIATING DEVICES

- A. Manual Station: Semi-flush mounted, double action manual station with break-glass rod.
- B. Duct Mounted Smoke Detector: NFPA 72; photoelectric type with auxiliary SPDT relay contact, key-operated NORMAL-RESET-TEST switch, duct sampling tubes extending width of duct, and visual indication of detector actuation, in duct-mounted housing. Two-wire detector with common power supply and signal circuit.
- C. Remote Test Switch: Key-operated switch mounted on flush cover with lamp to indicate detector actuation. Provide one switch for each duct mounted smoke detector.
- D. Smoke Detector: NFPA 72 photoelectric type with auxiliary SPDT relay, visual indication of detector activation. Four wire detector with separate power supply and signal circuits. For elevator lobby detectors, provide relay module with auxiliary contacts in smoke detector for signalling for elevator capture.

2.04 SIGNALING DEVICES

- A. Alarm Horn: NFPA 72; flush type fire alarm horn. Sound Rating: 87 dB at 10 feet. Provide integral strobe lamp and flasher with red lettered FIRE on white lens.

2.05 AUXILIARY DEVICES

- A. Digital Alarm Communicator Transmitter: Digital communicator to transmit fire alarm activation to a central monitoring location. The communicator shall be capable of monitoring alarm and trouble conditions for four, 1 style D and 3 style A supervised channels and shall be UL listed as compatible with and powered from any 24 VDC fire alarm control panel.

2.06 FIRE ALARM WIRE AND CABLE

- A. Fire Alarm Power Branch Circuits: Building wire as specified in Section 16120.
- B. Initiating and Signal Circuits: Building wire as specified in Section 16120. Power limited fire-protective signaling cable, copper conductor, 300 volts insulation rated 105 degrees C.

SECTION 16721
FIRE ALARM AND SMOKE DETECTION SYSTEMS**PART 3 - EXECUTION****3.01 INSTALLATION**

- A. Install system in accordance with manufacturer's instructions.
- B. Use 18 AWG minimum size conductors for fire alarm detection and signal circuit conductors. Install wiring in cable.
- C. Mount end-of-line device in box with last device or separate box adjacent to last device in circuit.
- D. Make conduit and wiring connections to sprinkler flow switches, fire suppression system control panels, duct smoke detectors, manual stations, and emergency generator remote panel.
- E. Automatic Detector Installation: NFPA 72E.
- F. Install wire and cable in conformance with NFPA 70, Article 760.

3.02 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Test in accordance with NFPA 72H and local fire department requirements.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Provide manufacturer's field services under provisions of Section 01400.
- B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

3.04 FIRE ALARM WIRE AND CABLE COLOR CODE

- A. Provide fire alarm circuit conductors with color coded insulation, or use color coded tape at each conductor termination and in each junction box as follows:
 - 1. Power Branch Circuit Conductors: Black, red, white.
 - 2. Initiating Device Circuit: Black, red.
 - 3. Detector Power Supply: Violet, brown.
 - 4. Signal Device Circuit: Blue (positive), white (negative).

END OF SECTION

**SECTION 16741
TELEPHONE CONDUIT AND PREWIRE SYSTEMS****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Telephone Service Entrance
- B. Telephone Conduit System

1.02 TELEPHONE SYSTEM

- A. Outlet boxes, coverplates and conduit shall be provided by the Contractor for the installation of a telephone system by others.
- B. 8"x8"x3/4" thick plywood terminal board in electrical rooms where shown, painted white.

PART 2 - PRODUCTS**2.01 TELEPHONE SYSTEM**

- A. Telephone conduit shall be minimum 3/4", with pullwire installed.
- B. Telephone service entrance conduits shall be as indicated on plans.

2.02 TELEPHONE SERVICE ENTRANCE

- A. Coordinate with telephone service utility for service and provide all required items.

2.03 TELEPHONE PREWIRE SYSTEM

- A. Pull cable as indicated on plans from each telephone or data outlet to nearest telephone terminal board. Terminate each telephone cable at telephone terminal board on telephone company approved punch block.

PART 3 - EXECUTION**3.01 TELEPHONE SYSTEM**

- A. Install blank coverplate on all unused outlets.
- B. Label all cables as required by owner's telephone installer.

END OF SECTION

SECTION 16770
PUBLIC ADDRESS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Public Address System.

1.02 PUBLIC ADDRESS SYSTEM

- A. The PA system shall consist of a shelf mounted amplifier, ceiling mounted loudspeakers, microphone receptacles, volume controls, microphones microphone stands, FM hearing assistance transmitter and receiving devices with earphones.

PART 2 - PRODUCTS

2.01 PUBLIC ADDRESS SYSTEM

- A. Amplifier shall be as noted on drawings.
B. Ceiling speakers shall be as noted on drawings.
C. Microphone and receptacles shall be as noted on drawings.
D. Provide microphones and stands as noted on drawings.
E. Provide FM hearing assistance transmitters and receiving devices with earphones as noted on drawings.

PART 3 - EXECUTION

3.01 PUBLIC ADDRESS SYSTEM

- A. Wire shall be run in conduit in walls and exposed above ceiling and shall be as required by the manufacturer.
B. After installation of the system is completed and at such time as directed by the construction inspector, the Contractor shall conduct a complete system operation test of all systems for approval.
C. The manufacturer shall provide two sets of Operators Manuals for each system.
D. Speaker Cable shall be as noted on drawings.
E. Microphone Cable shall be as noted on drawings.

END OF SECTION

1014

16770 - 1

THE FOREGOING MINUTES in Volume 95 on pages 001 through Volume 96 on page 16, inclusive had at a Special Session of Commissioners Court of Williamson County, Texas, having been read are hereby approved this 3rd day of February 1998.

John C. Doerfler, County Judge

ATTEST: Elaine Bizzell, Clerk County Court & Ex-officio Clerk,
Commissioners Court, Williamson County, Texas

by: _____
Deputy Clerk