TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Steven L. Beshear
Governor

Michael W. Hancock, P.E.
Secretary

April 18, 2014

CALL NO. 332
CONTRACT ID NO. 141217
ADDENDUM # 1

Subject: Warren County, JL04 114 031W 011-012
Letting April 25, 2014

(1)Revised - Plan Sheet - T27
(2)Added - Plan Sheets - T28, T29, T30, T31, & T32
(3)Revised - Completion Date - Page 4 of 177
(4)Revised - Notes - Pages 15-18 of 177
(5)Revised - Wage Rates - Pages 156-170 of 177
(6)Revised - Bid Items - Pages 174-177 of 177
(7)Added - Landscaping Specifications - Pages 1-69 of 70
(8)Added - Mast Arm Note - Page 70 of 70

Proposal revisions are available at http://transportation.ky.gov/Construction-Procurement/.

Plan revisions are available at http://www.lynnimaging.com/kytransportation/.

If you have any questions, please contact us at 502-564-3500.

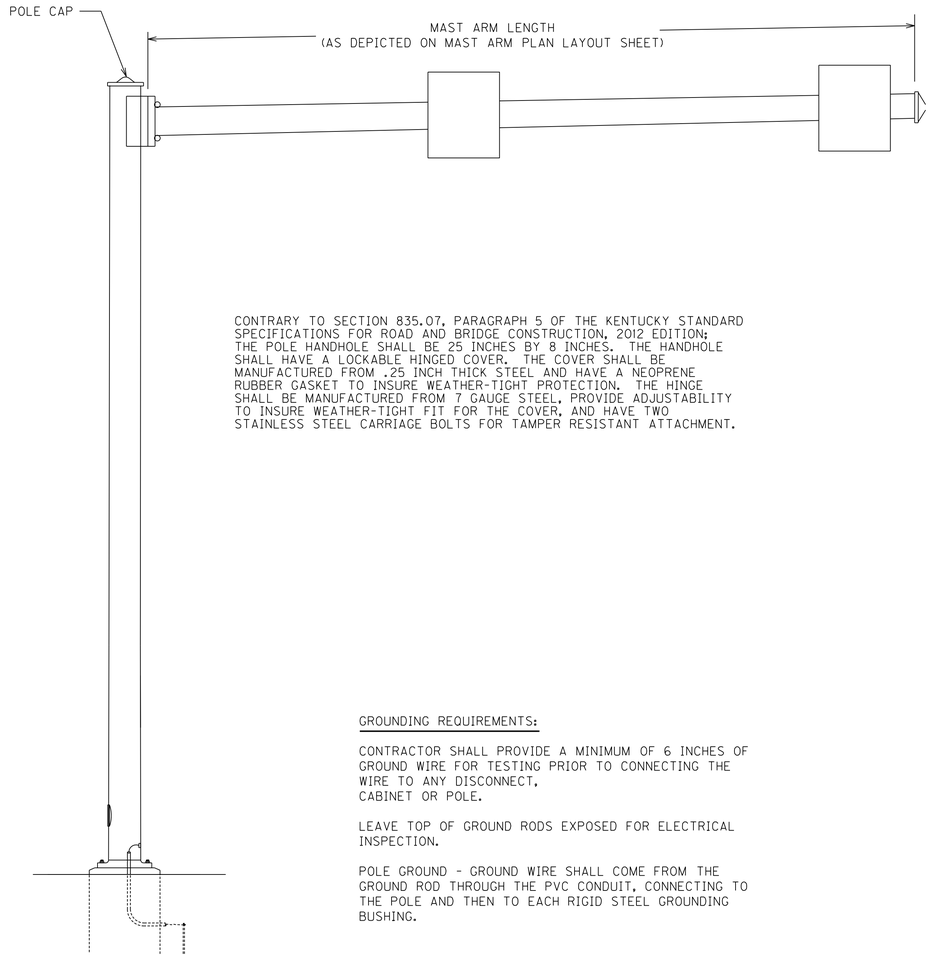
Sincerely,

Diana Castle Radcliffe

Diana Castle Radcliffe
Director
Division of Construction Procurement

DR:ks
Enclosures

COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-131.00	T27



SEE MAST ARM POLE BASE DETAIL FOR MATERIALS AND INSTALLATION REQUIREMENTS

CONTRARY TO SECTION 835.07, PARAGRAPH 5 OF THE KENTUCKY STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2012 EDITION; THE POLE HANDHOLE SHALL BE 25 INCHES BY 8 INCHES. THE HANDHOLE SHALL HAVE A LOCKABLE HINGED COVER. THE COVER SHALL BE MANUFACTURED FROM .25 INCH THICK STEEL AND HAVE A NEOPRENE RUBBER GASKET TO INSURE WEATHER-TIGHT PROTECTION. THE HINGE SHALL BE MANUFACTURED FROM 7 GAUGE STEEL, PROVIDE ADJUSTABILITY TO INSURE WEATHER-TIGHT FIT FOR THE COVER, AND HAVE TWO STAINLESS STEEL CARRIAGE BOLTS FOR TAMPER RESISTANT ATTACHMENT.

GROUNDING REQUIREMENTS:

CONTRACTOR SHALL PROVIDE A MINIMUM OF 6 INCHES OF GROUND WIRE FOR TESTING PRIOR TO CONNECTING THE WIRE TO ANY DISCONNECT, CABINET OR POLE.

LEAVE TOP OF GROUND RODS EXPOSED FOR ELECTRICAL INSPECTION.

POLE GROUND - GROUND WIRE SHALL COME FROM THE GROUND ROD THROUGH THE PVC CONDUIT, CONNECTING TO THE POLE AND THEN TO EACH RIGID STEEL GROUNDING BUSHING.

MONOTUBE MAST ARM POLE DETAIL

NOTES:

ALL CONDUITS USED FOR THE TELEPHONE, GROUNDING, AND SERVICE THAT ARE INSTALLED IN THE POLE BASE ARE INCIDENTAL TO BID ITEM "23157EN". THIS INCLUDES PROVIDING A MINIMUM OF 24 INCHES OF CONDUIT PAST THE EDGE OF THE CONCRETE POLE BASE.

ALL CONDUITS SHALL BE INSTALLED 6 INCHES ABOVE THE CONCRETE POLE BASE.

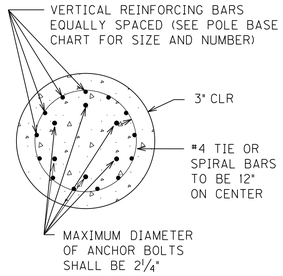
FOR POLE BASE DEPTH SEE CHART IN SECTION 723 OF THE KENTUCKY STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, CURRENT EDITION.

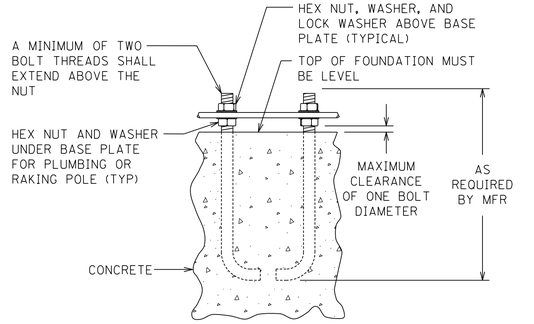
OVERHEAD SERVICE WIRES SHALL BE INSTALLED ON THE EXTERIOR OF THE POLE IN A ¾" RIGID STEEL CONDUIT WITH WEATHERHEAD, OR ON THE INSIDE THE STEEL STRAIN POLE IN FLEXIBLE CONDUIT.

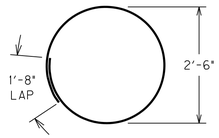
UNDERGROUND SERVICE WIRES SHALL BE INSTALLED IN ¾" RIGID STEEL CONDUIT AS SHOWN ON THE CONTROLLER CABINET DETAIL SHEET.

CONTRARY TO DETAIL, MAST ARMS WILL NOT HAVE LIGHTS AND/OR SIGNAL HEADS. MAST ARMS WILL NOT REQUIRE ELECTRICAL CONDUIT AND APPURTENANCES NORMALLY REQUIRED FOR SIGNAL HEADS.

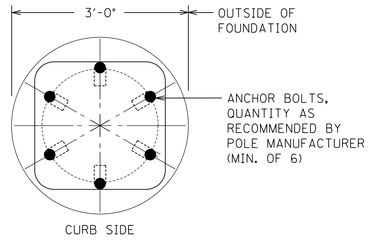
6/22/2012 REVISED



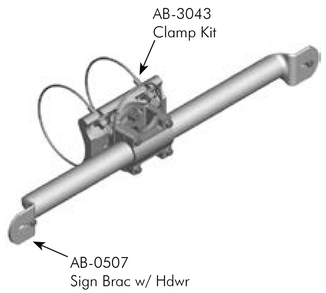




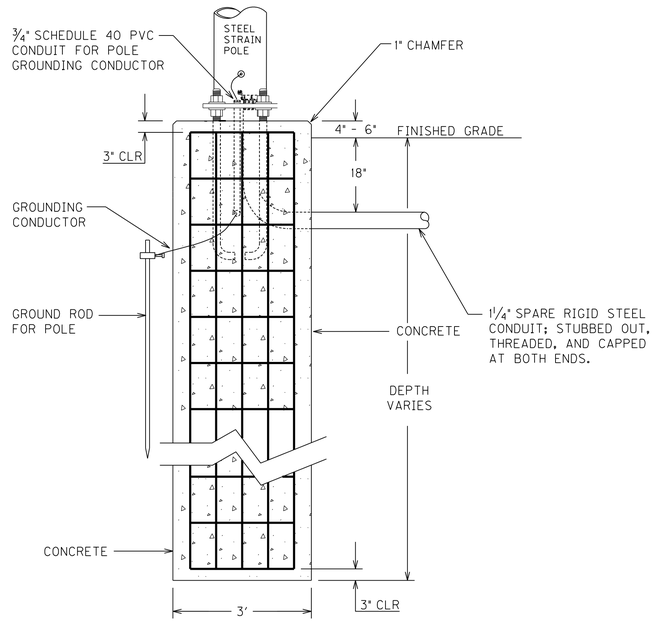
BENDING DETAIL FOR TIE BARS



BRACKET IS TO BE PELCO NO. AB-0634-42-120 OR APPROVED EQUAL.



ASTRO SIGN-BRAC, TALLON CABLE MOUNT, FORMED TUBE BRACKET ASSEMBLY FOR MOUNTING SIGNS ON MAST ARMS



MAST ARM POLE BASE WITH POLE GROUND DETAIL

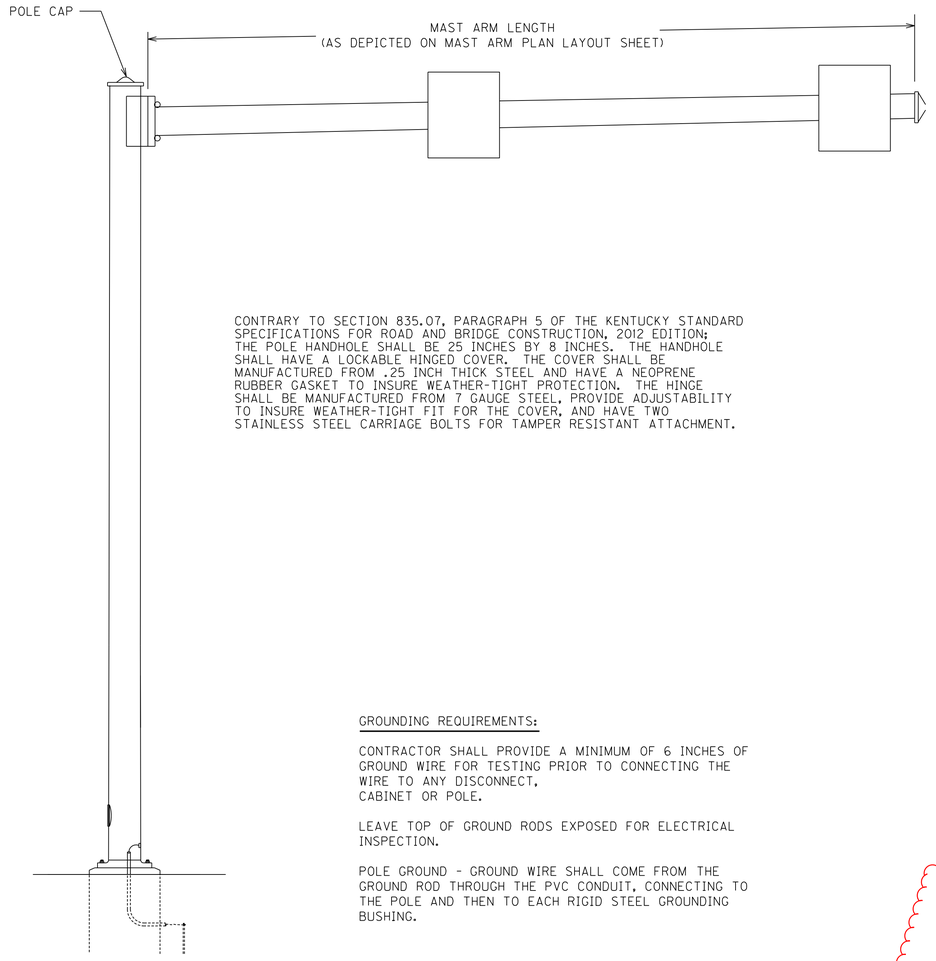
MAST ARM POLE DETAILS

BURGESS & NIPLE

FILE NAME: P:\PR50325\CADD\ROADWAY PLANS\T0270OMA.DGN
USER: backherms
DATE PLOTTED: April 7, 2014
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-131.00	T27

REVISED 04-07-2014



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MONOTUBE MAST ARM POLE DETAIL

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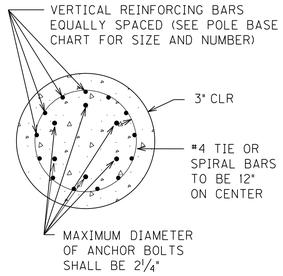

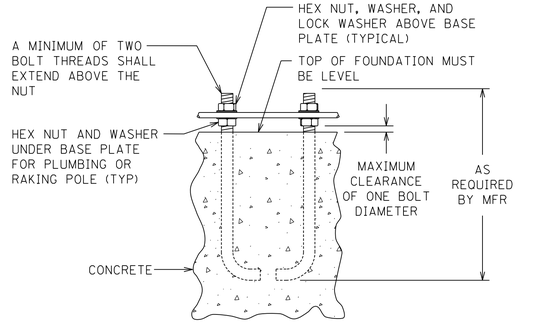

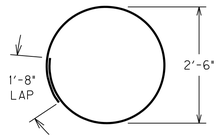

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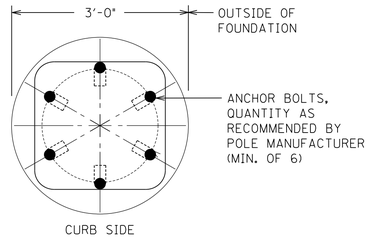

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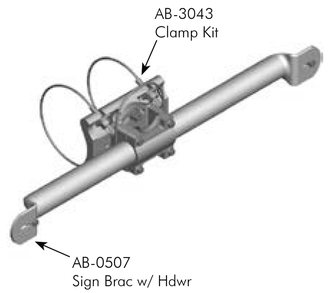

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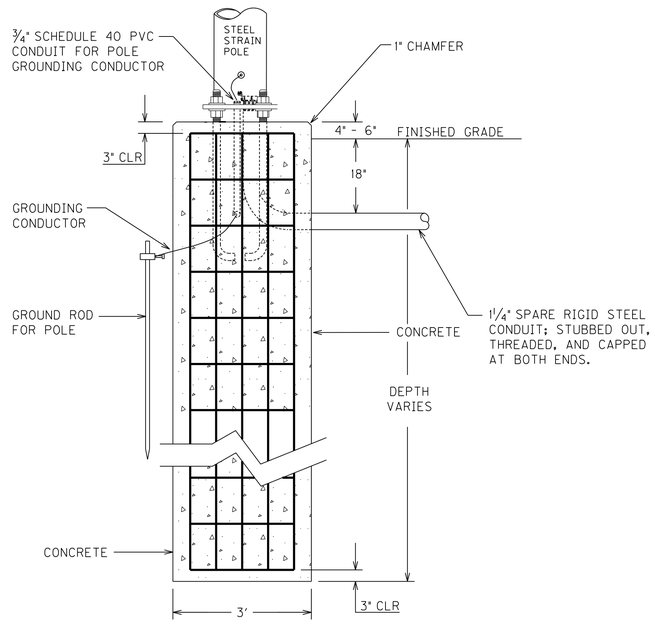


MAST ARM POLE BASE WITH POLE GROUND DETAIL

MAST ARM POLE DETAILS

BURGESS & NIPLE

FILE NAME: P:\PR50325\CADD\ROADWAY PLANS\T0270OMA.DGN
USER: backherms
DATE PLOTTED: April 7, 2014
E-SHEET NAME:
MicroStation v8.11.9.459

COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-131.00	T28

ROADWAY LIGHTING ESTIMATE OF QUANTITIES

ITEM CODE	ITEM	UNIT	TOTAL
21543EN	JACK AND BORE CONDUIT	LIN FT	446
4740	POLE BASE	EACH	22
4795	CONDUIT - 2 INCH	LIN FT	2950
4820	TRENCHING AND BACKFILLING	LIN FT	1527

THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, CURRNET EDITION, AND OTHER SPECIAL NOTES AND SPECIFICATIONS WILL APPLY ON THIS PROJECT. SEE SECTION 716 FOR MEASUREMENT AND OTHER DETAILS. SEE SECTION 602 FOR SPIRAL REINFOREMENT SPLICING.

