

The following standard drawings/specifications from the City of Hilliard, the City of Columbus, and the Ohio Department of Transportation are included on the Franklin Street Improvement title sheet, are referenced below, and are included in Appendix D.

City of Hilliard

CD-1	
CR-1	3/6/15
DD-1	
DD-2	
ID-2	4/16/15
MHA-1	
SL-5	9/1/15
SL-6	9/1/15
SL-16	9/1/15
SL-17	9/1/15
SW-1	
TC-1	7/30/15
TC-2	7/29/15
TC-5	6/14/16

City of Columbus Streets

1441	3/4/19
1510	9/15/15
1511	9/15/15
2000	3/30/18
2151	4/30/18
2160	12/31/18
2170	4/30/18
2201	12/31/18
2202	12/31/18
2301	4/30/18
2328	4/30/18
2337	4/30/18

City of Columbus Storm

AA-S102	12/6/13
AA-S106	7/9/12
AA-S107	7/9/12
AA-S111	12/6/13
AA-S112	12/6/13
AA-S119	8/8/14
AA-S121	7/9/12
AA-S125B	8/8/14
AA-S128	8/8/14
AA-S130	12/6/13
AA-S142	12/6/13
AA-S149	10/15/14
AA-S150	7/9/12

City of Columbus Water

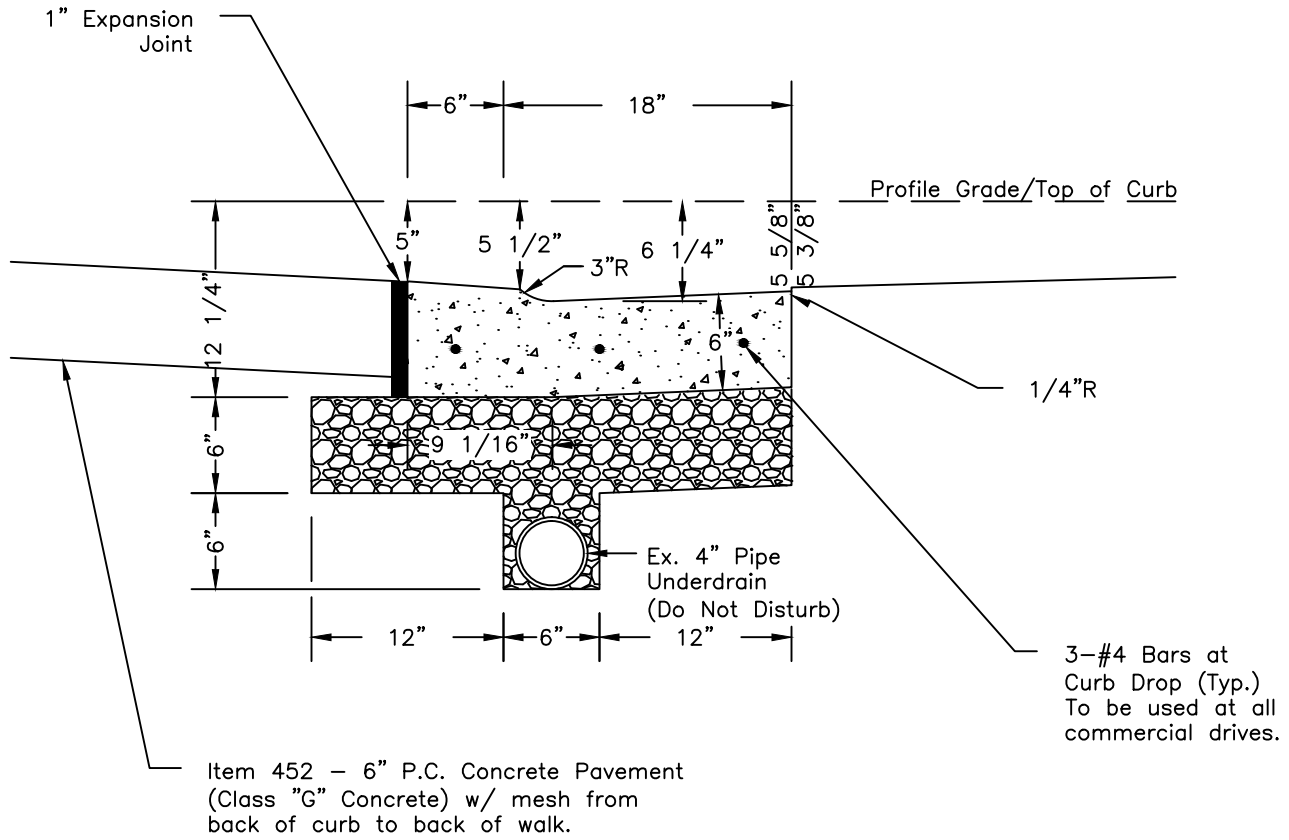
L-1001	5/14/13
L-6306	5/14/13
L-6309A	5/14/13
L-6309B	5/14/13
L-6310	5/14/13
L-6311	5/14/13
L-6312	5/14/13
L-6409A	5/15/13
L-6637A	5/16/13
L-6640	5/16/13
L-7102A	11/5/15
L-7102B	11/5/15
L-7102C	11/5/15
L-7401	11/5/15
L-7601	5/16/13
L-9901	11/5/15