THE CONTRACTOR SHALL MAKE AN INSPECTION OF THE PROJECT SITE PRIOR TO SUMITTING A BID AND SHALL BE THOROUGHLY FAMILIARIZED WITH EXISTING CONDITIONS. SUBMISSIONS OF A BID WILL BE CONSIDERED AN AFFIRMATION OF THIS INSPECTION HAVING BEEN COMPLETED.

THE CONTRACTOR IS TO COORDINATE WITH BOWLING GREEN MUNICIPAL UTILITIES-ELECTRIC DIVISION (BGMU-E) FOR REVIEW OF POLE LOCATIONS ONCE THE POLE LOCATIONS HAVE BEEN STAKED IN THE FIELD. THE CONTRACTOR MUST OBTAIN APPROVAL FROM BGMU-E ONCE THE BASES ARE FORMED AND PRIOR TO CONCRETE BEING POURED. THE PRIMARY POINT OF CONTACT IS MR. CHAD SPENCER, FIELD ENGINEER, (270) 782-4333.

US 31W / US 231X

LIGHTING QUANTITIES

COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-131.00	T29

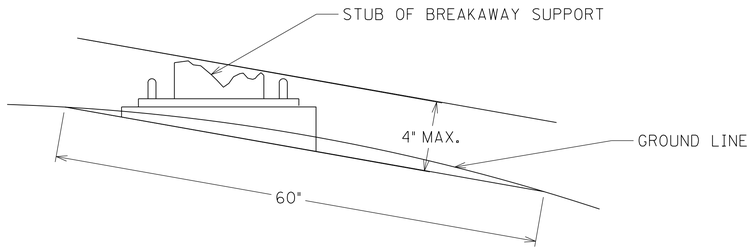
NOT USED

US 31W / US 231X

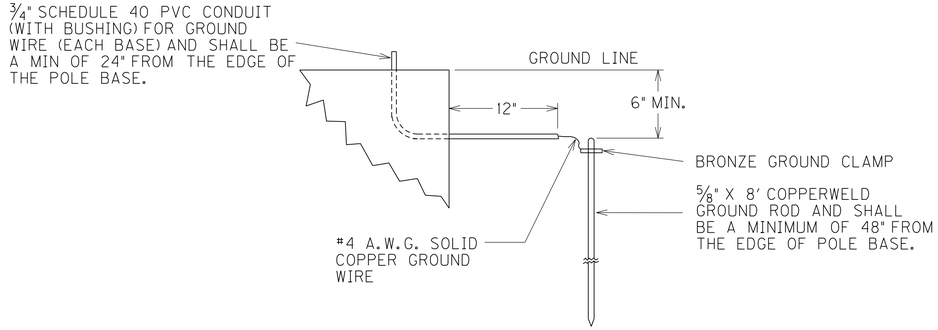
LIGHTING DETAILS

MicroStation v8.11.9.459 | E-SHEET NAME: | USER: bricker DATE PLOTTED: April 7, 2014 | FILE NAME: P:\PR5032S\CADD\ROADWAY PLANS\T029OLT_DETAILS.DGN

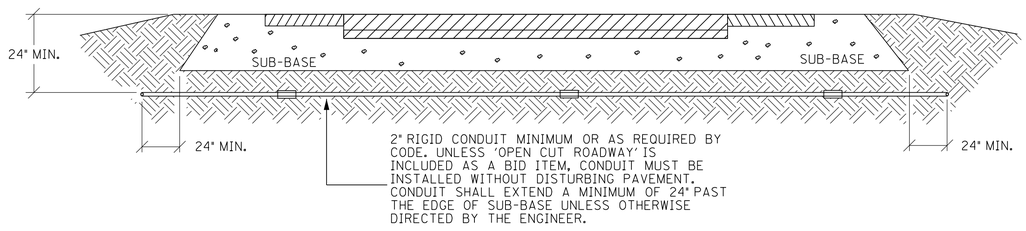
COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-131.00	T30



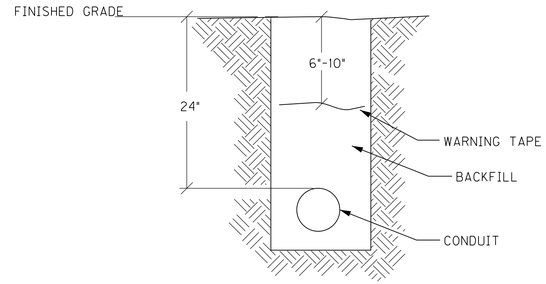
BREAKAWAY SUPPORT STUB HEIGHT MEASUREMENT



GROUNDING DETAIL

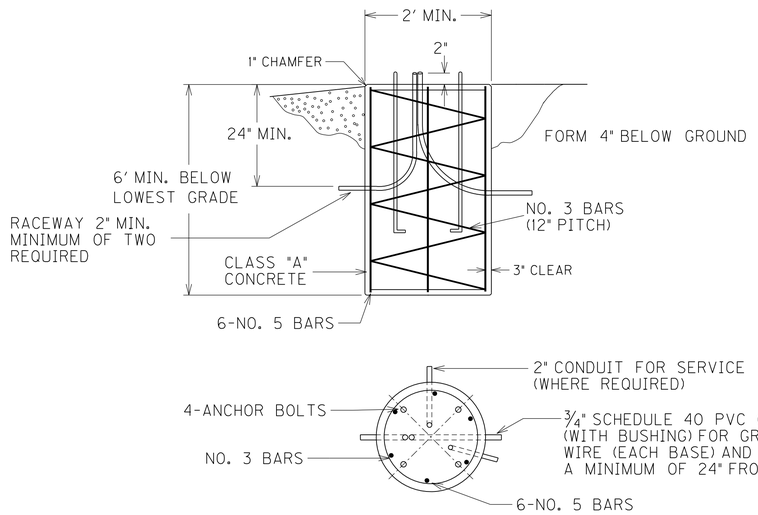


CONDUIT INSTALLATION UNDER EXISTING PAVEMENT DETAIL



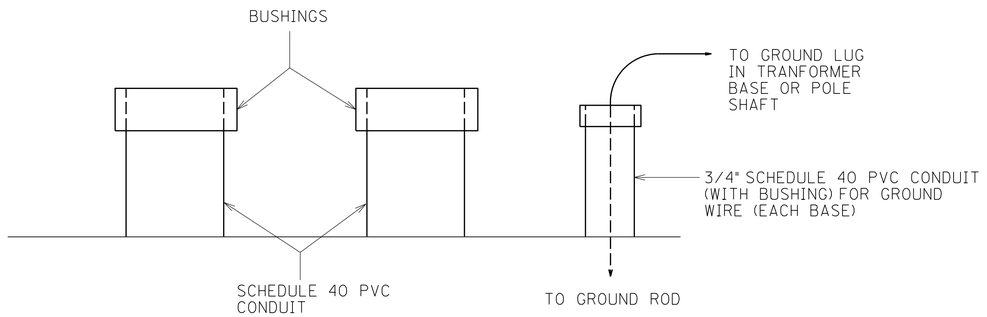
CONDUIT TRENCH

DEPTHS SHOWN FOR CONDUIT AND DUCTED CABLE ARE MINIMUMS. CONTRACTOR SHALL PLACE AND COMPACT BACKFILL IN 9" MAXIMUM LIFTS AND RETORE DISTURBED AREA TO THE SATISFACTION OF THE ENGINEER.



NOTE: PRECAST CONCRETE BASES ARE NOT ACCEPTABLE

FOUNDATION DETAIL



TYPICAL GROUNDING DETAIL

GROUNDING REQUIREMENTS:

POLE/TRANSFORMER BASE GROUND- GROUND WIRE SHALL COME FROM THE GROUND ROD THROUGH THE PVC CONDUIT, CONNECTING TO THE TRANSFORMER BASE/POLE.

NOTES:

ALL CONDUITS USED FOR GROUNDING, SPARES AND CONDUCTORS THAT ARE INSTALLED IN THE POLE BASE ARE INCIDENTAL TO BID ITEM "4740". THIS INCLUDES PROVIDING A MINIMUM OF 24 INCHES OF CONDUIT PAST THE EDGE OF THE POLE BASE.

SCALE: 1"=

US 31W / US 231X

TRANSFORMER BASE DETAIL

COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-131.00	T31

NOT USED

MicroStation v8.11.9.459 | E-SHEET NAME: | USER: bricker DATE PLOTTED: April 17, 2014 | FILE NAME: P:\PR50325\CADD\ROADWAY PLANS\T03100LT_DETAILS.DGN

US 31W / US 231X

LIGHTING DETAILS

COUNTY OF	ITEM NO.	SHEET NO.
WARREN	3-131.00	T32

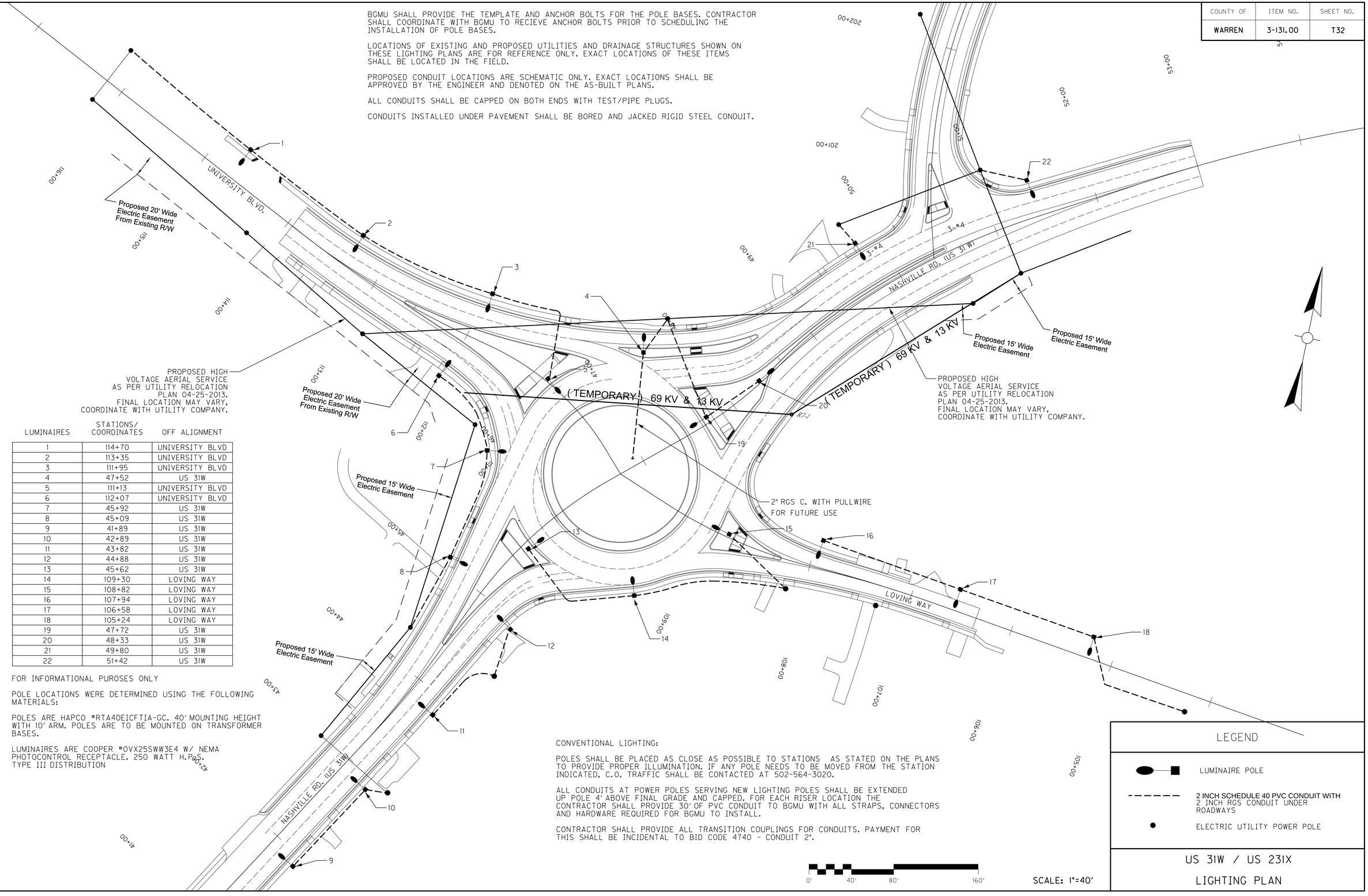
BGMU SHALL PROVIDE THE TEMPLATE AND ANCHOR BOLTS FOR THE POLE BASES. CONTRACTOR SHALL COORDINATE WITH BGMU TO RECIEVE ANCHOR BOLTS PRIOR TO SCHEDULING THE INSTALLATION OF POLE BASES.

LOCATIONS OF EXISTING AND PROPOSED UTILITIES AND DRAINAGE STRUCTURES SHOWN ON THESE LIGHTING PLANS ARE FOR REFERENCE ONLY. EXACT LOCATIONS OF THESE ITEMS SHALL BE LOCATED IN THE FIELD.

PROPOSED CONDUIT LOCATIONS ARE SCHEMATIC ONLY. EXACT LOCATIONS SHALL BE APPROVED BY THE ENGINEER AND DENOTED ON THE AS-BUILT PLANS.

ALL CONDUITS SHALL BE CAPPED ON BOTH ENDS WITH TEST/PIPE PLUGS.

CONDUITS INSTALLED UNDER PAVEMENT SHALL BE BORED AND JACKED RIGID STEEL CONDUIT.



LUMINAIRES	STATIONS/ COORDINATES	OFF ALIGNMENT
1	114+70	UNIVERSITY BLVD
2	113+35	UNIVERSITY BLVD
3	111+95	UNIVERSITY BLVD
4	47+52	US 31W
5	111+13	UNIVERSITY BLVD
6	112+07	UNIVERSITY BLVD
7	45+92	US 31W
8	45+09	US 31W
9	41+89	US 31W
10	42+89	US 31W
11	43+82	US 31W
12	44+88	US 31W
13	45+62	US 31W
14	109+30	LOVING WAY
15	108+82	LOVING WAY
16	107+94	LOVING WAY
17	106+58	LOVING WAY
18	105+24	LOVING WAY
19	47+72	US 31W
20	48+33	US 31W
21	49+80	US 31W
22	51+42	US 31W

FOR INFORMATIONAL PUROSES ONLY

POLE LOCATIONS WERE DETERMINED USING THE FOLLOWING MATERIALS:

POLES ARE HAPCO #RTA40EICFTIA-GC. 40' MOUNTING HEIGHT WITH 10' ARM. POLES ARE TO BE MOUNTED ON TRANSFORMER BASES.

LUMINAIRES ARE COOPER #OVX25SWW3E4 W/ NEMA PHOTOCONTROL RECEPTACLE. 250 WATT H.P.S. TYPE III DISTRIBUTION

CONVENTIONAL LIGHTING:

POLES SHALL BE PLACED AS CLOSE AS POSSIBLE TO STATIONS AS STATED ON THE PLANS TO PROVIDE PROPER ILLUMINATION. IF ANY POLE NEEDS TO BE MOVED FROM THE STATION INDICATED, C.O. TRAFFIC SHALL BE CONTACTED AT 502-564-3020.

ALL CONDUITS AT POWER POLES SERVING NEW LIGHTING POLES SHALL BE EXTENDED UP POLE 4' ABOVE FINAL GRADE AND CAPPED. FOR EACH RISER LOCATION THE CONTRACTOR SHALL PROVIDE 30' OF PVC CONDUIT TO BGMU WITH ALL STRAPS, CONNECTORS AND HARDWARE REQUIRED FOR BGMU TO INSTALL.

CONTRACTOR SHALL PROVIDE ALL TRANSITION COUPLINGS FOR CONDUITS. PAYMENT FOR THIS SHALL BE INCIDENTAL TO BID CODE 4740 - CONDUIT 2".

0' 40' 80' 160'

SCALE: 1"=40'

LEGEND

- LUMINAIRE POLE
- 2 INCH SCHEDULE 40 PVC CONDUIT WITH 2 INCH RGS CONDUIT UNDER ROADWAYS
- ELECTRIC UTILITY POWER POLE

US 31W / US 231X
LIGHTING PLAN

FILE NAME: P:\PR50325\CADD\ROADWAY PLANS\T03200LT_PLAN.DGN
USER: bricker
DATE PLOTTED: April 17, 2014
E-SHEET NAME:
MicroStation v8.11.9.459

ADMINISTRATIVE DISTRICT - 03

CONTRACT ID - 141217

JL04 114 031W 011-012

COUNTY - WARREN

PCN - DE114031W1417
JL04 114 031W 011-012

US 31W AT UNIVERSITY BOULEVARD / LOVING WAY ROUNDABOUT (MP 11.550) CONSTRUCT ROUNDABOUT AT US-31W BYPASS AND CHESTNUT STREET/UNIVERSITY BLVD/LOVING WAY. (MP 11.900), A DISTANCE OF 0.44 MILES.ASPHALT SURFACE WITH GRADE & DRAIN SYP NO. 03-00131.00.