City of Columbus Supplemental

SS1100	11/1/17
CS1032	10/31/11

ODOT

HL-30.11	1/18/19
MT-97.10	7/18/14
MT97.11	1/20/17
SS800	1/18/19



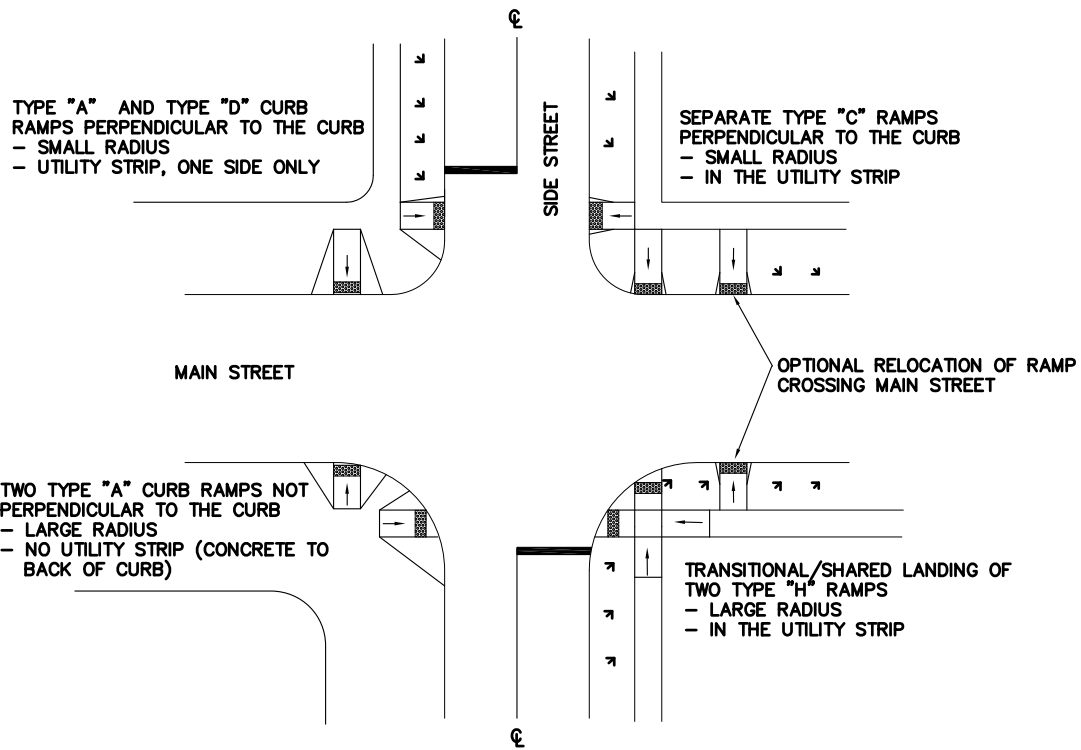
S:\Public Service - Engineering\Hilliard Standards\Drawings\ACAD\Curb Details.dwg, 4/25/2013 8:18:20 AM

APPROVED	CURB DETAIL DROP CURB AT DRIVE ENTRANCES	CITY OF <b>HILLIARD, OHIO</b>	
CITY ENGINEER _____ DATE _____		STANDARD CONSTRUCTION DRAWING	
SCALE: 1" = 1'		1/1	CD-1

**GENERAL NOTES. CURB RAMPS**

1. CURB RAMP COMPONENTS: THE CURB RAMP INCLUDES THE RAMP PANEL, FLARED SIDES, AND LANDING WHEN NEEDED.
2. MATERIAL: THE RAMP PANEL AND FLARED SIDES SHALL BE CONCRETE. THE USE OF BRICK OR PAVERS IS NOT PERMITTED.
3. CURB RAMP TYPE: CURB RAMPS SHALL BE SPECIFIED BY THE APPROPRIATE TYPE AND SHALL BE PERPENDICULAR TO THE CENTERLINE OF THE CROSSING STREET
  - TYPE A – RAMP WITH LONG FLARES
  - TYPE C – RAMP IN UTILITY STRIP
  - TYPE D – RAMP OBSTRUCTED ON ONE SIDE
  - TYPE G – RAMP WITH RECESSED LOWER LANDING.
  - TYPE H – RAMP WITH RECESSED LOWER LANDING IN A UTILITY STRIP
  - TYPE L – MEDIAN RAMP WITH CENTER LANDING
  - TYPE P1 – COMBINED PERPENDICULAR AND PARALLEL RAMP
  - TYPE P2 – COMBINED PERPENDICULAR AND PARALLEL RAMP IN ONE DIRECTION