GEOGRAPHIC COORDINATES LATITUDE 36:58:39.00 LONGITUDE 86:27:23.00

COMPLETION DATE(S):

COMPLETED BY 11/30/2014	APPLIES TO ENTIRE CONTRACT
COMPLETED BY 08/11/2014	SEE SPECIAL NOTE FOR MILESTONE COMPLETION IN TMP

WARREN COUNTY
US 31W Roundabout
ITEM NO. 3-131.00
TRAFFIC MANAGEMENT PLAN

GENERAL MAINTENANCE OF TRAFFIC NOTES

TRAFFIC CONTROL GENERAL NOTES

TRAFFIC SHALL BE MAINTAINED IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND THE STANDARD DRAWINGS, CURRENT EDITION.

EXCEPT FOR THE ROADWAY AND TRAFFIC CONTROL BID ITEMS LISTED, ALL ITEMS OF WORK NECESSARY TO MAINTAIN AND CONTROL TRAFFIC INCLUDING BUT NOT LIMITED TO MAINTAINING DRAINAGE AND TEMPORARY DRAINAGE WORK, ETC. WILL BE PAID FOR AT THE LUMP SUM BID PRICE TO "MAINTAIN AND CONTROL TRAFFIC," AS SET FORTH IN THE CURRENT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION UNLESS OTHERWISE PROVIDED FOR IN THESE NOTES.

SIGN SPACING MAY BE ADJUSTED TO FIT THE PHYSICAL CONDITIONS ENCOUNTERED.

SIGNS SHALL BE MADE INACCESSIBLE TO THE VIEW OF TRAFFIC WHENEVER SIGN MESSAGE DOES NOT APPLY.

SEE GENERAL NOTES SHEET R2M FOR DETAILS REGARDING THE REMOVAL OF SIGNAL EQUIPMENT.

NORMAL CONSIDERATION WILL BE GIVEN TO PROPERTY OWNERS FOR ACCESS.

THE CONTRACTOR SHALL NOTIFY THE RESIDENT ENGINEER TWO WEEKS IN ADVANCE OF ANY TRAFFIC CHANGES.

THE FOLLOWING COMPLETION DATES SHALL APPLY:

- **Milestone Completion Date – Monday, August 11, 2014**
  Contractor is to have the intersection operational as a dual lane roundabout as prescribed at the completion of Phase IV in the Maintenance of Traffic Plans. Final asphalt surfacing, all permanent signage, all permanent pavement markings, and construction of the central island gateway wall shall be completed by this date. Road closures after this date will not be allowed. Lane closures within the project after this date are only as approved by the Engineer during off-peak hours. Contractor vehicles

shall not be allowed in the central island after this date except during off-peak hours and approved by the Engineer.

- **Primary Completion Date – Sunday, November 30, 2014.**
  Applies to entire contract.

BLASTING OPERATIONS

DURING BLASTING OPERATIONS, TRAFFIC MAY BE HALTED FOR A MAXIMUM OF FIFTEEN MINUTES PER HOUR TO ALLOW EXECUTION OF THE "SHOT" AND ALLOW FOR REMOVAL OF ROCK FRAGMENTS AND DEBRIS. BLASTING WILL NOT BE PERMITTED BETWEEN THE HOURS OF 7:00 P.M. TO 9:00 A.M.

CLOSINGS IN EXCESS OF 15 MINUTES WILL RESULT IN FINES OF $5,000 FOR THE FIRST FIFTEEN MINUTES, ASSESSED AT MINUTE SIXTEEN, AND $10,000 PER FIFTEEN MINUTES AFTER ONE HALF HOUR, ASSESSED AT THE FIRST MINUTE OF VIOLATION.

TRAFFIC STOPPAGE WILL NOT BE PERMITTED BETWEEN THE HOURS OF 6:00 A.M. TO 9:00 A.M. AND 3:00 P.M. TO 6:00 P.M., MONDAY THROUGH FRIDAY.

BLASTING SIGNS SHOULD ONLY BE IN PLACE DURING BLASTING OPERATIONS.

TRAFFIC STOPPAGE

TRAFFIC MAY BE STOPPED FOR A MAXIMUM OF FIFTEEN MINUTES PER HOUR. TRAFFIC STOPPAGE WILL NOT BE PERMITTED BETWEEN THE HOURS OF 6:00 A.M. TO 9:00 A.M. AND 3:00 P.M. TO 6:00 P.M., MONDAY THROUGH FRIDAY. CLOSINGS IN EXCESS OF 15 MINUTES WILL RESULT IN FINES OF $5,000 FOR THE FIRST FIFTEEN MINUTES, ASSESSED AT MINUTE SIXTEEN, AND $10,000 PER FIFTEEN MINUTES AFTER ONE HALF HOUR, ASSESSED AT THE FIRST MINUTE OF VIOLATION.

LANE WIDTHS

THE CONTRACTOR SHALL MAINTAIN A MINIMUM 9 FT LANE WIDTH DURING CONSTRUCTION.

REMOVAL OF PAVEMENT MARKINGS

PAVEMENT MARKINGS SHALL BE REMOVED BY EITHER AN ABRASIVE, BURNING PROCESS, OR WATER BLASTING TO THE SATISFACTION OF THE ENGINEER. IF THE ABRASIVE METHOD IS USED, THE AREA AFFECTED IS TO BE COATED WITH BLACK (OR MORE PRECISELY, A COLOR SIMILAR TO THAT OF THE ADJACENT PAVEMENT SURFACE) TRAFFIC PAINT. PAINTING OF EXISTING MARKINGS WITH BITUMINOUS OR OTHER MATERIALS TO OBLITERATE THE MARKINGS SHALL NOT BE ALLOWED.

ROAD CLOSURES

ROAD CLOSURES IN EXCESS OF THE CALENDAR DAYS PERMITTED FOR EACH ROAD CLOSURE WILL RESULT IN FINES OF $5,000 FOR THE FIRST FIFTEEN MINUTES, ASSESSED AT MINUTE SIXTEEN, AND $10,000 PER FIFTEEN MINUTES AFTER ONE HALF HOUR, ASSESSED AT THE FIRST MINUTE OF VIOLATION. EXCEPT IN PHASE IV, OAKLAWN WAY AND LOVING WAY CANNOT BE CLOSED AT THE SAME TIME AND UNIVERSITY BLVD. AND CHESTNUT STREET CANNOT BE CLOSED AT THE SAME TIME.

LOVING WAY – ROAD CLOSURE (PHASE II AND III)

DURING ALLOWABLE PERIODS OF ACTIVE WORK THE CONTRACTOR WILL BE PERMITTED TO CLOSE LOVING WAY TO THRU TRAFFIC FOR COMPLETION OF ROADWAY CONSTRUCTION. ADEQUATE DETOUR SIGNING FOR LOCAL TRAFFIC SHALL BE PROVIDED. THE DURATION OF SUCH CLOSURE SHALL NOT EXCEED NINETY (90) CONSECUTIVE CALENDAR DAYS. CLOSURES IN EXCESS OF NINETY (90) CONSECUTIVE CALENDAR DAYS WILL RESULT IN FINES OF $5,000.00 PER DAY.

OAKLAWN WAY – ROAD CLOSURE (PHASE II)

DURING ALLOWABLE PERIODS OF ACTIVE WORK THE CONTRACTOR WILL BE PERMITTED TO CLOSE OAKLAWN WAY TO THRU TRAFFIC FOR COMPLETION OF ROADWAY CONSTRUCTION. ADEQUATE DETOUR SIGNING FOR LOCAL TRAFFIC SHALL BE PROVIDED. THE DURATION OF SUCH CLOSURE SHALL NOT EXCEED FORTY FIVE (45) CONSECUTIVE CALENDAR DAYS. CLOSURES IN EXCESS OF FORTY FIVE (45) CONSECUTIVE CALENDAR DAYS WILL RESULT IN FINES OF $25,000.00 PER DAY.

CHESTNUT STREET – ROAD CLOSURE (PHASE II)

DURING ALLOWABLE PERIODS OF ACTIVE WORK THE CONTRACTOR WILL BE PERMITTED TO CLOSE CHESTNUT STREET TO THRU TRAFFIC FOR COMPLETION OF ROADWAY CONSTRUCTION. CHESTNUT STREET AND UNIVERSITY BOULEVARD ARE TO BE CONSTRUCTED IN SEQUENCE. CONSTRUCTION ON CHESTNUT STREET IS TO BE COMPLETED AFTER WESTERN KENTUCKY UNIVERSITY COMMENCEMENT AND BETWEEN THE SPRING AND FALL SEMESTERS (MAY 17TH TO AUGUST 25TH). THE DURATION OF SUCH CLOSURE SHALL NOT EXCEED THIRTY (30) CONSECUTIVE CALENDAR DAYS. CLOSURES IN EXCESS OF THIRTY (30) CONSECUTIVE CALENDAR DAYS WILL RESULT IN FINES OF $25,000.00 PER DAY.

UNIVERSITY BLVD – ROAD CLOSURE (PHASE III)

DURING ALLOWABLE PERIODS OF ACTIVE WORK THE CONTRACTOR WILL BE PERMITTED TO CLOSE UNIVERSITY BOULEVARD TO THRU TRAFFIC FOR COMPLETION OF ROADWAY CONSTRUCTION. CHESTNUT STREET AND UNIVERSITY BOULEVARD ARE TO BE CONSTRUCTED IN SEQUENCE. CONSTRUCTION ON UNIVERSITY BOULEVARD IS TO BE COMPLETED AFTER WESTERN KENTUCKY UNIVERSITY COMMENCEMENT AND BETWEEN THE SPRING AND FALL SEMESTERS (MAY 17TH TO AUGUST 25TH). THE DURATION OF SUCH CLOSURE SHALL NOT EXCEED THIRTY (30) CONSECUTIVE CALENDAR DAYS. CLOSURES IN EXCESS OF THIRTY (30) CONSECUTIVE CALENDAR DAYS WILL RESULT IN FINES OF $25,000.00 PER DAY.

US 31W (NASHVILLE ROAD) INTERSECTIONS – ROAD CLOSURE (PHASE IV)

DURING ALLOWABLE PERIODS OF ACTIVE WORK THE CONTRACTOR WILL BE PERMITTED TO CLOSE THE US 31 (NASHVILLE ROAD) INTERSECTIONS WITH UNIVERSITY BOULEVARD, LOVING WAY AND CHESTNUT STREET TO THRU TRAFFIC FOR COMPLETION OF ROADWAY CONSTRUCTION. THE US 31 INTERSECTION CLOSURES ARE TO OCCUR AFTER CLOSURES TO CHESTNUT STREET AND UNIVERSITY BOULEVARD IN PHASES II AND III. CONSTRUCTION ON THE US 31 INTERSECTIONS IS TO BE COMPLETED BETWEEN THE DATES OF JULY 7, 2014 AND AUGUST 11, 2014. THE DURATION OF SUCH CLOSURE SHALL NOT EXCEED SIXTEEN (16) CONSECUTIVE CALENDAR DAYS, AND MUST BEGIN ON A FRIDAY AT 6 P.M. AND END ON A MONDAY AT 6 A.M. CLOSURES IN EXCESS OF SIXTEEN (16) CONSECUTIVE CALENDAR DAYS WILL RESULT IN FINES OF $50,000.00 PER DAY OR FRACTION OF A DAY.

TEMPORARY SIGNS

THE DEPARTMENT WILL MEASURE THE QUANTITY IN SQUARE FEET. THE DEPARTMENT WILL MEASURE EACH INSTALLATION AND REINSTALLATION OF POST MOUNTED SIGNS. UNLESS THE ENGINEER DIRECTS OTHERWISE, POST MOUNT ALL SIGNS INTENDED TO REMAIN IN PLACE FOR MORE THEN 3 DAYS. SEE SECTIONS 112.03 AND 112.04 OF THE STANDARD SPECIFICATIONS, CURRENT EDITION. ON THE GENERAL SUMMARY, THIS IS REFLECTED AS BID ITEM 2562 - SIGNS.

General Decision Number: KY140102 04/04/2014 KY102

Superseded General Decision Number: KY20130102

State: Kentucky

Construction Type: Highway

Counties: Allen, Ballard, Butler, Caldwell, Calloway, Carlisle, Christian, Crittenden, Daviess, Edmonson, Fulton, Graves, Hancock, Henderson, Hickman, Hopkins, Livingston, Logan, Lyon, Marshall, McCracken, McLean, Muhlenberg, Ohio, Simpson, Todd, Trigg, Union, Warren and Webster Counties in Kentucky.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Modification Number	Publication Date
0	01/03/2014
1	04/04/2014

BRIN0004-002 06/01/2013

BALLARD, BUTLER, CALDWELL, CARLISLE, CRITTENDEN, DAVIESS, EDMONSON, FULTON, GRAVES, HANCOCK, HENDERSON, HICKMAN, HOPKINS, LIVINGSTON, LYON, MARSHALL, MCCRACKEN, MCLEAN, MUHLENBERG, OHIO, UNION, and WEBSTER COUNTIES

	Rates	Fringes
BRICKLAYER		
Ballard, Caldwell, Carlisle, Crittenden, Fulton, Graves, Hickman, Livingston, Lyon, Marshall, and McCracken Counties	$ 24.11	10.30
Butler, Edmonson, Hopkins, Muhlenberg, and Ohio Counties	$ 24.61	10.22
Daviess, Hancock, Henderson, McLean, Union, and Webster Counties	$ 28.68	13.72

BRTN0004-005 05/01/2009

ALLEN, CALLOWAY, CHRISTIAN, LOGAN, SIMPSON, TODD, TRIGG, and WARREN COUNTIES

	Rates	Fringes
BRICKLAYER	$ 24.52	1.83

CARP0357-002 04/01/2013

	Rates	Fringes
CARPENTER	$ 26.90	14.42
Diver	$ 40.73	14.42
PILEDRIVERMAN	$ 27.15	14.42

ELEC0369-006 05/29/2013

BUTLER, EDMONSON, LOGAN, TODD & WARREN COUNTIES:

	Rates	Fringes
ELECTRICIAN	$ 29.48	14.37

ELEC0429-001 02/01/2010

ALLEN & SIMPSON COUNTIES:

	Rates	Fringes
ELECTRICIAN	$ 21.85	10.35

ELEC0816-002 06/01/2013

BALLARD, CALDWELL, CALLOWAY, CARLISLE, CHRISTIAN, CRITTENDEN, FULTON (Except a 5 mile radius of City Hall in Fulton), GRAVES, HICKMAN, LIVINGSTON, LYON, MARSHALL, MCCRACKEN & TRIGG COUNTIES:

	Rates	Fringes
ELECTRICIAN	$ 30.40	25.5%+5.60

Cable spicers receive $.25 per hour additional.

ELEC1701-003 06/01/2013

DAVIESS, HANCOCK, HENDERSON, HOPKINS, MCLEAN, MUHLENBERG, OHIO, UNION & WEBSTER COUNTIES:

	Rates	Fringes
ELECTRICIAN	$ 30.03	13.72

Cable spicers receive $.25 per hour additional.

ELEC1925-002 06/01/2012

FULTON COUNTY (Up to a 5 mile radius of City Hall in Fulton):

	Rates	Fringes
CABLE SPLICER	$ 25.00	10.27
ELECTRICIAN	$ 25.00	10.43

ENGI0181-017 07/01/2013

	Rates	Fringes
Operating Engineer:		
GROUP 1	$ 28.00	13.90
GROUP 2	$ 25.45	13.90
GROUP 3	$ 25.85	13.90
GROUP 4	$ 25.17	13.90

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - A-Frame Winch Truck; Auto Patrol; Backfiller; Batcher Plant; Bituminous Paver; Bituminous Transfer Machine; Boom Cat; Bulldozer; Mechanic; Cableway; Carry-All Scoop; Carry Deck Crane; Central Compressor Plant; Cherry Picker; Clamshell; Concrete Mixer (21 cu. ft. or Over); Concrete Paver; Truck-Mounted Concrete Pump; Core Drill; Crane; Crusher Plant; Derrick; Derrick Boat; Ditching & Trenching Machine; Dragline; Dredge Operator; Dredge Engineer; Elevating Grader & Loaders; Grade-All; Gurries; Heavy Equipment Robotics Operator/Mechanic; High Lift; Hoe-Type Machine; Hoist (Two or More Drums); Hoisting Engine (Two or More Drums); Horizontal Directional Drill Operator; Hydrocrane; Hyster; KeCal Loader; LeTourneau; Locomotive; Mechanic; Mechanically Operated Laser Screed; Mechanic Welder; Mucking Machine; Motor Scraper; Orangepeel Bucket; Overhead Crane; Piledriver; Power Blade; Pumpcrete; Push Dozer; Rock Spreader, attached to equipment; Rotary Drill; Roller (Bituminous); Rough Terrain Crane; Scarifier; Scoopmobile; Shovel; Side Boom; Subgrader; Tailboom; Telescoping Type Forklift; Tow or Push Boat; Tower Crane (French, German & other types); Tractor Shovel; Truck Crane; Tunnel Mining Machines, including Moles, Shields or similar types of Tunnel Mining Equipment

GROUP 2 - Air Compressor (Over 900 cu. ft. per min.); Bituminous Mixer; Boom Type Tamping Machine; Bull Float; Concrete Mixer (Under 21 cu. ft.); Dredge Engineer; Electric Vibrator; Compactor/Self-Propelled Compactor; Elevator (One Drum or Buck Hoist); Elevator (When used to Hoist Building Material); Finish Machine; Firemen & Hoist (One Drum); Flexplane; Forklift (Regardless of Lift Height); Form Grader; Joint Sealing Machine; Outboard Motor Boat; Power Sweeper (Riding Type); Roller (Rock); Ross Carrier; Skid Mounted or Trailer Mounted Conrete Pump; Skid Steer Machine with all Attachments; Switchman or Brakeman; Throttle Valve Person; Tractair & Road Widening Trencher; Tractor (50 H.P. or Over); Truck Crane Oiler; Tugger; Welding Machine; Well Points;& Whirley Oiler

GROUP 3 -All Off Road Material Handling Equipment, including Articulating Dump Trucks; Greaser on Grease Facilities servicing Heavy Equipment

GROUP 4 - Bituminous Distributor; Burlap & Curing Machine; Cement Gun; Concrete Saw; Conveyor; Deckhand Oiler; Grout Pump; Hydraulic Post Driver; Hydro Seeder; Mud Jack; Oiler; Paving Joint Machine; Power Form Handling Equipment; Pump; Roller (Earth); Steerman; Tamping Machine; Tractor (Under 50 H.P.); & Vibrator

CRANES - with booms 150 ft. & Over (Including JIB), and where the length of the boom in combination with the length of the piling equals or exceeds 150 ft. - $1.00 above Group 1 rate

EMPLOYEES ASSIGNED TO WORK BELOW GROUND LEVEL ARE TO BE PAID 10% ABOVE BASIC WAGE RATE. THIS DOES NOT APPLY TO OPEN CUT WORK.

IRON0070-005 06/01/2013

BUTLER COUNTY (Eastern eighth, including the Townships of Decker, Lee & Tilford);
EDMONSON COUNTY (Northern three-fourths, including the Townships of Asphalt, Bee Spring, Brownsville, Grassland, Huff, Kyrock, Lindseyville, Mammoth Cave, Ollie, Prosperity, Rhoda, Sunfish & Sweden)

	Rates	Fringes
Ironworkers: Structural; Ornamental; Reinforcing; Precast Concrete Erectors	$ 26.47	19.30

IRON0103-004 04/01/2013

DAVIESS, HANCOCK, HENDERSON, HOPKINS, MCLEAN, OHIO, UNION & WEBSTER COUNTIES
BUTLER COUNTY (Townships of Aberdeen, Bancock, Casey, Dexterville, Dunbar, Elfie, Gilstrap, Huntsville, Logansport, Monford, Morgantown, Provo, Rochester, South Hill & Welchs Creek);
CALDWELL COUNTY (Northeastern third, including the Township of Creswell);
CHRISTIAN COUNTY (Northern third, including the Townships of Apex, Crofton, Kelly, Mannington & Wynns);
CRITTENDEN COUNTY (Northeastern half, including the Townships of Grove, Mattoon, Repton, Shady Grove & Tribune);
MUHLENBERG COUNTY (Townships of Bavier, Beech Creek Junction, Benton, Brennen, Browder, Central City, Cleaton, Depoy, Drakesboro, Eunis, Graham, Hillside, Luzerne, Lynn City, Martwick, McNary, Millport, Moorman, Nelson, Paradise, Powderly, South Carrollton, Tarina & Weir)

	Rates	Fringes
Ironworkers:	$ 27.82	16.555

IRON0492-003 05/01/2013

ALLEN, LOGAN, SIMPSON, TODD & WARREN COUNTIES
BUTLER COUNTY (Southern third, including the Townships of Boston, Berrys Lick, Dimple, Jetson, Quality, Sharer, Sugar Grove & Woodbury);
CHRISTIAN COUNTY (Eastern two-thirds, including the Townships

of Bennettstown, Casky, Herndon, Hopkinsville, Howell, Masonville, Pembroke & Thompsonville);
EDMONSON COUNTY (Southern fourth, including the Townships of Chalybeate & Rocky Hill);
MUHLENBERG COUNTY (Southern eighth, including the Townships of Dunnior, Penrod & Rosewood)

	Rates	Fringes
Ironworkers:	$ 23.84	10.96

IRON0782-006 05/01/2013

BALLARD, CALLOWAY, CARLISLE, FULTON, GRAVES, HICKMAN, LIVINGSTON, LYON, MARSHALL, MCCRACKEN & TRIGG COUNTIES
CALDWELL COUNTY (Southwestern two-thirds, including the Townships of Cedar Bluff, Cider, Claxton, Cobb, Crowtown, Dulaney, Farmersville, Fredonia, McGowan, Otter Pond & Princeton);
CHRISTIAN COUNTY (Western third, Excluding the Townships of Apex, Crofton, Kelly, Mannington, Wynns, Bennettstown, Casky, Herndon, Hopkinsville, Howell, Masonville, Pembroke & Thompsonville);
CRITTENDEN COUNTY (Southwestern half, including the Townships of Crayne, Dycusburg, Frances, Marion, Mexico, Midway, Sheridan & Told)

	Rates	Fringes
Ironworkers:		
Projects with a total contract cost of $20,000,000.00 or above	$ 26.46	19.91
All Other Work	$ 24.95	18.65

LABO0189-005 07/01/2013

BALLARD, CALLOWAY, CARLISLE, FULTON, GRAVES, HICKMAN, LIVINGSTON, LYON, MARSHALL & MCCRACKEN COUNTIES

	Rates	Fringes
Laborers:		
GROUP 1	$ 20.95	12.01
GROUP 2	$ 21.20	12.01
GROUP 3	$ 21.25	12.01
GROUP 4	$ 21.85	12.01

LABORER CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler;

Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Blaster; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal Boring; Air Track Drillers (All Types); Powdermen & Blasters; Troxler & Concrete Tester if Laborer is Utilized

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LABO0189-006 07/01/2013

ALLEN, BUTLER, CALDWELL, CHRISTIAN, DAVIESS, EDMONSON, HANCOCK, HOPKINS, LOGAN, MCLEAN, MUHLENBERG, OHIO, SIMPSON, TODD, TRIGG & WARREN COUNTIES

	Rates	Fringes
Laborers:		
GROUP 1	$ 21.96	11.00
GROUP 2	$ 22.21	11.00
GROUP 3	$ 22.26	11.00
GROUP 4	$ 22.86	11.00

LABORER CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Blaster; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal Boring; Air Track Drillers (All Types); Powdermen & Blasters; Troxler & Concrete Tester if Laborer is Utilized

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LABO0561-001 07/01/2013

CRITTENDEN, HENDERSON, UNION & WEBSTER COUNTIES

	Rates	Fringes
Laborers:		
GROUP 1	$ 21.11	12.25
GROUP 2	$ 21.36	12.25
GROUP 3	$ 21.41	12.25
GROUP 4	$ 22.01	12.25

LABORER CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter;

Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Blaster; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal Boring; Air Track Drillers (All Types); Powdermen & Blasters; Troxler & Concrete Tester if Laborer is Utilized

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PAIN0032-002 05/01/2013

BALLARD COUNTY

	Rates	Fringes
Painters:		
Bridges	$ 30.56	15.18
All Other Work	$ 28.26	15.18

Spray, Blast, Steam, High & Hazardous (Including Lead Abatement) and All Epoxy - $1.00 Premium

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PAIN0118-003 05/01/2010

EDMONSON COUNTY:

	Rates	Fringes
Painters:		
Brush & Roller	$ 18.50	10.30
Spray, Sandblast, Power Tools, Waterblast & Steam Cleaning	$ 19.50	10.30

PAIN0156-006 04/01/2010

DAVIESS, HANCOCK, HENDERSON, MCLEAN, OHIO, UNION & WEBSTER COUNTIES

	Rates	Fringes
Painters:		
BRIDGES		
GROUP 1	$ 25.60	10.05
GROUP 2	$ 25.85	10.05
GROUP 3	$ 26.60	10.05

GROUP 4	$ 27.60	10.05
ALL OTHER WORK:		
GROUP 1	$ 25.60	11.30
GROUP 2	$ 25.85	11.30
GROUP 3	$ 26.60	11.30
GROUP 4	$ 27.60	11.30

PAINTER CLASSIFICATIONS

GROUP 1 - Brush & Roller

GROUP 2 - Plasterers

GROUP 3 - Spray; Sandblast; Power Tools; Waterblast; Steamcleaning; Brush & Roller of Mastics, Creosotes, Kwinch Koate & Coal Tar Epoxy

GROUP 4 - Spray of Mastics, Creosotes, Kwinch Koate & Coal Tar Epoxy

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PAIN0456-003 07/01/2011

ALLEN, BUTLER, LOGAN, MUHLENBERG, SIMPSON, TODD & WARREN COUNTIES:

	Rates	Fringes
Painters:		
BRIDGES		
Brush & Roller	$ 22.55	9.65
Spray; Sandblast; Power Tools; Waterblast & Steam Cleaning	$ 23.55	9.65
ALL OTHER WORK		
Brush & Roller	$ 17.55	9.65
Spray; Sandblast; Power Tools; Waterblast & Steam Cleaning	$ 18.55	9.65

ALL OTHER WORK - HIGH TIME PAY
Over 35 feet (up to 100 feet) - $1.00 above base wage
100 feet and over - $2.00 above base wage

DURING SPRAY PAINTING AND SANDBLASTING OPERATIONS, POT TENDERS SHALL RECEIVE THE SAME WAGE RATES AS THE SPRAY PAINTER OR NOZZLE OPERATOR

PAIN0500-002 07/01/2013

CALDWELL, CALLOWAY, CARLISLE, CHRISTIAN, CRITTENDEN, FULTON, GRAVES, HICKMAN, HOPKINS, LIVINGSTON, LYON, MARSHALL, MCCRACKEN & TRIGG COUNTIES:

	Rates	Fringes
Painters:		

Bridges	$ 25.80	11.95
All Other Work	$ 19.55	11.95

Waterblasting units with 3500 PSI and above - $.50 premium
Spraypainting and all abrasive blasting - $1.00 premium
Work 40 ft. and above ground level - $1.00 premium

PLUM0184-002 07/01/2013

BALLARD, CALDWELL, CALLOWAY, CARLISLE, CHRISTIAN, CRITTENDEN, FULTON, GRAVES, HICKMAN, LIVINGSTON, LYON, MARSHALL, MCCRACKEN and TRIGG COUNTIES

	Rates	Fringes
Plumber; Steamfitter	$ 33.11	14.83

PLUM0502-004 08/01/2013

ALLEN, BUTLER, EDMONSON, SIMPSON & WARREN

	Rates	Fringes
Plumber; Steamfitter	$ 32.00	17.17

PLUM0633-002 08/01/2013

DAVIESS, HANCOCK, HENDERSON, HOPKINS, LOGAN, MCLEAN, MUHLENBERG, OHIO, TODD, UNION & WEBSTER COUNTIES:

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 29.87	14.25

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* TEAM0089-003 03/30/2014

ALLEN, BUTLER, EDMONSON, LOGAN, SIMPSON & WARREN COUNTIES

	Rates	Fringes
Truck drivers:		
Zone 1:		
Group 1	$ 19.58	17.83
Group 2	$ 19.76	17.83
Group 3	$ 19.84	17.83
Group 4	$ 19.86	17.83

GROUP 1 - Greaser; Tire Changer

GROUP 2 - Truck Mechanic; Single Axle Dump; Flat Bed; All Terrain Vehicles when used to haul materials; Semi Trailer or Pole Trailer when used to pull building materials and equipment; Tandem Axle Dump; Driver of Distributors

GROUP 3 - Mixer All Types

GROUP 4 - Winch and A-Frame when used in transporting

materials; Ross Carrier; Fork Lift when used to transport building materials; Driver on Pavement Breaker; Euclid and Other Heavy Earth Moving Equipment; Low Boy; Articulator Cat; Five Axle Vehicle

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TEAM0215-003 03/31/2013

DAVIESS, HANCOCK, HENDERSON, HOPKINS, MCLEAN, MUHLENBERG, OHIO & WEBSTER COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 20.93	16.85
Group 2	$ 21.16	16.85
Group 3	$ 21.23	16.85
Group 4	$ 21.24	16.85

GROUP 1: Greaser, Tire Changer

GROUP 2: Truck Mechanic

GROUP 3: Single Axle Dump; Flat Bed; All Terrain Vehicle when used to haul materials; Semi Trailer or Pole Trailer when used to pull building materials and equipment; Tandem Axle Dump; Driver of Distributors; Mixer All Types

GROUP 4: Euclid and other heavy earth moving equipment; Low Boy; Articulator Cat; 5 Axle Vehicle; Winch and A- Frame when used in transporting materials; Ross Carrier; Fork Lift when used to transport building materials; Driver on Pavement Breaker

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TEAM0236-001 03/31/2013

BALLARD, CALDWELL, CALLOWAY, CARLISLE, CHRISTIAN, CRITTENDEN, FULTON, GRAVES, HICKMAN, LIVINGSTON, LYON, MARSHALL, MCCRACKEN,TODD & TRIGG COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 19.38	16.85
Group 2	$ 19.56	16.85
Group 3	$ 19.56	16.85
Group 4	$ 19.66	16.85
Group 5	$ 19.64	16.85

GROUP 1: Greaser, Tire Changer

GROUP 2: Truck Mechanic

GROUP 3: Single Axle Dump; Flat Bed; All Terrain Vehicle when used to haul materials; Semi Trailer or Pole Trailer when used to pull building materials and equipment; Tandem Axle Dump; Drivers of Distributors

GROUP 4: Euclid and other heavy earth moving equipment; Low Boy; Articulator Cat; Five Axle Vehicle; Winch and A-Frame when used in transporting materials; Ross Carrier

GROUP 5: Mixer All Types

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived

from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

Fringe benefit amounts are applicable for all hours worked except when otherwise noted.

These rates are listed pursuant to the Kentucky Determination No. CR-13-I-HWY dated April 15, 2013.

No laborer, workman or mechanic shall be paid at a rate less than that of a Journeyman except those classified as bona fide apprentices.

Apprentices or trainees shall be permitted to work as such subject to Administrative Regulations adopted by the Commissioner of Workplace Standards. Copies of these regulations will be furnished upon request from any interested person.

Before using apprentices on the job the contractor shall present to the Contracting Officer written evidence of registration of such employees in a program of a State apprenticeship and training agency approved and recognized by the U. S. Bureau of Apprenticeship and Training. In the absence of such a State agency, the contractor shall submit evidence of approval and registration by the U. S. Bureau of Apprenticeship and Training.

The contractor shall submit to the Contracting Officer, written evidence of the established apprenticeship-journeyman ratios and wage rates in the project area, which will be the basis for establishing such ratios and rates for the project under the applicable contract provisions.

TO: EMPLOYERS/EMPLOYEES

PREVAILING WAGE SCHEDULE:

The wages indicated on this wage schedule are the least permitted to be paid for the occupations indicated. When an employee works in more than one classification, the employer must record the number of hours worked in each classification at the prescribed hourly base rate.

OVERTIME:

Overtime is to be paid after an employee works eight (8) hours a day or forty (40) hours a week, whichever gives the employee the greater wages. At least time and one-half the base rate is required for all overtime. A laborer, workman or mechanic and an employer may enter into a written agreement or a collective bargaining agreement to work more than eight (8) hours a calendar day but not more than ten (10) hours a calendar day for the straight time hourly rate. Wage violations or questions should be directed to the designated Engineer or the undersigned.