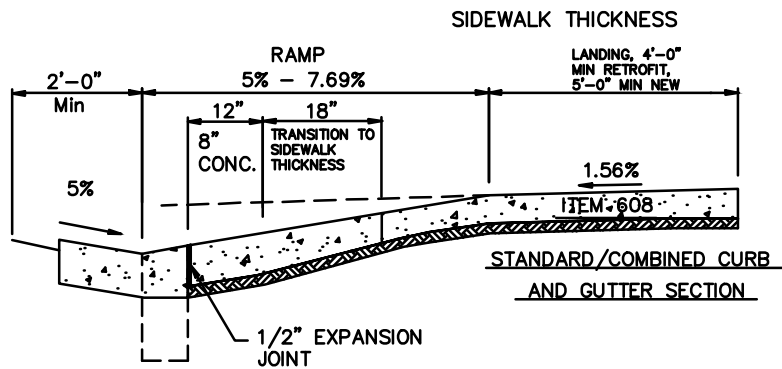
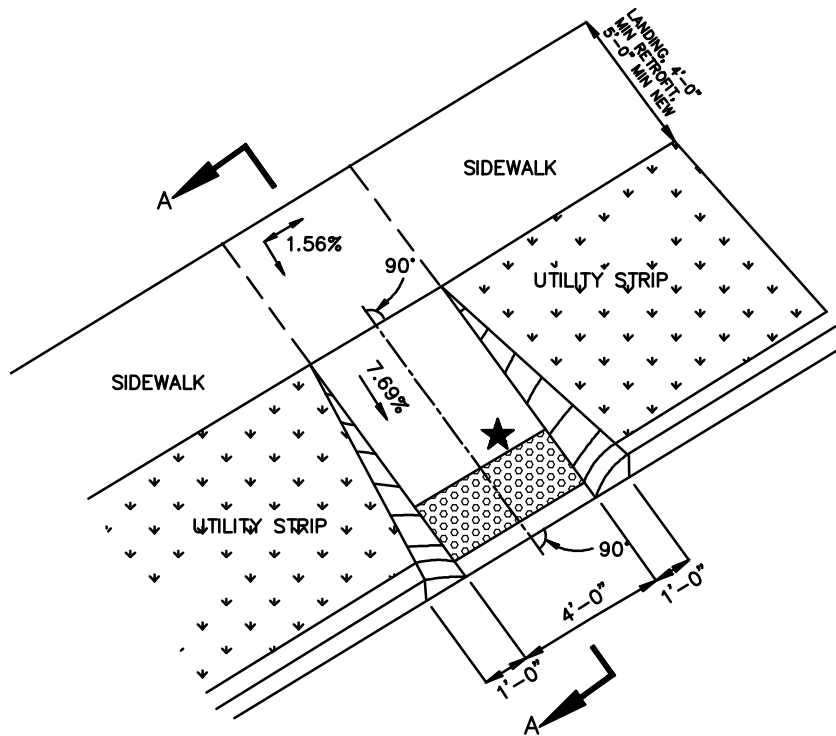
NOTE: CITY OF HILLIARD ORDER OF PREFERENCE IS (1) KEEP RAMPS IN LINE WITH APPROACH WALKS AND (2) KEEP RAMPS IN FRONT OF SIDE STREET STOP SIGNS. RAMPS THAT DIRECT PEDESTRIANS INTO THE MIDDLE OF AN INTERSECTION AT AN ANGLE ARE NOT PERMITTED. WHEN RAMPS ARE NOT PERPENDICULAR TO THE CURB, A LANDING RECESSED SHALL BE PROVIDED AT THE BOTTOM OF THE RAMP & THE GRADE BREAK SHALL BE PERPENDICULAR TO THE DIRECTION OF TRAVEL. EXAMPLES OF RECOMMENDED CURB RAMP ALIGNMENTS ARE SHOWN BELOW:



	CURB RAMP GENERAL NOTES	CITY OF <b>HILLIARD, OHIO</b>	
DATE: March 6, 2015		STANDARD CONSTRUCTION DRAWING	
SCALE: NTS		1/12	CR-1

4. CURB RAMPS AT ALLEY AND ARTERIAL CROSSINGS SHALL BE 8" THICK CONCRETE
5. RAMP RUNNING SLOPE: THE RUNNING SLOPE SHALL BE 5% TO 7.7%. THE RUNNING SLOPE MAY BE INCREASED TO 10 % WITH PRIOR WRITTEN CITY APPROVAL.
6. RAMP CROSS SLOPE: THE MAXIMUM CROSS SLOPE SHALL BE 1.56%.
7. FOR NEW CONSTRUCTION, MINIMUM RAMP WIDTH AND LANDING SIZE SHALL BE:
  - SIDEWALKS: 5' RAMP AND 5'X5' LANDING
  - MULTI-USE PATHS: 8' RAMP AND 5'X8' LANDING
  - LANDING AT INTERSECTING SIDEWALKS – WHEREVER SIDEWALKS INTERSECT, THERE SHALL BE A LANDING MEETING THE ABOVE REQUIREMENTS.
10. IN RETROFIT SITUATIONS, THE RAMP WIDTH MAY MATCH THE EXISTING APPROACH SIDEWALK OR MULTI-USE PATH OR 4' MINIMUM, WHICHEVER IS GREATER. THE MINIMUM LANDING SIZE SHALL BE 4' BY THE WIDTH OF THE EXISTING APPROACH WALK OR MULTI-USE PATH.
11. ALL JOINTS BETWEEN NEW AND EXISTING MATERIALS SHALL BE FLUSH.
12. LONG FLARES: THE LENGTH MEASUREMENT OF THE FLARE AT THE FACE OF CURB SHALL BE A MINIMUM OF 10 TIMES THE CURB HEIGHT
13. 1-FT FLARES: THE MEASUREMENT OF THE FLARE AT THE FACE OF CURB SHALL BE A MINIMUM OF 1-FT.
14. STREET COUNTER SLOPE: THE COUNTER SLOPE AT THE BASE OF THE RAMP SHALL BE A MAXIMUM OF 5% FOR A MINIMUM OF 2-FT.
15. RAMPS AT MARKED AND UNMARKED CROSSINGS: AT MARKED CROSSINGS THE RAMP AND STREET LANDING MUST BE FULLY CONTAINED WITHIN THE MARKED CROSSWALK. AT UNMARKED CROSSINGS THE RAMP AND STREET LANDING MUST BE WITHIN THE PEDESTRIAN RIGHT-OF-WAY AS DEFINED BY CITY CODE.
16. SURFACES: RAMP, FLARE, AND LANDING SURFACES MUST BE STABLE AND SLIP RESISTENT. RAMPS SHALL BE MEDIUM BROOMED TRANSVERSE TO THE DIRECTION OF TRAVEL. GRATINGS, VALVE BOXES, AND UTILITY BOXES SHALL NOT BE LOCATED IN THE RAMP, LANDING, OR TRANSITION AREAS.
17. OFFSET INTERSECTIONS: AT OFFSET 'T' INTERSECTIONS RAMPS BETWEEN OFFSET STREETS MAY BE DELETED IF THE CENTERLINES OF OFFSET STREETS ARE NO MORE THAN 200-FT APART.
18. OPPOSING RAMPS SHALL HAVE A PEDESTRIAN WALKWAY ACROSS THE STREET, ATLEAST 7' WIDE, WITH A CROSS SLOPE (LONGITUDINAL STREET SLOPE) OF NO GREATER THAN 1.56%. VERTICAL CURVES SHALL BE INSTALLED AS NEEDED.
19. FOR SIDEWALK OR MULTI-USE PATH CROSSINGS OF PRIVATE DRIVEWAYS:
  - PEDESTRIANS HAVE THE RIGHT OF WAY FOR CROSSINGS OF UNSIGNALIZED PRIVATE DRIVEWAYS (RESIDENTIAL AND COMMERCIAL): THEREFORE, THE SIDEWALK OR PATH SHOULD EXTEND THROUGH THE DRIVEWAY AT GRADE WITH NO CURB RAMP OR DETECTABLE WARNING.
  - IN LOCATIONS WHERE TREE LAWN WIDTHS ARE NARROW MAKING THE DRIVEWAY APPROACH TOO STEEP TO PROVIDE A SAFE TRANSITION FOR VEHICLES BETWEEN THE STREET AND DRIVEWAY, THE SIDEWALK OR PATH MAY DROP IN ELEVATION 10'-15' ON EITHER SIDE OF THE DRIVEWAY. NO CURB RAMP OR DETECTABLE WARNING IS REQUIRED IN THIS CASE. THE MAX CROSS SLOPE SHALL BE 1.56%.
  - AT LARGE COMMERCIAL UNSIGNALIZED DRIVEWAYS, PROVISIONS FOR SIDEWALKS AND PATHS AND THE NEED FOR RAMPS AND DETECTABLE WARNINGS SHALL BE EVALUATED ON A CASE-BY-CASE BASIS.
  - LARGE COMMERCIAL SIGNALIZED DRIVEWAYS SHALL BE TREATED AS PUBLIC STREET INTERSECTIONS WITH RESPECT TO LOCATION AND DESIGN OF ALL SIDEWALKS, MULTI-USE PATHS, CURB RAMPS, AND DETECTABLE WARNINGS.