Diana Castle Radcliffe, P.E.
Director, Division of Construction Procurement
Frankfort, Kentucky 40622

141217

PROPOSAL BID ITEMS

Report Date 4/18/14

Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
0010	00001		DGA BASE	419.00	TON		$	
0020	00003		CRUSHED STONE BASE	2,219.00	TON		$	
0030	00020		TRAFFIC BOUND BASE	1,289.00	TON		$	
0040	00078		CRUSHED AGGREGATE SIZE NO 2	11,505.00	TON		$	
0050	00194		LEVELING & WEDGING PG76-22	242.00	TON		$	
0060	00214		CL3 ASPH BASE 1.00D PG64-22	2,906.00	TON		$	
0070	00216		CL3 ASPH BASE 1.00D PG76-22	1,777.00	TON		$	
0080	00332		CL3 ASPH SURF 0.50A PG76-22	1,416.00	TON		$	
0090	02084		JPC PAVEMENT-8 IN	356.00	SQYD		$	
0100	02101		CEM CONC ENT PAVEMENT-8 IN	555.00	SQYD		$	
0110	02676		MOBILIZATION FOR MILL & TEXT	1.00	LS		$	
0120	02677		ASPHALT PAVE MILLING & TEXTURING	774.00	TON		$	
0130	08100		CONCRETE-CLASS A	12.00	CUYD		$	

Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
0140	00078		CRUSHED AGGREGATE SIZE NO 2 (FOR PERFORATED PIPE HEADWALL)	2.00	TON		$	
0150	01000		PERFORATED PIPE-4 IN	3,242.00	LF		$	
0160	01010		NON-PERFORATED PIPE-4 IN	760.00	LF		$	
0170	01015		INSPECT & CERTIFY EDGE DRAIN SYSTEM	1.00	LS		$	
0180	01024		PERF PIPE HEADWALL TY 2-4 IN	1.00	EACH		$	
0190	01028		PERF PIPE HEADWALL TY 3-4 IN	1.00	EACH		$	
0200	01059		STEEL ENCASEMENT PIPE-2 IN	44.00	LF		$	
0210	01810		STANDARD CURB AND GUTTER	3,274.00	LF		$	
0220	01825		ISLAND CURB AND GUTTER	459.00	LF		$	
0230	01875		STANDARD HEADER CURB	1,652.00	LF		$	
0240	01891		ISLAND HEADER CURB TYPE 2	408.00	LF		$	
0250	02014		BARRICADE-TYPE III	37.00	EACH		$	
0260	02200		ROADWAY EXCAVATION	8,776.00	CUYD		$	
0270	02223		GRANULAR EMBANKMENT	1,286.00	CUYD		$	
0280	02429		RIGHT-OF-WAY MONUMENT TYPE 1	37.00	EACH		$	
0290	02430		RIGHT-OF-WAY MONUMENT TYPE 1A	5.00	EACH		$	
0300	02469		CLEAN SINKHOLE	5.00	EACH		$	
0310	02483		CHANNEL LINING CLASS II	6.00	TON		$	
0320	02545		CLEARING AND GRUBBING (APPROXIMATELY 7.10 ACRES)	1.00	LS		$	
0330	02551		CONCRETE-CLASS A FOR STEPS	1.00	CUYD		$	
0340	02562		TEMPORARY SIGNS	1,963.00	SQFT		$	
0350	02596		FABRIC-GEOTEXTILE TYPE I	12.00	SQYD		$	
0360	02599		FABRIC-GEOTEXTILE TYPE IV	36,600.00	SQYD		$	
0370	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		$	
0380	02653		LANE CLOSURE	7.00	EACH		$	
0390	02671		PORTABLE CHANGEABLE MESSAGE SIGN	18.00	EACH		$	
0400	02720		SIDEWALK-4 IN CONCRETE (MODIFIED)	1,648.00	SQYD		$	
0410	02726		STAKING	1.00	LS		$	

141217

PROPOSAL BID ITEMS

Report Date 4/18/14

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
0420	04950		REMOVE SIGNAL EQUIPMENT	1.00	EACH		$	
0430	04953		TEMP RELOCATION OF SIGNAL HEAD	5.00	EACH		$	
0440	05950		EROSION CONTROL BLANKET	219.00	SQYD		$	
0450	05963		INITIAL FERTILIZER	1.00	TON		$	
0460	05964		20-10-10 FERTILIZER	1.00	TON		$	
0470	05990		SODDING	8,257.00	SQYD		$	
0480	05992		AGRICULTURAL LIMESTONE	6.00	TON		$	
0490	06510		PAVE STRIPING-TEMP PAINT-4 IN	11,743.00	LF		$	
0500	06514		PAVE STRIPING-PERM PAINT-4 IN	15,834.00	LF		$	
0510	06516		PAVE STRIPING-PERM PAINT-8 IN	1,169.00	LF		$	
0520	06530		PAVE STRIPING REMOVAL-4 IN	18,261.00	LF		$	
0530	06546		PAVE STRIPING-THERMO-12 IN W	109.00	LF		$	
0540	06547		PAVE STRIPING-THERMO-12 IN Y	206.00	LF		$	
0550	06566		PAVE MARKING-THERMO X-WALK-12 IN	900.00	LF		$	
0560	06568		PAVE MARKING-THERMO STOP BAR-24IN	25.00	LF		$	
0570	06573		PAVE MARKING-THERMO STR ARROW	5.00	EACH		$	
0580	06573		PAVE MARKING-THERMO STR ARROW (ROUNDABOUT)	2.00	EACH		$	
0590	06574		PAVE MARKING-THERMO CURV ARROW	14.00	EACH		$	
0600	06574		PAVE MARKING-THERMO CURV ARROW (LEFT TURN ROUNDABOUT)	3.00	EACH		$	
0610	06575		PAVE MARKING-THERMO COMB ARROW	3.00	EACH		$	
0620	06575		PAVE MARKING-THERMO COMB ARROW (THRU-RIGHT ROUNDABOUT)	6.00	EACH		$	
0630	06575		PAVE MARKING-THERMO COMB ARROW (THRU-LEFT ROUNDABOUT)	5.00	EACH		$	
0640	06576		PAVE MARKING-THERMO ONLY	3.00	EACH		$	
0650	06600		REMOVE PAVEMENT MARKER TYPE V	40.00	EACH		$	
0660	10020NS		FUEL ADJUSTMENT	14,009.00	DOLL	$1.00	$	$14,009.00
0670	10030NS		ASPHALT ADJUSTMENT	24,791.00	DOLL	$1.00	$	$24,791.00
0680	20100ES842		PAVE MARK TEMP PAINT LINE ARROW	33.00	EACH		$	
0690	20100ES842		PAVE MARK TEMP PAINT LINE ARROW (CURVED ARROW)	11.00	EACH		$	
0700	20100ES842		PAVE MARK TEMP PAINT LINE ARROW (COMBO ARROW)	3.00	EACH		$	
0710	20456NS835		INSTALL TEMP VIDEO CAMERA	2.00	EACH		$	
0720	20782NS714		PAVE MARKING THERMO-BIKE	2.00	EACH		$	
0730	21289ED		LONGITUDINAL EDGE KEY	2,174.00	LF		$	
0740	23010EN		PAVE MARK TEMP PAINT STOP BAR-24 IN	50.00	LF		$	
0750	23143ED		KPDES PERMIT AND TEMP EROSION CONTROL	1.00	LS		$	
0760	23158ES505		DETECTABLE WARNINGS	387.00	SQFT		$	
0770	23607EC		PAVE MARK THERMO-LANE REDUCTION ARROW	2.00	EACH		$	
0780	23745EC		YIELD LINES	24.00	EACH		$	
0790	24114EC		PAVE MARK-THERMO-YIELD	7.00	EACH		$	
0800	24543EC		CLEAN (EXISITING STORM SEWER)	482.00	LF		$	

Section: 0003 - DRAINAGE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT

141217

PROPOSAL BID ITEMS

Report Date 4/18/14

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
0810	00520		STORM SEWER PIPE-12 IN	11.00	LF		$	
0820	00521		STORM SEWER PIPE-15 IN	440.00	LF		$	
0830	00522		STORM SEWER PIPE-18 IN	2,182.00	LF		$	
0840	01456		CURB BOX INLET TYPE A	10.00	EACH		$	
0850	01459		CURB BOX INLET TYPE A MOD ADDED: 4-18-14	5.00	EACH		$	
0860	01521		DROP BOX INLET TYPE 6A	1.00	EACH		$	
0870	01544		DROP BOX INLET TYPE 11	1.00	EACH		$	
0880	01559		DROP BOX INLET TYPE 13G	10.00	EACH		$	
0890	01568		DROP BOX INLET TYPE 13S	1.00	EACH		$	
0900	01580		DROP BOX INLET TYPE 15	3.00	EACH		$	
0910	02600		FABRIC GEOTEXTILE TY IV FOR PIPE	6,469.00	SQYD	$2.00	$	$12,938.00
0920	04811		ELECTRICAL JUNCTION BOX TYPE B	1.00	EACH		$	
0930	23131ER701		PIPELINE VIDEO INSPECTION	1,668.00	LF		$	

Section: 0004 - UTILITY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
0940	01792		ADJUST MANHOLE (REMOVE & REPLACE MANHOLE GRADE RINGS)	3.00	EACH		$	
0950	01792		ADJUST MANHOLE (REMOVE & REPLACE CONE SECTION/BARREL SECTION)	2.00	EACH		$	
0960	02220		FLOWABLE FILL	5.00	CUYD		$	

Section: 0005 - SIGNING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
0970	04881		MAST ARM POLE	3.00	EACH		$	
0980	06406		SBM ALUM SHEET SIGNS .080 IN	441.00	SQFT		$	
0990	06407		SBM ALUM SHEET SIGNS .125 IN	273.00	SQFT		$	
1000	06411		STEEL POST TYPE 2	1,319.00	LF		$	
1010	20418ED		REMOVE & RELOCATE SIGNS	8.00	EACH		$	
1020	21373ND		REMOVE SIGN	11.00	EACH		$	
1030	23157EN		TRAFFIC SIGNAL POLE BASE ADDED: 4-18-14	9.00	CUYD		$	
1040	24631EC		BARCODE SIGN INVENTORY	140.00	EACH		$	

Section: 0006 - LIGHTING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
1050	04740		POLE BASE	22.00	EACH		$	
1060	04795		CONDUIT-2 IN	2,950.00	LF		$	
1070	04820		TRENCHING AND BACKFILLING REVISED: 4-18-14	1,527.00	LF		$	
1080	21543EN		BORE AND JACK CONDUITADDED: 4-18-14	446.00	LF		$	

PROPOSAL BID ITEMS

141217

Report Date 4/18/14

Section: 0007 - LANDSCAPING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
1090	23411EC		IRRIGATION SYSTEM	1.00	LS		$	
1100	24681EC		CONSTRUCT DECORATIVE WALL	1.00	LS		$	
1110	24682EC		SITE ELECTRICAL	1.00	LS		$	

Section: 0008 - MOBILIZATION AND/OR DEMOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	FP	AMOUNT
1120	02568		MOBILIZATION	1.00	LS		$	
1130	02569		DEMOBILIZATION	1.00	LS		$	

Specifications and Contract Documents

Roundabout Landscaping

Item No. 3-131.00
Bid Documents

Table of Contents

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US 31W AT UNIVERSITY BOULEVARD ROUNDABOUT
DEPARTMENT OF HIGHWAYS
COUNTY OF WARREN JANUARY 2014

SECTION 02810 - IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Underground irrigation system.
2. Pipe and fittings, valves, sprinkler heads, and accessories.
3. Battery-operated automatic control system.
4. Excavation and backfilling for installation of underground system components.

1.2 SYSTEM DESCRIPTION

A. Layout design: Modify layout as needed to obtain required and complete coverage with manufacturer's standard heads as specified.
1. Provide irrigation layout with separate plant type zones:
a. Lawns.
b. Shrub/Groundcover Beds
c. Trees (supplemental irrigation)
2. Provide flow velocities that do not exceed 5.0 ft. Per second.
3. Provide irrigation of lawn areas with no overspray into planting beds or pavements, unless so designed on the drawings.
4. Provide independent irrigation of individual bed zones or planters.

B. Only similar types of heads with matched precipitation rates may run on same zone.

C. Piping Design: Do not mix different heads for each line. Provide main size as needed for proper flow, but not less than specified on plan.

D. Provide electric solenoid controlled underground irrigation system manufactured especially for control of automatic circuit valves of underground irrigation system. Provide unit of capacity to suit number of circuits indicated.
a. Source Power: 120 volts
b. Low Voltage Controls: 24 volts AC.

E. Provide controller to control all zones.

F. The extent of the irrigation system is shown on the Drawings.

1.3 SUBMITTALS - REVIEW

A. Product Data: System components.

B. Shop Drawings:
1. Indicate piping layout to water source.
2. Include piping layout and details illustrating location and types of sprinkler heads, valves, control system and wiring, and schedule of fittings.
3. Indicate location of sleeves under pavements and conflicts with existing utilities.

C. Samples
1. Submit the following material samples:
a. Piping and fittings.
b. Wire connectors and sealer.
c. Control wire.
2. Submit the following equipment samples:
a. Sprinkler heads, one of each type, complete with housing.

b. Valves and access boxes.
c. Battery-operated controller.

3. Approved equipment samples will be returned to the Contractor and may be used in the work before final approval.

1.4 SUBMITTALS - CLOSE-OUT

A. Comply with the requirements of the General Conditions.

B. Record Drawings:
1. Indicate exact location of gate valves, wire locations; sprinkler head layout, automatic valves, quick couplers, all irrigation and drainage piping, etc.
2. At the time of the irrigation mainline test, provide a preliminary set of "Record" drawings to the Owner's Authorized Representative.

C. Operation and Maintenance Data: Comply with requirements of Section 01730.
1. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
2. Provide schedule indicating length of time each valve is required to be run to provide a determined amount of water.
3. Include complete parts list with manufacturer's designations for each component.

D. Loose Equipment to Furnish: Loose irrigation equipment, operating keys and spare parts will be furnished by the Irrigation Contractor in quantities as shown on the plans.
1. Two (2) quick coupler keys and matching swivel hose ells.
2. Two (2) valve keys for gate valves.
3. Two (2) keys for each controller.

1.5 QUALITY ASSURANCE

A. Installer's Qualifications: Single firm specializing in irrigation work with a minimum of five (5) years experience properly installing irrigation systems of comparable size.
1. Provide references of your last five- (5) consecutive systems, and five systems of comparable size with bid proposal.

B. Materials, equipment, and methods of installation shall comply with the following codes and standards:
1. State and City Building Codes.
2. American Society for Testing and Materials (ASTM).
3. National Sanitation Foundation (NSF).

C. Requirements of Regulatory Agencies:
1. All work and materials shall be in full accordance with the latest rules and regulations of safety orders of Division of Industrial Safety; the Uniform Building Code and other applicable laws or regulations, including any local Plumbing Codes.
2. Should the Contract documents be at variance with the aforementioned rules and regulations, notify the Owner's authorized representative for instructions before proceeding with work affected.

D. Testing:
1. Preliminary review of completed installation will be made prior to backfilling of trenches and hydrostatic testing.
2. Final review and testing shall be made in conjunction with the final review of lawn, shrub and tree planting.

E. Permits and Inspections:
1. Any permits for the installation or construction of any work included under this contract, which are required by any of the legally constituted authorities having jurisdiction, shall be obtained and paid for by the contractor, each at the proper time.

2. The Contractor shall also arrange for and pay all costs in connection with any inspection and examination required by these authorities.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver irrigation system components in manufacturer's original, undamaged and unopened containers, with labels intact and legible.

B. Deliver plastic pipe in bundles, packaged to provide adequate protection of pipe ends.

C. Store and handle materials to prevent damage and deterioration.

D. Provide secure, locked storage for valves, sprinkler heads and similar components that cannot be immediately replaced to prevent installation delays.

E. Contractor is responsible for materials through final acceptance.

1.7 PROJECT CONDITIONS

A. Protect existing trees, plants, and lawns and other features designated to remain as part of the final landscape.

B. The Contractor shall carefully coordinate with the landscape work and other site developments, including all new and existing utilities.

C. The Contractor shall verify the correctness of all finish grades within the work area to ensure the proper soil coverage of the irrigation pipes.

D. Irrigation system layout is diagrammatic. Exact location of piping, sprinkler heads, valves, and other components shall be established by Contractor in the field at time of installation.

E. Space sprinkler components as indicated. Do not exceed sprinkler spacing shown on Drawings.

F. Locate existing utilities in areas of work. If utilities are to remain, provide adequate means of protection during the system installation. Repair utilities damaged during the work to the satisfaction of the Utility Owner and at the Contractor's expense. Notify local Utility Protection Service three (3) days prior to beginning excavation work.

G. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, notify the Owner's Authorized Representative immediately for direction as to procedure. Cooperate with the Owner and Utility companies in keeping active services and facilities in operation.

H. Minor adjustments in system layout will be permitted to clear existing field obstruction. Final system layout shall be acceptable to the Owner's Authorized Representative.

1.8 WARRANTY

A. Warranties are subject to the General and Supplementary Conditions.

B. Irrigation Contractor is responsible to insure complete coverage as specified herein of the areas to be irrigated. During the warranty period the Irrigation Contractor shall make any adjustments as necessary to maintain proper coverage.

C. If, within one year from the date of completion, settlement occurs, and adjustments in pipes, valves and sprinkler heads, lawn areas or paving are necessary to bring the system, grade or paving to the proper level of the permanent grades. The Contractor, as part of the work under his Contract, shall make all adjustments without extra cost to the Owner, including the restoration of all damaged planting, paving or other improvements of any kind.

D. Should any operational difficulties in connection with the irrigation system develop within the specified guarantee period, which, in the opinion of the Owner's Authorized Representative may be due to inferior material and/or workmanship, said difficulties shall be immediately corrected by the Contractor to the satisfaction of the Owner at no additional cost to the Owner, including any and all other damages caused by such defects.

1.9 OPERATION & MAINTENANCE — IRRIGATION SYSTEM

A. The entire irrigation system shall be under fully automatic operation for a period of three (3) days prior to any planting.

B. It is the Landscape Contractor's responsibility to determine water application rates and controller cycling. The Irrigation Contractor will instruct the Landscape Contractor on the operation and programming of the controller and will assist the Landscape Contractor as necessary in such operations throughout the one-year maintenance period. Any adjustments, repairs, etc., other than programming are the total responsibility of the Irrigation Contractor.

C. The Irrigation Contractor shall service the system at the request of the Owner's Authorized Representative during the guarantee period and shall be paid for work performed which is not covered by the guarantee. The Irrigation Contractor shall winterize the system the first year as part of this contract, and provide written instructions to the Owner's Authorized Representative for future service and maintenance.

D. The Irrigation Contractor shall return to the site during the subsequent spring season and demonstrate to the Owner's Authorized Representative the proper procedures for the system start-up, operation and maintenance.

PART 2 - PRODUCTS

2.1 UNAUTHORIZED MATERIALS

A. Materials and products required for work of this section shall not contain asbestos. Polychlorinated biphenyl (PCB) or other hazardous materials identified by the Owner.

2.2 IRRIGATION SYSTEM MANUFACTURERS

A. All irrigation system components shall be supplied by regionally authorized distributors to provide single source responsibility for warranty service and operations to conform to specifications in all aspects. Unless specifically stated otherwise, the Irrigation Contractor may assume the phrase "Acceptable Substitute", except that the burden is upon the Contractor to prove such equality. If the Contractor elects to prove such equality, he/she must request the Landscape Architect's and the Owner's Authorized Representative's approval in writing (one week prior to bid) to substitute such item for the specified item, stating the cost difference involved with supporting data and samples to permit a fair evaluation of the proposed substitute with respect of quality, serviceability, warranty, and cost. If sprinkler heads or remote control valves are requested to be substituted, each zone affected by such substitution shall be recalculated for pressure loss, GPM, and shall be submitted to the Owner's Authorized Representative for his review.