	CURB RAMP GENERAL NOTES	CITY OF <b>HILLIARD, OHIO</b>	
DATE: March 6, 2015		STANDARD CONSTRUCTION DRAWING	
SCALE: NTS		2/12	CR-1



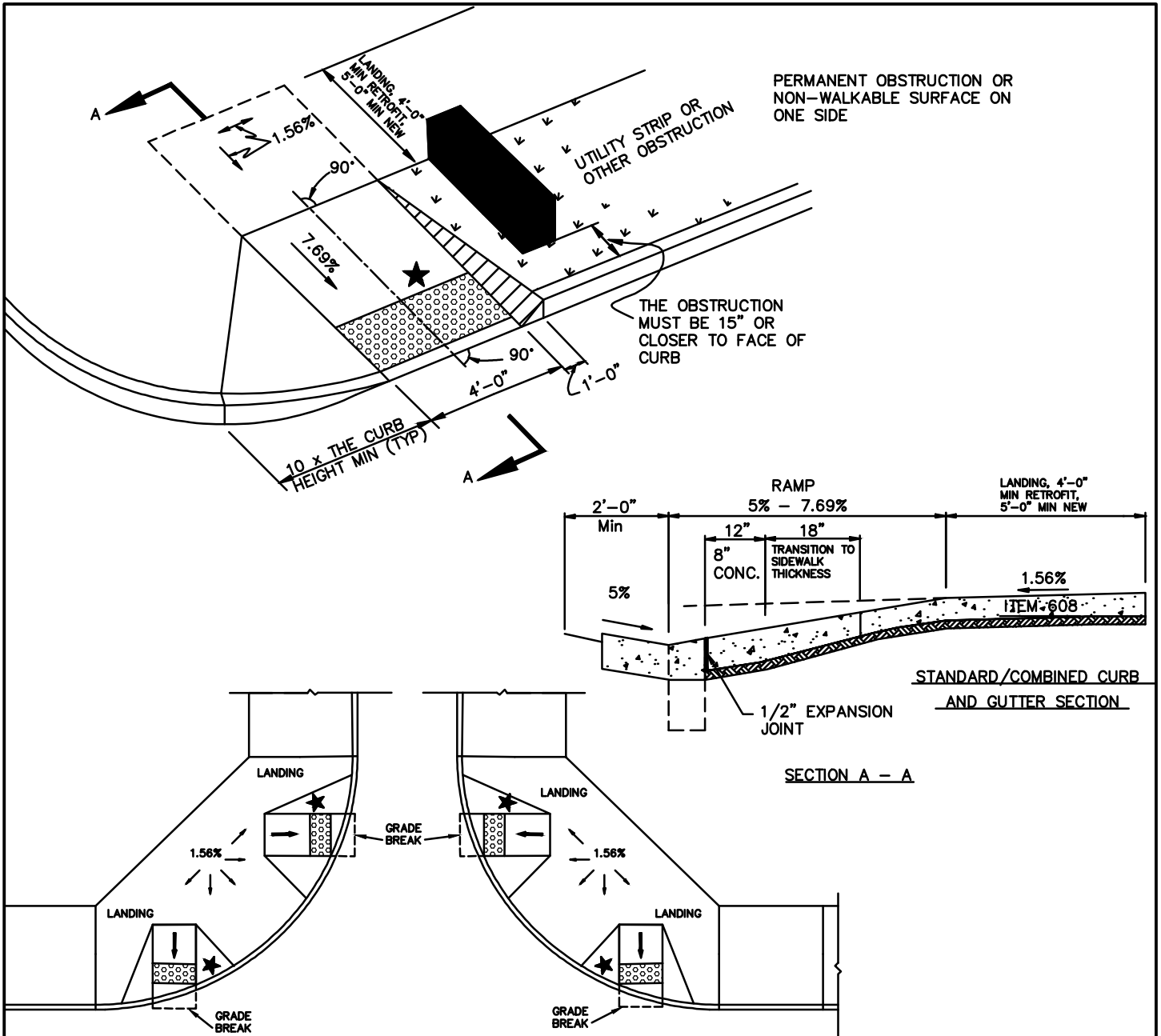
SECTION A - A

NOTES:

1. RAMP SHALL NOT BE PLACED IN FRONT OF A STOP SIGN OR IN FRONT OF THE NORMAL STOPPING LOCATION OF VEHICLES AT A STOP OR SIGNAL CONTROLLED INTERSECTION. A TYPE H RAMP SHOULD BE USED INSTEAD.
2. THE 5% MAXIMUM COUNTERSLOPE WHERE THE BOTTOM OF THE RAMP MEETS THE STREET APPLIES TO BOTH STRAIGHT CURB AND CURB AND GUTTER SECTIONS

★ SEE SHEET 12/12 FOR DETECTABLE WARNING DETAILS

	CURB RAMP TYPE C	CITY OF <b>HILLIARD, OHIO</b>	
DATE: March 6, 2015	RAMP IN UTILITY STRIP	STANDARD CONSTRUCTION DRAWING	
SCALE: NTS		4/12	CR-1



NOTES:

1. RAMP SHALL NOT ORIENT PEDESTRIANS INTO THE CENTER OF AN INTERSECTION. WHEN PLACED WITHIN THE RADIUS, A TYPE "D" RAMP SHALL BE ORIENTED DIRECTLY ACROSS FROM THE OPPOSING RAMP, PERPENDICULAR TO THE CENTERLINE OF THE CROSSING STREET.
2. THE 5% MAXIMUM COUNTERSLOPE WHERE THE BOTTOM OF THE RAMP MEETS THE STREET APPLIES TO BOTH STRAIGHT CURB AND CURB AND GUTTER SECTIONS
3. WHEN RAMPS ARE NOT PERPENDICULAR TO THE CURB, A RECESSED LANDING SHALL BE PROVIDED AT THE BOTTOM OF THE RAMP AND THE GRADE BREAK SHALL BE PERPENDICULAR TO THE DIRECTION OF TRAVEL

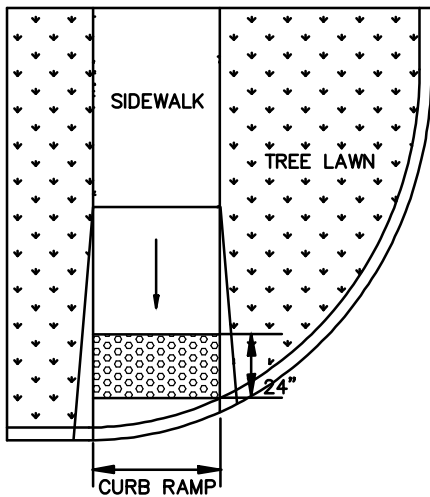
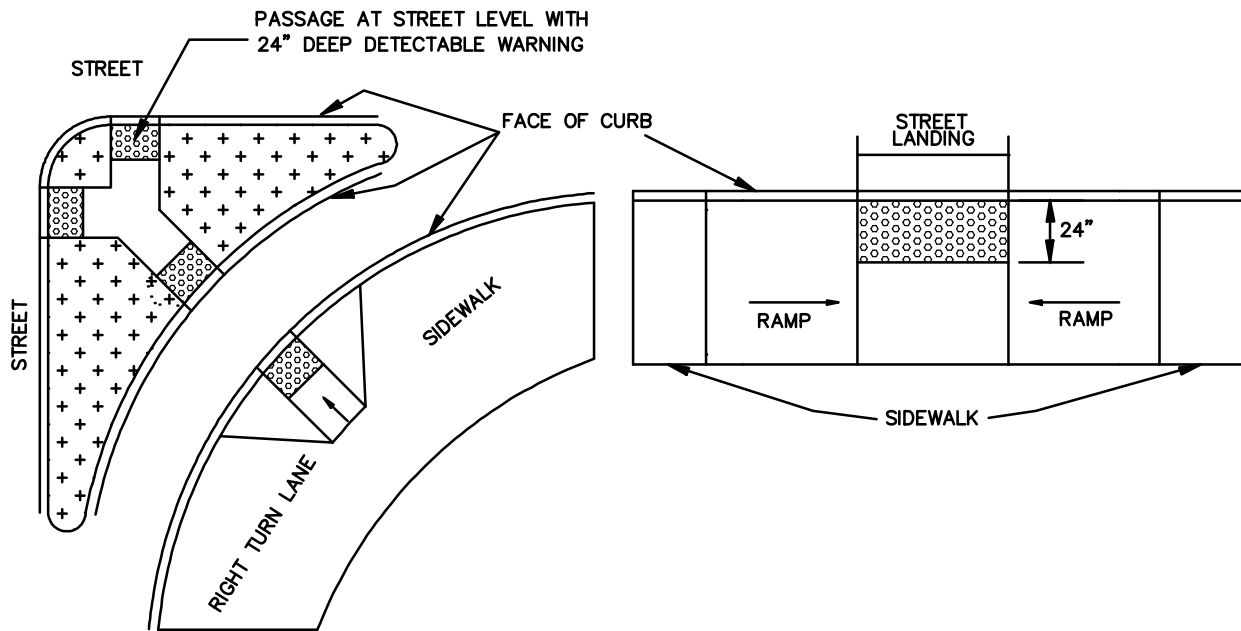
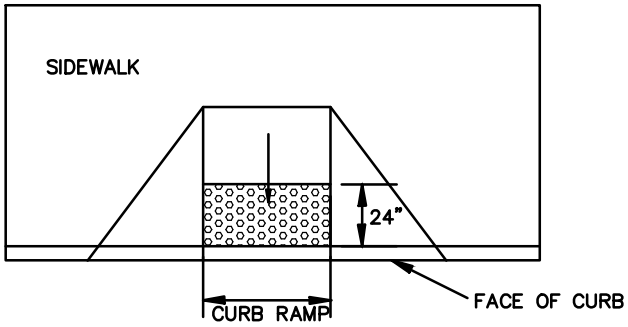
★ SEE SHEET 12/12 FOR DETECTABLE WARNING DETAILS