2.3 MATERIALS

A. All materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of this system.

B. Plastic Pipe
1. All piping shall be from virgin parent material. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious wrinkles and dents.
2. For all irrigation piping, use polyvinyl chloride (PVC) 1120 with a minimum class rating of 200, sized to maintain a maximum flow velocity of less than 5 ft. per second (FPS).
3. Pipe shall be marked at intervals (not to exceed 5') with the following information: Manufacturer's name or trademark, nominal pipe size, schedule, PVC type and grade (i.e. PVC 1120), SDR rating class rating.
4. When connection is plastic to metal, male adapters shall be used. The male adapter shall be hand tightened, plus one turn with a strap wrench.
5. Comply with pipe sizes indicated on drawings. No substitution of smaller pipe will be permitted. Larger sizes may be used subject to acceptance of the Owner's Authorized Representative. Remove damaged and defective pipe from site.
6. All PVC pipe to be furnished in 20' lengths.

C. Piping for Sleeving
1. For sleeves under six inches (6") in size, high impact type, polyvinyl chloride (PVC) 1120, minimum Schedule 40.
2. For sleeves six inches (6") and above in size shall be Polyvinyl Chloride (PVC) 1120 Class 200.
3. Irrigation Contractor shall be responsible for the coordination of sleeves for all piping passing through concrete curbing, under paved areas, concrete or masonry walls and floors while the same are under construction

D. Fittings
1. Fittings for Solvent -weld PVC Pipe
   a. Schedule 40 or 80, polyvinyl chloride (PVC), Type 1 injection molded fittings suitable for solvent weld or threaded connections, to meet ASTM D-2466-73 and D-2467-73 NSF approved. Fittings made of other materials are not permitted.
2. Threaded PVC nipples shall be Schedule 80. Use high quality grade of Teflon tape for threaded fittings.
   a. Saddle fittings are not permitted.
   b. Use high quality grade of Teflon tape for sprinkler head and electric remote control valve connections.

E. Isolation Valves
1. Gate valves under 3" shall be 200 psi rated W.O.G. 200 domestically manufactured with bronze bodies. Valves shall be equipped with tee handles. As manufactured by Watts Regulator, West Anover, MA or Acceptable Substitute.

F. Quick Coupling Valves
1. Valve shall be three-quarter inch (3/4") female thread.
2. Furnish one (1) valve key fitted with be three-quarter inch (3/4") swivel hose ells.
3. All quick coupling valve keys and hose swivels shall be of the same manufacturer as the quick coupler.

G. Valve Boxes
1. Tapered rib reinforcement enclosure of rigid tensile strength plastic material components chemically inert and unaffected by moisture, ultra violet light, corrosion and temperature changes. Lid and base shall withstand normal loads exerted by turf equipment without collapsing. Lid to be green in color.
2. For remote control valves and quick coupler valves use rectangular standard turf box, 16" x 11".
3. For Isolation valves use 9" circular turf box.

H. Spray heads
1. Full or part circle pop-up fixed spray sprinkler.
2. The sprinkler body, stem, nozzle and screen shall be constructed of heavy-duty, ultra-violet resistant plastic. It shall have a heavy-duty stainless steel retract spring for positive pop-down and a ratcheting system for easy alignment of the pattern. The sprinkler shall have a soft elastic pressure-activated co-molded wiper seal for cleaning debris from the pop-up stem as it retracts into the case to prevent the sprinkler from sticking up to minimize "flow-by."
3. The sprinkler shall have a matched precipitation rate (MPR) plastic nozzle with an adjusting screw capable of regulating the radius and flow. The sprinkler shall be capable of housing under the nozzle; protective, non-clogging filter screens or pressure compensating screens (PCS). The screen shall be used in conjunction with the regulating screw for regulating.
4. The sprinkler shall have a Pop-Top Flush Plug reinstalled. The plug shall prevent debris from clogging the sprinkler during installation and allow for system to be flushed before nozzling. The plug shall be bright orange in color and constructed of polypropylene material.
5. Pop-up heights: 4 inches (see drawings).
6. Spray nozzles for sprinkler heads shall be of the same manufacturer as the sprayhead.

I. Mid-Range Turf Rotors
1. The full or part circle rotor sprinkler shall be a single stream, water lubricated, gear drive.
2. The sprinkler shall have adjustable arc coverage form 40 to 360 degrees in one unit.

3. The sprinkler shall have a pressure-activated multi-function wiper seal that positively seals against the nozzle flange to keep debris out of the rotor and to clean debris from the pop-up stem as it retracts. The wiper seal shall prevent sprinkler from sticking up, and be capable of sealing the sprinkler cap to sprinkler body under normal operating pressures.
4. The sprinkler shall be fully adjustable from the top using only a flat-blade screwdriver.
5. The sprinkler shall have a screen attached to the drive housing to filter inlet water, protect the drive from clogging and simplify its removal for cleaning and flushing of the system. It shall have a ¾" (FNTP) bottom inlet.
6. The sprinkler shall have a stainless steel adjusting screw capable of reducing the radius up to 25%.
7. The sprinkler shall have a strong stainless steel retract spring for positive pop down. It shall have a check valve to check 7 feet of elevation change (if specified on the Drawing).

J. Automatic Controller

1. The ESP-LXME Controller shall be of a hybrid type that combines electro-mechanical and microelectronic circuitry capable of fully automatic or manual operation.
2. The controller shall be housed in a wall-mountable, weather-resistant plastic cabinet with a key-locking cabinet door suitable for either indoor or outdoor installation.
3. The display shall show programming options and operating instructions in the chosen language without altering the programming or operation information.
4. The controller shall have a Seasonal Adjustment by program which adjusts the station run time from 0 to 300% in 1% increments. The controller shall also have a Monthly Seasonal Adjustment of 0 to 300% by month. Station timing with Seasonal Adjustment shall be from 1 second to 16 hours.
5. The controller shall have 4 separate and independent programs which can have different start times, start day cycles, and station run times. Each program shall have up to 8 start times per day for a total of 32 possible start times per day. The 4 programs shall be allowed to overlap operation based on user defined settings which control the number of simultaneous stations per program and total for the controller.
6. The controller shall allow up to 5 valves to operate simultaneously per program and total for the controller including the master valve/pump start circuit.
7. The controller shall have an electronic, diagnostic circuit breaker that shall sense a station with an electrical overload or short circuit and shall bypass that station and continue to operate all other stations.
8. The controller shall have a 365-day calendar with Permanent Day Off feature that allows a day(s) of the week to be turned off on any user selected program day cycle. (Custom, Even, Odd, Odd31, & Cyclical). Days set to Permanent Day Off shall override the normal repeating schedule and not water on the specified day(s) of the week. The controller shall also have a Calendar Day Off feature allowing the user to select up to 5 dates up to 365-days in the future when the controller shall not start programs.
9. The controller shall incorporate a Rain Delay feature allowing the user to set the number of days the controller should remain off before automatically returning to the auto mode.
10. The controller shall have Cycle+Soak water management software which is capable of operating each station for a maximum cycle time and a minimum soak time to reduce water run-off. The maximum cycle time shall not extended by Seasonal Adjustment.
11. The controller shall incorporate a FloManager feature providing real-time flow, power, and station management. FloManager shall manage the number of stations operating at any point in time based on water source capacity, station flow rate, number of valves per station; user defined simultaneous stations per program and for the controller. The controller shall provide station priorities to determine the order in which stations shall operate. The controller shall ignore the station number and instead operate the highest priority stations first and the lower priority stations last.
12. The controller shall offer Water Windows for each program. This function sets the allowed start and stop time where watering is allowed. If the watering cannot be completed by the time the Water Window closes, the stations with remaining run time are paused and watering automatically resumes when the Water Window opens the next time.
13. Acceptable Product:
    a. Rain Bird model ESP-LXME or equivalent approved by Section Engineer.

K. Splicing Material
1. Splicing material shall be 3M Direct Bury (DBY) splice kits as manufactured by 3M Corporation, Austin, TX or equivalent approved by Section Engineer. Use DBR for larger wires.

L. Remote Control Valves
1. The remote control valve shall be normally closed 24 VAC 50/60-cycle solenoid actuated globe pattern. The pressure rating shall not be less than 150 psi.
2. The valve body and bonnet shall be constructed of heavy-duty UV-resistant plastic and have stainless steel screws; diaphragm shall be of nylon reinforced nitrile rubber.
3. The valve shall have both internal and external manual open/close control (internal and external bleed) to manually open and close the valve without electrically energizing the solenoid. The valve's internal bleed shall prevent flooding of the valve box.
4. The valve shall house a fully encapsulated, one-piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing, and a leverage handle for easy turning. This 24 VAC 50/60 Hz solenoid shall open with 19.6-volt minimum at 150 psi. At 24 VAC average inrush current shall not exceed .23 amps.
5. The valve shall have a brass flow control stem for accurate manual regulation and/or shut-off of outlet flow. The valve must open or close in less than 1 minute at 150 psi, and less than 30 seconds at 20 psi.
6. The valve construction shall be such as to provide for all internal parts to be removable from the top of the valve without disturbing the valve installation.
7. See Drawings for size of valves.

M. Accessory materials
1. Drainage fill at valve boxes:
   a. Provide 1/2" to 3/4" washed pea gravel.
2. Suitable excavated materials removed to accommodate the irrigation system work shall be used as fill materials provided it conforms to the requirements of fill as noted above.

N. PVC Solvent Cement:
1. Provide professional grade cement for PVC pipe and fittings.

O. PVC Primer/Cleaner
1. Provide professional grade primer/cleaner.

PART 3 - EXECUTION

3.1 GENERAL

A. General Contractor is to provide sleeves wherever piping or electrical wires are placed under paved surfaces.

B. Lay out work as accurately as possible to Drawings. Drawings are diagrammatic to the extent that swing joints, offsets, and fittings are not shown.

C. The Irrigation Contractor shall carefully schedule his work with the Landscape Contractor and all other site developments.

D. Sleeves are required wherever piping or electrical wires are placed under paved surfaces. (Installed as part of other sections and Contract). Irrigation Contractor is responsible for coordination of all sleeves.

E. Full and completed coverage is required. Contractor shall make any necessary minor adjustments to layout as required to achieve full coverage of irrigated areas at no additional cost to the Owner.

F. Where piping is shown on drawings to be under paved areas but running parallel and adjacent to planted areas, the intent is to install piping in planted areas. Do not install directly over another line in the same trench.

G. It shall be the Contractor's responsibility to establish the location of all sprinkler heads in order to assure proper coverage of all areas. In no case shall spacing of sprinkler heads exceed distances shown on the drawings and/or those specified. Pipe sizes shall conform to those shown on drawings. No substitution of smaller pipe sizes will be permitted, but substitutions of larger sixes may be approved. All pipe damaged or rejected because of defects shall be removed from the site at the time of said rejection.

H. Install irrigation system after completion of site grading, the irrigation system shall be installed and completely operational three days prior to the installation of any planting operations.

3.2 EXCAVATING AND BACKFILLING:

A. All piping is to be trenched, other than one inch (1") which may be pulled.

B. Excavate to depths required to provide two inches (2") depth of sand bedding material for piping when unsuitable bearing materials are encountered.

C. Should utilities not shown on the plans be found during excavations, the Contractor shall promptly notify the Owner's Authorized Representative for instructions as to further action. Failure to do so will make Contractor liable for any and all damage thereto arising from his operations subsequent to discovery of such utilities. Indicate such utility crossings on the record drawings promptly.

D. Install main line irrigation lines with a minimum cover of sixteen inches (16") and a maximum cover of twenty-four inches (24") based on finished grades.

E. Install lateral irrigation lines with a minimum cover of twelve inches (12") and a maximum cover of twenty-four inches (24") based on finished grades.

F. Perform all excavations as required for installation of work included under this Section, including shoring of earth banks, if necessary. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavations, to their original condition.

G. Trenches shall be open, vertical sided construction wide enough to provide free working space around work installed and to provide adequate space for backfilling and compacting.

H. When two (2) pipes are to be placed in the same trench, a six-inch (6") space is to be maintained between the pipes. The Contractor shall not install two pipes with one directly above the other.

I. The Contractor shall cut trenches for pipe to required grade lines and compact trench bottom to prove accurate grade and uniform bearing for the full length of the line.

J. The Contractor shall be held responsible for damages caused by these operations and shall immediately repair or replace damaged parts.

3.3 PIPE LINE ASSEMBLY

A. General
1. Install pipes and fittings in accordance with manufacturer's latest printed instructions.
2. Clean all pipes and fittings of dirt, scales and moistures before assembly.
3. All pipe, fittings and valves, etc., shall be carefully placed in the trenches. Interior of pipes shall be kept free from dirt and debris and when laying is not in progress, open ends of pipe shall be closed by approved means.
4. All lateral connections to the main line as well as all other connections shall be made to the side of the main line pipe. No connections to the top of the line shall be allowed.

B. Solvent-Welded Joints for PVC Pipe
1. Use solvents and methods approved by solvent and pipe manufacturers.
2. Cure joint a minimum of one hour before applying any external stress on the piping and at least twenty four (24) hours before placing the joint under water pressure, unless otherwise specified by the manufacturer.
3. Cut all pipe with square ends and remove burrs, ridges and dirt. Check dry fit pipe and fitting. Clean pipe and fitting with purple primer and apply thin coat of cement to fitting with a liberal coat to pipe.

Quickly push pipe fully into fitting using a 1/4 turning motion. Hold pipe and fitting together a minimum of 30 seconds, wipe off excess with cloth.

C. Threaded Joints for PVC Pipe
1. Use Teflon tape on all threaded PVC fittings.
2. Use strap-style friction wrench only. Do not use metal-jawed wrench.

D. Laying of Pipe
1. Pipes shall be bedded in at least in at least two inches (2") of finely divided material with no rocks or clods over one inch (1") diameter to provide a uniform bearing.
2. Pipe shall be snaked from side to side of trench bottom to allow for expansion and contraction. One additional foot per 100 feet of pipe is the minimum allowance for snaking.
3. Do not lay PVC pipe when there is water in the trench.
4. Plastic pipe shall be cut with PVC pipe cutters or hacksaw, or in a manner so as to ensure that a square cut. Burrs at end cuts shall be removed prior to installation so that a smooth unobstructed flow will be obtained.
5. All plastic-to-plastic joints will be solvent-weld joints or slip seal joints. All plastic pipe and fittings shall be installed as outlined and instructed by the pipe manufacturer and it shall be the Contractor's responsibility to make arrangements with the pipe manufacturer for any field assistance that may be necessary. The Contractor shall assume full responsibility for the correct installation.

3.4 PVC SLEEVES AND ELECTRICAL CONDUIT

A. Provide all sleeves indicated and as otherwise required for the successful completion of the irrigation system. Coordinate sleeving efforts with General Contractor and the Owner's Authorized Representative.

B. All PVC sleeves shall be a minimum of twice (2x) the diameter of pipe to be sleeved.

C. All PVC control wire conduit shall be of sufficient size to hold the required quantity of control and common wires. Electrical wires are not to be placed in the same trench with water pipes.

3.5 ISOLATION VALVES

A. Shall be located in the following locations:
1. After backflow preventer and prior to main supply loop.
2. Between main line and each remote control valve.
3. Between main line and each quick coupler valve.
4. As located on irrigation system drawings within lawn areas.

B. Install each isolation valve in an individual valve box with a six-inch (6") (deep) layer of washed gravel below the bottom of the valve.

C. Seal threaded connections with Teflon tape.

3.6 IRRIGATION CONTROL VALVES
1. Install control valves in valve boxes grouped together where practical. Place no closer than twelve inches (12") to walk edges, buildings and walls.
2. All irrigation control valves shall be installed with ductile iron service tees (if mainline is 3" or larger).
3. Install line size bronze gate valve on pressure side of each control valve. Locate in valve box with control valve.
4. Install each electric control valve in an individual valve box with a six-inch (6") (deep) layer of washed gravel below the bottom of the valve.
5. Seal threaded connections with Teflon tape.
6. Valves shall be installed as shown in details and in accordance with manufacturer's instructions and specifications.

3.7 QUICK COUPLING VALVES

1. Shall be set a minimum of twelve inches (12”) from walks, curbs, or paved areas where applicable or as otherwise noted. Quick coupling valves shall be housed in standard size valve boxes.
2. All quick coupler valves shall be installed on to ductile iron service tee.
3. Install one inch (1”) bronze gate valve on pressure side of each quick coupler valve. Locate in valve box with quick coupler valve.
4. Valves shall be installed on a three- (3) elbow PVC Schedule 80 swing joint assembly.
5. Provide six-inch (6”) (deep) layer of washed gravel below the bottom of the valve. Top of quick coupler valves shall be as close to the top of the valve box as possible. Top of gravel layer shall be three inches (3”) below the top of the valve.
6. Quick coupling valves shall be set perpendicular to finished grade unless otherwise designated on the plans.

3.8 VALVE BOXES

A. Valve boxes shall be set flush with grade in lawn areas and one half inch (1/2”) above finish grade in ground cover and shrub bed areas.

B. Install valve access boxes on a suitable base of gravel to provide a level foundation at proper grade and to provide drainage of the valve box.