	<p>CURB RAMP TYPE D</p>	<p>CITY OF <b>HILLIARD, OHIO</b></p>	
<p>DATE: March 6, 2015</p>	<p>RAMP OBSTRUCTED ON ONE SIDE</p>	<p>STANDARD CONSTRUCTION DRAWING</p>	
<p>SCALE: NTS</p>		<p>5/12</p>	<p>CR-1</p>

**NOTES**

1. DETECTABLE WARNINGS SHALL BE PROVIDED WHEREVER A CURB RAMP CROSSES A VEHICULAR WAY. EXCLUDING UNSIGNALIZED DRIVEWAY CROSSINGS. SEE #19 OF GENERAL CURB RAMP NOTES.
2. DETECTABLE WARNINGS SHALL BE PROVIDED 24" IN THE DIRECTION OF TRAVEL AND EXTEND THE FULL WIDTH OF THE CURB RAMP OR FLUSH SURFACE. THE DETECTABLE WARNING SHALL BE LOCATED ADJACENT TO THE CURB LINE.
3. DETECTABLE WARNINGS SHALL BE PLACED 6" TO 8" BEHIND THE FACE OF CURB AND BEHIND CURB JOINT
4. CAST IN PLACE OR ANY NON-SURFACE APPLIED DETECTABLE WARNING SHALL HAVE A MIN OF 3" OF CONCRETE ON EACH SIDE OF THE WARNING.
5. MATERIALS SHALL COMPLY WITH C.O.C. SUPPLEMENTAL SPECIFICATION 1551 WITH THE FOLLOWING NOTED EXCEPTIONS:
  - A. BRICK RED IS THE ONLY APPROVED COLOR UNLESS OTHERWISE APPROVED IN ADVANCE IN WRITING BY THE CITY ENGINEER
  - B. TYPE "A", "B" AND "C" DETECTABLE WARNING SURFACES ARE NOT APPROVED
  - C. TYPE "D" THIN TILE AND THIN MOLDED SHEET GOODS ARE APPROVED ON RETROFIT INSTALLATIONS ONLY.
    - THE PRE-APPROVED TYPE "D" MATERIAL IS "ARMOR TILE TACTILE SYSTEMS" FLAT SURFACE APPLIED MAT.
    - OTHER MATERIALS MAY BE SUBSTITUTED FOR THIS PRODUCT IF PRIOR APPROVAL IS GRANTED TO THE CITY ENGINEER
  - D. TYPE "E" PRE-MANUFACTURED WET-SET PROJECTS ARE APPROVED FOR USE ON NEW CONSTRUCTION ONLY. THESE PRODUCTS MUST BE 24" WIDE AND 1/2" THICK. ONE PIECE PANELS SHOULD BE USED FOR SIDEWALK INSTALLATIONS. ALL PRODUCTS MUST BE APPLIED ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS AND GUIDELINES. THE TYPE "E" PRODUCTS PRE-APPROVED FOR USE IN THE CITY OF HILLIARD ARE LISTED BELOW.
    - ENGINEERED PLASTICS, INC. - ARMOR-TILE CAST IN PLACE SYSTEMS
    - ADA SOLUTIONS, INC. - COMPOSITE (WET SET) REPLACEABLE TWS UNIT
    - ARMORCAST PRODUCTS COMPANY - CAST IN PLACE DETECTABLE WARNING PANEL
    - OTHER MATERIALS MAY BE SUBSTITUTED FOR THE ABOVE LISTED PRODUCTS IF PRIOR APPROVAL IS GRANTED BY THE CITY ENGINEER.
  - E. DETECTABLE WARNINGS SHALL EXTEND THE ENTIRE WIDTH OF THE CURB RAMP FOR SIDEWALKS AND MULTI-USE PATHS LOCATED PARALLEL TO A PUBLIC STREET (SIDE PATHS).
  - F. DETECTABLE WARNING STRIPS MUST COMPLY WITH ADA SPECIFICATIONS FOR RAMP AREA, INCLUDING RUNNING SLOPE, CROSS-SLOPE, FLATNESS AND SMOOTHNESS CRITERIA AS WELL AS FLUSH TRANSITIONS BETWEEN THE CONCRETE RAMP AND THE DETECTABLE WARNING SURFACE.
  - G. ALL DETECTABLE WARNING STRIP INSTALLATIONS SHALL BE WARRANTED BY THE INSTALLING CONTRACTOR AND MANUFACTURER TO BE FREE OF DEFECTS FOR A PERIOD OF THREE (3) YEARS FROM THE DATE OF INSTALLATION. THE DETECTABLE WARNING STRIP SHALL LOSE NO MORE THAN FIVE PERCENT (5.0 %) OF TRUNCATED DOMES DUE TO DELAMINATION BECAUSE OF PRODUCT FAILURE. SURFACE SHALL BE WARRANTED FOR THAT 3-YEAR PERIOD FROM FADING, CHIPPING, CRACKING, PEELING, OR LOSS OF COLOR DUE TO THE EXPOSURE TO WEATHERING, DE-ICING SALTS, AND SUNLIGHT.

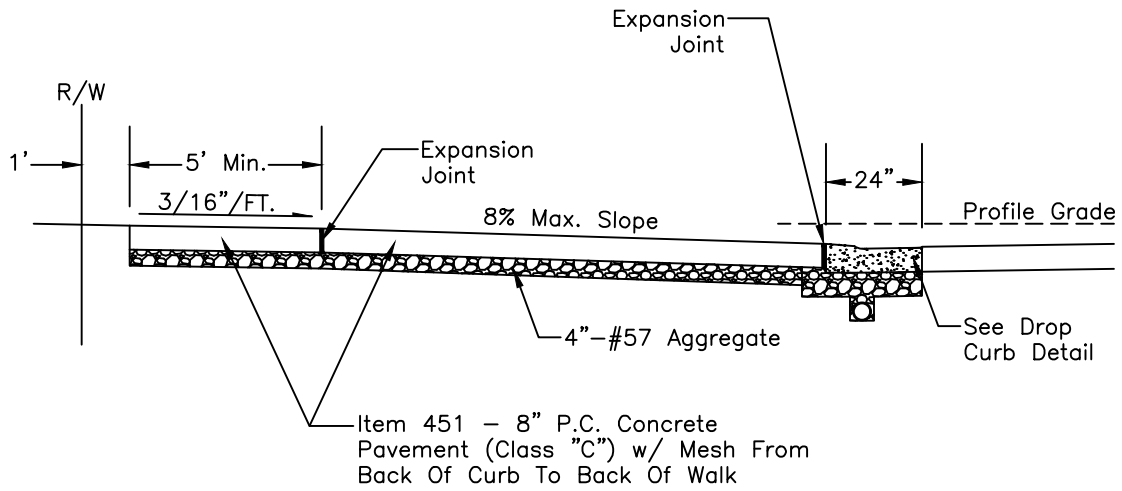
	CURB RAMP	CITY OF <b>HILLIARD, OHIO</b>	
DATE: March 6, 2015	DETECTABLE WARNING NOTES	STANDARD CONSTRUCTION DRAWING	
SCALE: NTS		11/12	CR-1



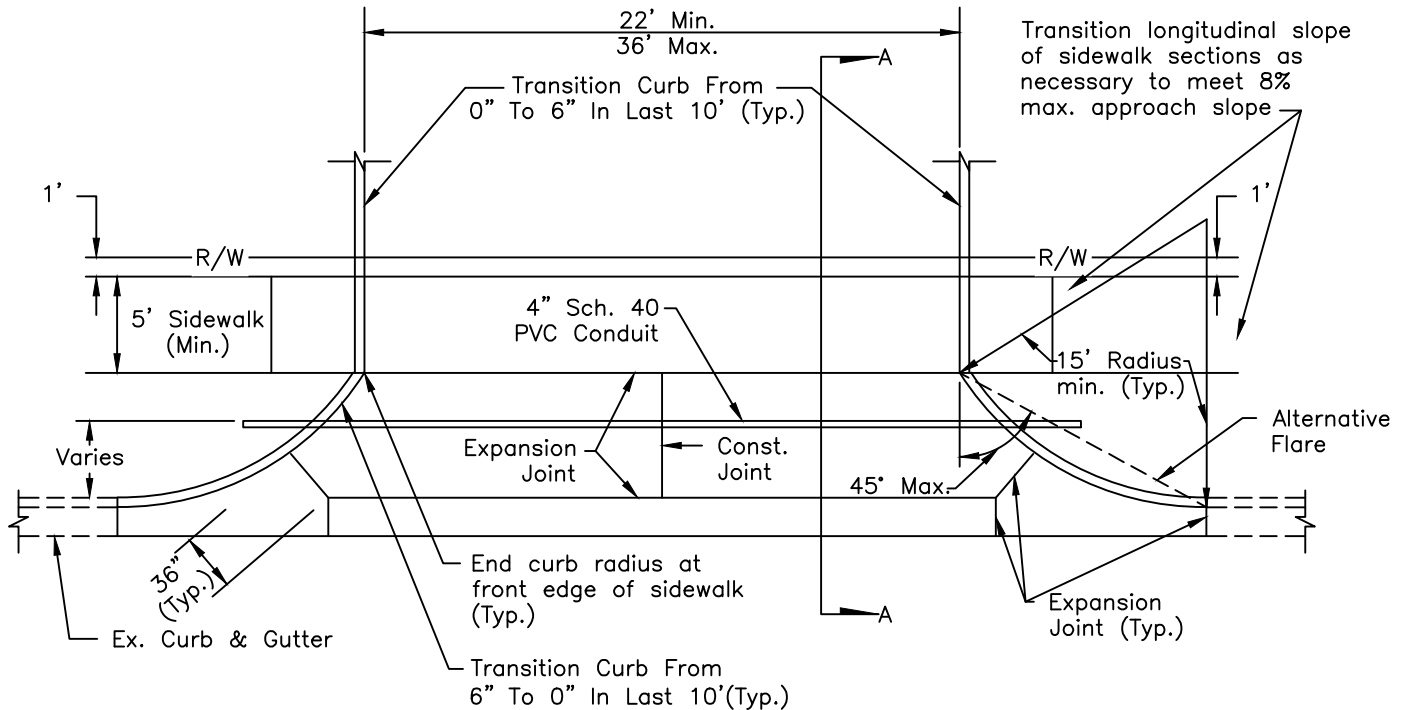
	<p>CURB RAMP</p> <p>DETECTABLE WARNINGS</p>	<p>CITY OF</p> <p><b>HILLIARD, OHIO</b></p>	
DATE: March 6, 2015		<p>STANDARD</p> <p>CONSTRUCTION DRAWING</p>	
SCALE: NTS		12/12	CR-1