3.9 SPRAY HEADS AND ROTORS

A. All sprinkler heads shall be pop-up type heads. Permanent shrub risers are not permitted.

B. All sprinkler heads within a zone shall have matched precipitation rates.

C. Install plumb to within 1/16”, unless otherwise noted (see detail for heads on sloped areas on detail sheet). Top of collar (not nozzle) should be flush with finish grade.

D. Place part-circle pop-up sprinkler heads at least two inches (2”) and no more than six inches (6”) from edge of adjacent walks, curbs and mowing bands, or paved areas at time of installation.

E. Install pop-up sprinkler heads, and accessories in accordance with manufacturer’s latest printed instructions, except as otherwise noted.

F. All sprinkler nozzles shall be adjusted for the proper radius and direction of spray pattern. Make adjustments where possible to prevent overspraying onto walks, pavement or buildings.

G. Tighten nozzles on spray type sprinklers after installation. Adjust sprinkler adjusting screw as required for proper radius.

H. Install pop-up sprayheads with approved flexible thick wall polyethylene swing pipe with spiral barb fittings. Do not install to side inlet of sprinkler head.

I. Polyethylene swing joints are not to be used to extend head more than eighteen inches (18”) from lateral.

J. Heads to be installed at the top of a slope shall be tilted toward the toe of the slope. They shall also be installed slightly down from the top edge of the slope to decrease wind drift.

K. Mid-slope sprinkler heads shall be installed at an angle halfway between vertical and perpendicular to the slope. For example, a 2:1 or 50% slope has an angle of 26 degrees, so tilt the heads 13 degrees into the slope from the perpendicular.

L. Heads installed at the toe of the slope shall be tilted slightly away from the slope to avoid driving water into the slope directly in front of the sprinkler.

M. Do not mix different types of heads within a zone.

3.10 AUTOMATIC CONTROLLER

A. The automatic controller shall be installed at the approximate location shown on the drawings. Controller shall be pedestal mounted in locking stainless steel cabinet. (suitable power supply will be supplied as part of other Sections and Contract).

B. Install per local code, manufacturer's latest printed instructions, and as detailed.

C. Valve wires shall be neatly stripped to expose 1/4" of copper conductor for connections to the controller terminal strip. The common wire shall be connected directly to the controller's common terminal.

D. Valve control wires shall be numbered at the terminal strip.

3.11 CONTROLLERS POWER SUPPLY

A. Power to the controller(s) shall be supplied from a dedicated circuit. (Installed as part of work of other sections and Contract).

3.12 CONTROL WIRING

A. All electrical equipment and wiring shall comply with local and state codes and be installed by those skilled and licensed in the trade.

B. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines whenever possible, and shall have a minimum of twelve inches (12") cover.

C. Control wires shall be installed to the side of the main line whenever possible. Placement over pipes is not permitted.

D. Where more than one (1) wire is placed in a trench, the wiring shall be taped together at intervals of twenty feet (20').

E. An expansion curl shall be provided within three feet (3') of each wire connection and at least every one hundred feet (100') of wire length on runs of more than one hundred feet (100') in length. Expansion curls shall be formed by wrapping at least five (5) turns of wire around a one-inch (1") diameter pipe, then withdrawing pipe.

F. Control wire splices at remote control valves to be crimped and sealed with specified splicing materials. Line splices will be allowed only on runs of more than five hundred (500') and they must be located in ten inch (10") round splice boxes which are green in color. The connector shall be 3M DBY splice kit by 3M Corporation, or accepted Substitute. Use one splice per connector sealing pack.

G. The main line shall have two (2) spare wire installed its entire length and to the automatic controller. Label each end " spare wire". Spare wires to be blue in color.

3.13 RAIN SENSOR

A. Install one (1) sensor in a location approved by the Owner's Authorized Representative and connect to the irrigation system.
   1. All exposed wire shall be installed in metal electrical conduit painted to match the brick.

3.14 CLOSING OF PIPE AND FLUSHING OF LINES

A. All testing shall be done under the supervision of the Owner's Authorized Representative. Submit written requests for inspections to the Owner's Authorized Representative at least three (3) days prior to anticipated inspection date.
   1. Thoroughly flush out all water lines under a full head of water before installing heads, valves, quick coupler assemblies, etc. Maintain flushing for a minimum of three (3) minutes at the valve located furthest from water supply.
   2. After flushing, cap or plug all openings to prevent entrance of materials that would obstruct the pipe or clog heads. Leave in place until removal is necessary for completion of installation.
   3. Test as specified below.

4. Upon completion of testing, complete assembly and adjust sprinkler heads for proper distribution.

3.15 TESTING

A. Make hydrostatic when welded PVC joints have cured as per manufacturer's instructions.
   1. Pressurized mainlines:
      a. Completely install water meter, mains, isolation valves and control valves. Do not open laterals.
      b. Open all isolation valves.
      c. Fill all lines with water and shut off at meter.
      d. Pressurize the main with air to 70 PSI. monitor gauge for pressure loss for a minimum of four (4) hours.
      e. Leave lines and fittings exposed throughout testing period.
      f. Leaks resulting from tests shall be repaired and tests repeated until the system passes.
      g. Test all isolation valves for leakage.

B. Non-pressurized laterals:
   a. Test piping after laterals and risers are installed and system is fully operational.

3.16 INSPECTIONS

A. The contractor shall maintain proper facilities and provide safe access for inspection to all parts of the work.

B. Irrigation inspection shall consist of a minimum of:
   a. Mainline pressure test.
   b. Coverage test.
   c. Final irrigation inspection.

C. If the specifications, the Owner's Authorized representative's instructions, laws, ordinances or any public authority require any work to be tested or approved, the contractor shall give the Owner's Authorized Representative three (3) days notice of its readiness for inspection.

D. The contractor shall be solely responsible for notifying the Owner's Authorized Representative where and when such work is in readiness or testing.

E. If any work should be covered up without the approval of the Owner' Authorized Representative it must be uncovered, if required, for examination at the contractor's expense.

F. No inspection will commence without "Record" drawings and without completing previously corrections, or without preparing the system for inspection.

3.17 BACKFILLING AND COMPACTING

A. After system is operating and required tests and inspections have been made, backfill trenches.

B. Backfill for all trenches, regardless of the type of pipe to be covered, shall be compacted to minimum 95 percent density under pavements, 85 percent under planted areas.

C. Backfill material shall be suitable material. Unsuitable material, including clods and rocks over two inches (2") in size shall be removed form the site.

D. A fine granular material shall be placed initially on all lines with a minimum of three inches (3") cover. No foreign matter larger than one-half inch (1/2") in size shall be permitted in the initial backfill.
   1. Trenches located under paving shall be backfilled with sand (a layer six inches (6") below the pipe and three inches (3") above the pipe) and compacted in layers of 95 percent compaction.
   2. Compact trenches in areas to be planted, by thoroughly flooding the backfill.
   3. Within all planting and lawn areas, the existing four inches (4") layer of topsoil shall be restored to its original condition and finish grade.
   4. Surplus earth remaining after backfilling shall be disposed of off-site by the contractor.

3.18 CLEANING AND DISPOSAL OF WASTE MATERIAL

A. Perform clean-up during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment as fast as it accumulates.

B. Restore and repair all disturbed or damaged areas resulting form irrigation installation operations to original condition in a manner acceptable to the Owner's Authorized Representative.

C. Stockpile, haul from site, and legally dispose of waste materials, including unsuitable excavated materials, rock, trash, and debris.

END OF SECTION 02810

SECTION 02920 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Sodding
   2. Grass paving material(s)

B. Related Sections include the following:
   1. KYTC Division 206 for earthwork excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Certification of Sod Grass: From sod vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

   1. Certification of each seed mixture for turfgrass sod, identifying source, including name and telephone number of supplier.

C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.

D. Qualification Data: For landscape Installer.

E. Material Test Reports: For existing surface soil and imported topsoil.

F. Samples for verification:
   1. Turf reinforcement mat: 12 inches by12 inches

G. Planting Schedule: Indicating anticipated planting dates for each type of planting.

H. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.

   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

   1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding."

1.7 SCHEDULING

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

   1. Spring Planting: February 15 through June 1
   2. Fall Planting: August 15 1 through October 15

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Sodded Lawns: 90 days from date of Substantial Completion.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches (100 mm).

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of sod or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn at a minimum rate of 1 inch (25 mm) per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow grass 2 to 3 inches (50 to 75 mm) high.

E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to lawn area.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

A. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Standard Fescue Lawn Mixture.

a. Tall Fescue Mixtures “Southern Supreme” or “Dryspell” or “Falcon” or “Rebel”

2.2 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

    a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

2. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.
3. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

    a. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.

2.3 INORGANIC SOIL AMENDMENTS

A. Use the following inorganic soil amendments in amounts recommended in soil reports from a qualified soil-testing agency.

B. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
1. Class: Class O, with a minimum 95 percent passing through No. 8 (2.36-mm) sieve and a minimum 55 percent passing through No. 60 (0.25-mm) sieve.
2. Provide lime in form of dolomitic limestone.

C. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.

D. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

E. Aluminum Sulfate: Commercial grade, unadulterated.

F. Perlite: Horticultural perlite, soil amendment grade.

G. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

H. Sand: Clean, washed, natural or manufactured, free of toxic materials.

I. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

J. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

A. Use the following inorganic soil amendments in amounts recommended in soil reports from a qualified soil-testing agency.

B. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

D. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

E. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cubic foot (cubic meter) of loose sawdust or ground bark.

F. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.6 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition.

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.7 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

2.8 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

B. Erosion-Control Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

2.9 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:

1. Ratio of Loose Compost to Topsoil by Volume: 1:3.
2. Ratio of Loose Peat to Topsoil by Volume: Contingent of test results.
3. Ratio of Loose Wood Derivatives to Topsoil by Volume: Contingent of test results.
4. Weight of Lime per 1000 Sq. Ft. (92.9 Sq. m): Contingent of test results.
5. Weight of Sulfur, Iron Sulfate, or Aluminum Sulfate per 1000 Sq. Ft. (92.9 Sq. m): Contingent of test results.
6. Weight of Agricultural Gypsum per 1000 Sq. Ft. (92.9 Sq. m): Contingent of test results.
7. Volume of Sand Plus 10 Percent Diatomaceous Earth or Zeolites per 1000 Sq. Ft. (92.9 Sq. m): Contingent of test results.
8. Weight of Bonemeal per 1000 Sq. Ft. (92.9 Sq. m): Contingent on test results.
9. Weight of Superphosphate per 1000 Sq. Ft. (92.9 Sq. m): Contingent of test results.
10. Weight of Commercial Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): Contingent of test results.
11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): Contingent of test results.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil mix to a depth of 4 inches (100 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil mix.
    b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.

2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.5 SATISFACTORY LAWNS

A. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.

3.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

C. Remove erosion-control measures after grass establishment period.

END OF SECTION 02920

US 31W AT UNIVERSITY BOULEVARD ROUNDABOUT
DEPARTMENT OF HIGHWAYS
COUNTY OF WARREN JANUARY 2014

SECTION 02930 - EXTERIOR PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.
3. Tree stabilization.
4. Landscape edgings.

B. Related Sections:

1. KYTC Site Clearing for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. KYTC Earthwork for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. KYTC Subdrainage for below-grade drainage of landscaped areas, paved areas, and wall perimeters.
4. Lawns and Grasses for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with natural or untreated burlap, tied, rigidly supported, and drum laced with natural biodegradable twin, jute and or wire basket with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from

container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

H. Finish Grade: Elevation of finished surface of planting soil.

I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

K. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

L. Planting Area: Areas to be planted.

M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

T. Planting Completion: The date of completion of all work related to a specific project including installation of plants, lawns and grasses, etc.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
3. Plant Photographs: Include color photographs in 1Mb. Digital files or 3- by 5-inch print format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 12 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Samples for Verification: For each of the following:

1. Trees and Shrubs: Three samples of each variety and size delivered to the site for review. Maintain approved samples on-site as a standard for comparison.
2. Organic Compost & Mulch: 1 pint volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Material Test Reports: For imported topsoil.

F. Maintenance Instructions: Procedures including watering, fertilizer, pruning, weeding, disease control, etc. for proper maintenance of plants during a calendar year. Contractor to submit maintenance schedule before start of required maintenance periods.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in landscape installation similar in scale and scope to the requirements of this Project
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

a. Certified Landscape Technician - Exterior, with installation and maintenance, specialty area(s), designated CLT-Exterior.
b. Certified Ornamental Landscape Professional, designated COLP.
c. Certified ISA Arborist

5. Pesticide Applicator: State licensed, commercial.
6. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of five representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Landscape Architect shall observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

G. Pre-installation Conference: Conduct conference at Project site unless otherwise advised.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers**,** lime, and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Landscape Architect no fewer than three days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Landscape Architect's written permission.

C. Planting Restrictions: Plant during one of the following periods unless otherwise authorized by Owner/Landscape Architect. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: March 1st to May 15th.
2. Fall Planting: September 1st to December 15th.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of tree stabilization.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Planting Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
c. Annuals: Three months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 10-15% percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees, Shrubs & Perennials: Provide maintenance by skilled employees of landscape Installer. Maintain as required. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 90 days from date of planting completion.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 90 days from date of planting completion.

C. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
3. All plant material shall be grown in zone 5 or zone 6.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

E. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
3. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.

B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

C. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 10-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

2.5 PLANTING SOILS

A. Planting Soil: Imported topsoil complying with ASTM D5268, a pH range of 5.5 to 7, a minimum of 4 percent organic content and from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs, or marshes.

1. Additional Properties of Imported Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
2. Stones may comprise no more than 10 percent of the total soil volume
3. Mix imported topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Topsoil by Volume: 1:4.
b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: 1:4.
c. Weight of Lime per 1000 Sq. Ft.: as required by soil test.
d. Weight of Aluminum Sulfate per 1000 Sq. Ft.: as required by soil test.
e. Weight of Agricultural Gypsum per 1000 Sq. Ft.: as required by soil test.
f. Weight of Bonemeal per 1000 Sq. Ft.: as required by soil test.
g. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: as recommended by manufacturer.

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees, shrubs and annual beds consisting of one of the following:

1. Type: Annual Beds
   a. Shredded hardwood bark.
   b. Size Range: 2 inches maximum, 1/2 inch minimum.
   c. Color: Cherry Brown

2. Type: Landscape Beds
   a. Shredded pine mulch
   b. Size Range: 2 inches maximum, ½ inch minimum
   c. Color: natural dye-free

2.7 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes.
3. Tree-Tie Webbing: UV-resistant polypropylene.
4. Retain first subparagraph below for tall and large-caliper trees.
5. Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations.

   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

      1) Arborbrace; ArborBrace Tree Guying System

      2) Tree-Guy Systems

2.9 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

B. Root Barrier: Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, 85 mils thick, with vertical root deflecting ribs protruding 3/4 inch out from panel, and each panel 24 inches wide.

C. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

D. Burlap: Non-synthetic, untreated, biodegradable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Apply anti-desiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.

E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen sub-grade of planting areas to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Thoroughly blend planting soil off-site before spreading.

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
b. Mix lime with dry soil before mixing fertilizer.

2. Spread planting soil to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 30-45 degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision and protection of excavations at all times during the project.
7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
8. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Subject to the acceptance of the Landscape Architect or Owner, subsoil and topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

E. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots on bare rooted plant material. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts specified in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set balled and potted stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Set fabric bag-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. Set and support bare-root stock in center of planting pit or trench with root flare 1 inch above adjacent finish grade.

1. Use planting soil for backfill.
2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.
3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch from root tips; do not place tablets in bottom of the hole or touching the roots.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

G. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 MECHANIZED TREE SPADE PLANTING

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

C. Cut exposed roots cleanly during transplanting operations.

D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.

E. Plant trees as shown on Drawings, following procedures in "Tree, Shrub, and Vine Planting" Article.

F. Where possible, orient the tree in the same direction as in its original location.

3.7 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Landscape Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds unless authorized by Owner/Landscape Architect.

3.8 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend to the dimension shown on drawings above grade. Set stakes and space to avoid penetrating root balls or root masses.
2. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Staking and Guying: Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes 30 inches long, driven to grade.

1. Site-Fabricated Staking-and-Guying Method:

a. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
b. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
c. Support trees with strands of cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
d. Attach flags to each guy wire, 30 inches above finish grade.
e. Paint turnbuckles with luminescent white paint.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.9 ROOT-BARRIER INSTALLATION

A. Where indicated on the Drawings, install root barrier where trees are planted within 60 inches of paving or other hardscape elements, such as walls, curbs, and walkways.

B. Align root barrier vertically with bottom edge angled at 20 degrees away from the paving or other hardscape element and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 60 inches in each direction from the tree trunk, for a total distance of 10 feet per tree. If trees are spaced closer, use a single continuous piece of root barrier.

1. Position top of root barrier per manufacturer's recommendations.
2. Overlap root barrier a minimum of 12 inches at joints.
3. Do not distort or bend root barrier during construction activities.
4. Do not install root barrier surrounding the root ball of tree.

3.10 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.11 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Shrubs in Turf Areas: Apply organic mulch ring of 3-inch average thickness, with 24-inch radius around trunks or stems. Do not place mulch within 3 inches inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch minimum thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 6 inches of trunks or stems.

3.12 EDGING INSTALLATION

A. Aluminum Edging: Install aluminum edging where indicated according to manufacturer's written instructions. Anchor with aluminum stakes spaced approximately 36 inches apart, driven below top elevation of edging.

B. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- deep, shovel-cut edge as shown on Drawings.

3.13 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

D. Remove tree stabilization devices after 1 year from date of installation.

E. Water trees as required to provide 1” of water per week on average. Water remaining plantings as recommended by manufacturer.

3.14 CHEMICAL APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.15 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before the final inspection for completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.16 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 02930

US 31W AT UNIVERSITY BOULEVARD ROUNDABOUT
DEPARTMENT OF HIGHWAYS
COUNTY OF WARREN JANUARY 2014

SECTION 04720 - CAST STONE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast stone trim including the following:

a. Wall base trim.

b. Column base trim

2. Wall caps.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

C. Samples for Initial Selection: For colored mortar.

D. Samples for Verification:

1. For each color and texture of cast stone required, 10 inches (250 mm) square in size.
2. For colored mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and testing agency.

1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364, including test for resistance to freezing and thawing.

1. Provide test reports based on testing within previous two years.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute or the Precast/Prestressed Concrete Institute for Group A, Category AT.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE MATERIALS

A. General: Comply with ASTM C 1364 and the following:

B. Portland Cement: ASTM C 150, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.

C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.

D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.

E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

F. Admixtures: Use only admixtures specified or approved in writing by Section Engineer.

1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
3. Air-Entraining Admixture: ASTM C 260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
5. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
6. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.

G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60 (Grade 420). Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches (38 mm) of cast stone material.

1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

H. Embedded Anchors and Other Inserts: Fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.

2.2 CAST STONE UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or approved equal:
1. Haddonstone (USA) Ltd. (BASIS OF DESIGN)
2. Continental Cast Stone
3. Architectural Cast Stone
4. American Artstone
5. Architectural Concrete Casting, Inc.
6. Atlanta West Cast Stone

7. Southern Castings, Inc.

B. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.

C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

D. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch (3 mm).
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater, but in no case by more than 1/4 inch (6 mm).
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch (3 mm) on formed surfaces of units and 3/8 inch (10 mm) on unformed surfaces.

E. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F (38 deg C) for 12 hours or 70 deg F (21 deg C) for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:

a. No fewer than five days at mean daily temperature of 70 deg F (21 deg C) or above.

b. No fewer than six days at mean daily temperature of 60 deg F (16 deg C) or above.

c. No fewer than seven days at mean daily temperature of 50 deg F (10 deg C) or above.

d. No fewer than eight days at mean daily temperature of 45 deg F (7 deg C) or above.

F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

G. Colors and Textures: Match Ownert's samples.

2.3 MORTAR MATERIALS

A. Provide mortar materials that comply with Section 04810 "Unit Masonry Assemblies."

B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

E. Masonry Cement: ASTM C 91.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Capital Materials Corporation; Flamingo Color Masonry Cement.

b. Cemex S.A.B. de C.V.

c. Essroc, Italcementi Group.

d. Holcim (US) Inc.

e. Lafarge North America Inc.

f. Lehigh Cement Company.

g. National Cement Company, Inc.; Coosa Masonry Cement.

F. Mortar Cement: ASTM C 1329.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Lafarge North America Inc.

b. Essroc, Brixment

c. Quikrete

G. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Davis Colors; True Tone Mortar Colors.

b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.

c. Solomon Colors, Inc.; SGS Mortar Colors.

H. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements and containing no other ingredients.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Colored Portland Cement-Lime Mix:

1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
3) Lafarge North America Inc.; Eaglebond Portland & Lime.
4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

b. Colored Masonry Cement:

1) Capital Materials Corporation; Flamingo Color Masonry Cement.
2) Cemex S.A.B. de C.V.; Richcolor Masonry Cement.
3) Essroc, Italcementi Group; Brixment-in-Color.
4) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
5) Lafarge North America Inc.; U.S. Cement Custom Color Masonry Cement.
6) Lehigh Cement Company; Lehigh Custom Color Masonry Cement.
7) National Cement Company, Inc.; Coosa Masonry Cement.

2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
3. Pigments shall not exceed 10 percent of portland cement by weight.
4. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

I. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

J. Water: Potable.

2.4 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.

B. Dowels: 1/2-inch- (12-mm-) diameter, round bars, fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123/A 123M.

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following or approved equal:

a. Diedrich Technologies, Inc.

b. EaCo Chem, Inc.

c. ProSoCo, Inc.

2.5 MORTAR MIXES

A. Comply with requirements in Section 04810 "Unit Masonry Assemblies" for mortar mixes.

B. Do not use admixtures including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.

C. Comply with ASTM C 270, Proportion Specification.

1. For setting mortar, use Type N.
2. For pointing mortar, use Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
3. Mix to match Owner's sample.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Owner's sample.

2.6 SOURCE QUALITY CONTROL

A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.

1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING CAST STONE IN MORTAR

A. Install cast stone units to comply with requirements in Section 04810 "Unit Masonry Assemblies."

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.

D. Set units in full bed of mortar with full head joints unless otherwise indicated.

1. Set units with joints 1/4 to 3/8 inch (6 to 10 mm) wide unless otherwise indicated.
2. Build anchors and ties into mortar joints as units are set.
3. Fill dowel holes and anchor slots with mortar.
4. Fill collar joints solid as units are set.
5. Build concealed flashing into mortar joints as units are set.
6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
7. Keep joints at shelf angles open to receive sealant.

E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch (19 mm). Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

H. Provide sealant joints at copings and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.

1. Keep joints free of mortar and other rigid materials.
2. Build in compressible foam-plastic joint fillers where indicated.
3. Form joint of width indicated, but not less than 3/8 inch (10 mm).
4. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07920 "Joint Sealants."

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

A. Set and install upper fountain pool per manufacturer’s instructions.

B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

C. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.

D. Fill anchor holes with sealant.

1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.

E. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.

F. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.

1. Form open joint of width indicated, but not less than 3/8 inch (10 mm).

G. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.

H. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07920 "Joint Sealants."

3.4 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch (1.5 mm), except where variation is due to warpage of units within tolerances specified.

3.5 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Section Engineer.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses.

1. Remove mortar fins and smears before tooling joints.
2. Remove excess sealant immediately, including spills, smears, and spatter.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Section Engineer's approval of sample cleaning before proceeding with cleaning of cast stone.
3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 04720

US 31W AT UNIVERSITY BOULEVARD ROUNDABOUT
DEPARTMENT OF HIGHWAYS
COUNTY OF WARREN JANUARY 2014

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Face brick.
3. Stone trim units.
4. Mortar and grout.
5. Steel reinforcing bars.
6. Masonry joint reinforcement.
7. Ties and anchors.
8. Miscellaneous masonry accessories.

B. Related Sections:

1. Section 04720 "Cast Stone" for furnishing cast stone trim.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Face brick, in the form of straps of five or more bricks.
2. Stone trim.
3. Colored mortar.
4. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:

1. Face brick, in the form of straps of five or more bricks.
2. Stone trim.
3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
4. Weep holes and vents.
5. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence according to ASTM C 67.
d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention,and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

D. Pre-installation Conference: Conduct conference at Project site to comply with KYTC requirements .

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
2. Density Classification: Normal weight.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

2.3 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

B. Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).

1. Products: Subject to compliance with requirements, provide samples including the following:

a. Contractor shall submit samples for approval including manufacturer's name & product name. Color selection shall be by Owner from entire selection of manufacturer's colors.

2. Grade: SW.
3. Type: FBX or HBX.
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Size (Actual Dimensions): or 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long.
7. Color and Texture: Match Judicial Center Brick

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Mortar Cement: ASTM C 1329.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc.; SGS Mortar Colors.

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Aggregate for Grout: ASTM C 404.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Euclid Chemical Company (The); Accelguard 80.
b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

I. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Exterior Walls: Hot-dip galvanized, carbon steel.
2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.

2.6 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M,Class B-2 coating.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.

1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches (50 mm) long may be used for masonry constructed from solid units.
2. Where wythes do not align are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches (32 mm).

D. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).

2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213.
2) Heckmann Building Products Inc.; 315-D with 316 or Pos-I-Tie.
3) Hohmann & Barnard, Inc.; DW-10HS.
4) Wire-Bond; 1004, Type III.

b. Anchor Section: Sheet metal plate, 1-1/4 inches (32 mm) wide by 6 inches (152 mm) long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch (16 mm) wide by 3-5/8 inches (92 mm) long, stamped into center to provide a slot between strap and plate for inserting wire tie.

c. Fabricate sheet metal anchor sections and other sheet metal parts from 1.05-inch- (2.66- mm-) thick, steel sheet, galvanized after fabrication.

d. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch-(4.76-mm-) diameter, hot-dip galvanized steel wire.

2.7 MISCELLANEOUS ANCHORS

A. Post installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2.8 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).

a. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include the following or approved equal:

1) Advanced Building Products Inc.; Peel-N-Seal.
2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
4) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
5) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
6) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
7) Hohmann & Barnard, Inc.; Textroflash.
8) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
9) Polyguard Products, Inc.; Polyguard 300.
10) Sandell Manufacturing Co., Inc.; Sando-Seal.
11) Williams Products, Inc.; Everlastic MF-40.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity. Use only for weeps.
2. Aluminum Weep Hole/Vent: One-piece, L-shaped units made from sheet aluminum, designed to fit into a head joint and consisting of a vertical channel with louvers stamped in web and with a top flap to keep mortar out of the head joint.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

1) Hohmann & Barnard, Inc.; #343W - Wilko Weep Hole.
2) CavClear Weep Vents
3) Mortar Net Weep Vents

3. Vinyl Weep Hole/Vent: One-piece, offset, T-shaped units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Section Engineer.

a. Products: Subject to compliance with requirements, provide the following] available products that may be incorporated into the Work include the following or approved equal:

1) Hohmann & Barnard, Inc.; #343 Louvered Weep Hole.
2) Williams Products, Inc.; Williams-Goodco Brick Vent.
3) Wire-Bond; Louvered Weepholes.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Advanced Building Products Inc.; Mortar Break.
b. Archovations, Inc.; CavClear Masonry Mat.
c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
d. Mortar Net USA, Ltd.; Mortar Net.

2. Provide one of the following configurations:

a. Strips, full-depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.

F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following or approved equal:

a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.10 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following or approved equal:

a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. For exterior masonry, use portland cement-lime mortar.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan do not vary from that indicated by more than plus or minus ½ inch (12 mm).
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

2. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.

3. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

4. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).

3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).

4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-halfsize units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath,wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick and CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
3. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
5. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Form expansion joints in brick as follows:

1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch (10 mm) for installation of sealant and backer rod.

D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod, but not less than 3/8 inch (10 mm).

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.9 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under building paper or building wrap, lapping at least 4 inches (100 mm).
3. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
4. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
4. Space weep holes formed from wicking material 16 inches (400 mm) o.c.
5. Trim wicking material flush with outside face of wall after mortar has set.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

F. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

3.10 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Section Engineer's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

1. Excess salvageable bricks shall become the property of the Owner.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in KYTC earthwork section.
3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810

US 31W AT UNIVERSITY BOULEVARD ROUNDABOUT
DEPARTMENT OF HIGHWAYS
COUNTY OF WARREN JANUARY 2014

SECTION 32 31 00 - ORNAMENTAL PICKET FENCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basis of Design: Monumental Iron Works™ Ornamental picket fencing and accessories. Equivalent product and manufacturer may be approved by Section Engineer.

1.02 RELATED SECTIONS

A. KYTC Section 400 Paving and Surfacing.
B. KYTC Section 600 Cast in Place Concrete.
C. Section 04720 Cast Stone
D. Section 04810 Unit Masonry.

1.03 SUBMITTALS:

A. Changes in specification may not be made after the bid date.

B. Shop Drawings: Layout of fence and gates with dimensions, details, and finishes of component accessories and post foundations.

C. Product Data: Manufacturer's catalogue cuts indicating material compliance and specified options.

D. Samples: If requested, samples of materials are available (e.g. finials, post caps, and accessories).

1.04 SPECIAL WARRANTY

A. Provide manufacturer's standard limited warranty that its ornamental fence system is free from defects in material and workmanship including cracking, peeling, blistering and corroding for a period of 15 years from the date of purchase.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Products from other qualified manufacturers having a minimum of 5 years experience manufacturing ornamental picket fencing will be acceptable by the Section Engineer as equal, if in writing, ten days prior to bidding, and if they meet the following specifications for design, size, gauge of metal parts and fabrication.

B. Basis of Design: Monumental Iron Works Ornamental Picket Fence:

Style: ESTATE - K
Height: 42" Nominal Height
Color: Black

Approved Supplier: Master Halco, Inc.
4000 W. Metropolitan Drive, Suite 400
Orange, CA 92868
Phone (800) 229-5615 Fax (714) 385-0107
Site: www.fenceonline.com E-mail: spec@fenceonline.com

2.02 ORNAMENTAL PICKET FENCE

A. Pickets: Galvanized square steel tubular members manufactured per ASTM A-924/A-924M, having a 45,000 psi (310 MPa) yield strength and hot-dip galvanized per ASTM A653/A653M with a G90 zinc coating, 0.90 oz/ft^2 (0.27 kg/M^2). Picket Size 3/4" (19 mm). Pickets are spaced 3-15/16" maximum (100 mm) face to face. Pickets are attached to rails at the factory using industrial drive rivets.

B. Rails: 1-1/2" (38mm) x 1-3/8" (35mm) x 1-1/2" (38mm), 11 gauge [0.120" (3.05mm)] thick galvanized steel "U" channel per ASTM A-653/A-653M, having a 50,000 psi (344 MPa) yield strength and G90 zinc coating, 0.90 oz/fl^2 (0.27 kg/M^2).

C. Posts: Galvanized square steel tubular members manufactured per ASTM A-653/A-653M having a 45,000 psi (310 MPa) yield strength and G90 zinc coating, 0.90 oz/fl^2). Posts are coated with zinc on the inside and outside. (Posts that are zinc coated on the outside and painted on the inside are unacceptable).

Minimum post size 1" , having 16 gauge wall thickness

D. Rail Brackets: Pro-Arc™ Rail Brackets (see section 2.04 A).

E. Finish: All pickets, rails, posts, fittings and accessories are polyester powder coated individually after drilling and layout, to ensure maximum corrosion protection. (Coating of assembled sections is unacceptable). All ferrous components are given a 4-stage "Power Wash" pre-treatment process that cleans and prepares the galvanized surface to assure complete adhesion of the finish coat. All metal is a polyester resin based powder coating applied by the electrostatic spray process, minimum 2.5 mils. The finish is then cured in a 450^{0}F (232^{0}C) (metal temperature) oven for 20 minutes. Standard Color – Black

2.03 ACCESSORIES

A. Rail Brackets: Pro-Arc™ brackets die cast of zinc (ZAMAK #3 Alloy) per ASTM B86-83Z 33521. Ball and socket design capable of 30° swivel (up/down - left/right). Bracket to fully encapsulate panel rail ends for complete security (no substitution).

B. Industrial Drive Rivets: Of sufficient length to attach factory assembled panel rail ends to Pro-Arc brackets in a secure, non-rattling position. Rivet to have a minimum of 1100 lbs. (4894 N) holding power and a shear strength of 1500 lbs. (6674 N).

C. Ornamental Picket Fence Accessories: Provide indicated items required to complete fence system. Galvanize each ferrous metal item in accordance with ASTM B695 and finish to match framing.

D. Post Caps: Formed steel, cast of malleable iron or aluminum alloy, and weather tight closure cap.
Provide one Ball style post cap for each post.

E. Rings: N/A

F. Picket Tops: _____Pressed steel pointed top - Estate A & B only

___X__Flat top with polymer plug - Estate K & L only

_____Imperial top - All Imperial Pickets terminate inside of rail

_____Optional Finial top* - Estate F & G only

2.04 SETTING MATERIAL

A. Concrete: Minimum 28 day compressive strength of 3000 psi (20 MPa).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries of work are clearly established.

3.02 INSTALLATION

A. Install fence in accordance with manufacturer's instructions.

B. Space posts uniformly at 7'8-3/4" (2356 mm) maximum face to face unless otherwise indicated.

C. Concrete Set Posts: Drill hole in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than nominal outside dimension of post, and depths approximately 6" (152 mm) deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" (914 mm) below surface when in firm, undisturbed soil. Place concrete around post in a continuous pour. Trowel finish around posts and slope to direct water away from posts.

1. Gate Posts and Hardware: Set keepers, stops, sleeves and other accessories into concrete.

D. Surface mount (wall mount) posts with mounting plates where indicated. Fasten with lag bolts and shields.

E. Check each post for vertical and top alignment, and maintain in position during placement and finishing operation.

F. Align fence panels between posts. Firmly attach Pro-Arc rail brackets to posts with 1/4" (6 mm) bolt and lock nut, ensuring panels and posts remain plumb.

3.03 ACCESSORIES

A. Install post caps and other accessories to complete fence.

3.04 CLEANING

A. Clean up debris and unused material, and remove from site.

4/3/2014

MAST ARM TUBE SIGN HANGERS
(48 Inch Sign)

Sign Hangers for a 48 inch sign shall consist of a sign bracket and a cable assembly. Bracket shall attach to the horizontal component of a mast arm pole. Bracket shall mount to pole using a 120 inch cable assembly. The bracket shall be an aluminum 42 inch formed tube with stainless steel fasteners and a natural non-anodic protective coating.

Each sign hanger and all hardware shall be packaged in one box.

PELCO NO. AB-0634-42-120 or approved equal.