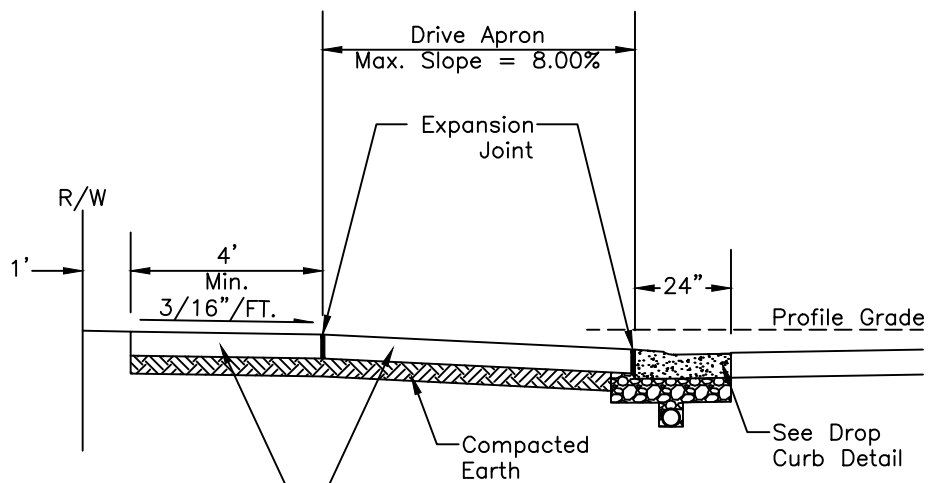
S:\Public Service - Engineering\Hilliard Standards\Drawings\ACAD\Drive Details.dwg, 8/15/2017 7:16:49 AM



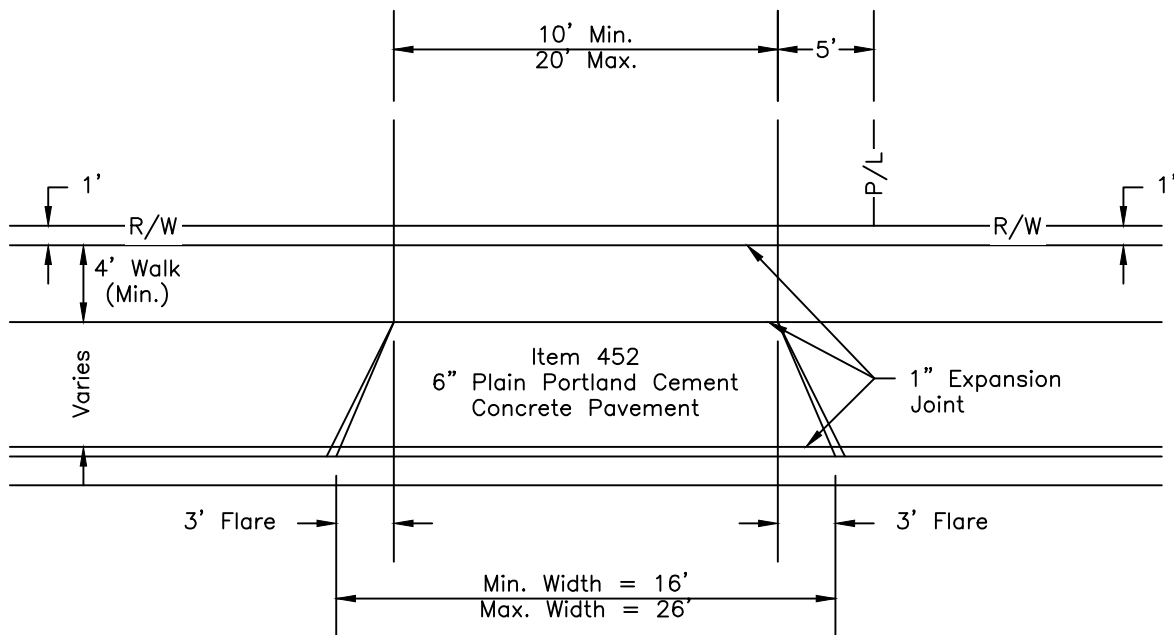
SECTION A-A



APPROVED	DRIVE DETAIL COMMERCIAL ENTRANCE	CITY OF <b>HILLIARD, OHIO</b>	
CITY ENGINEER _____ DATE _____		STANDARD CONSTRUCTION DRAWING	
SCALE: NTS		1/1	DD-1



Item 452 - 6" P.C. Concrete Pavement (Class "C") w/ Mesh From Back Of Curb To Back Of Walk



APPROVED

CITY ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_

SCALE: NTS

DRIVE DETAIL  
RESIDENTIAL ENTRANCE

CITY OF  
**HILLIARD, OHIO**

STANDARD  
CONSTRUCTION DRAWING

1/1

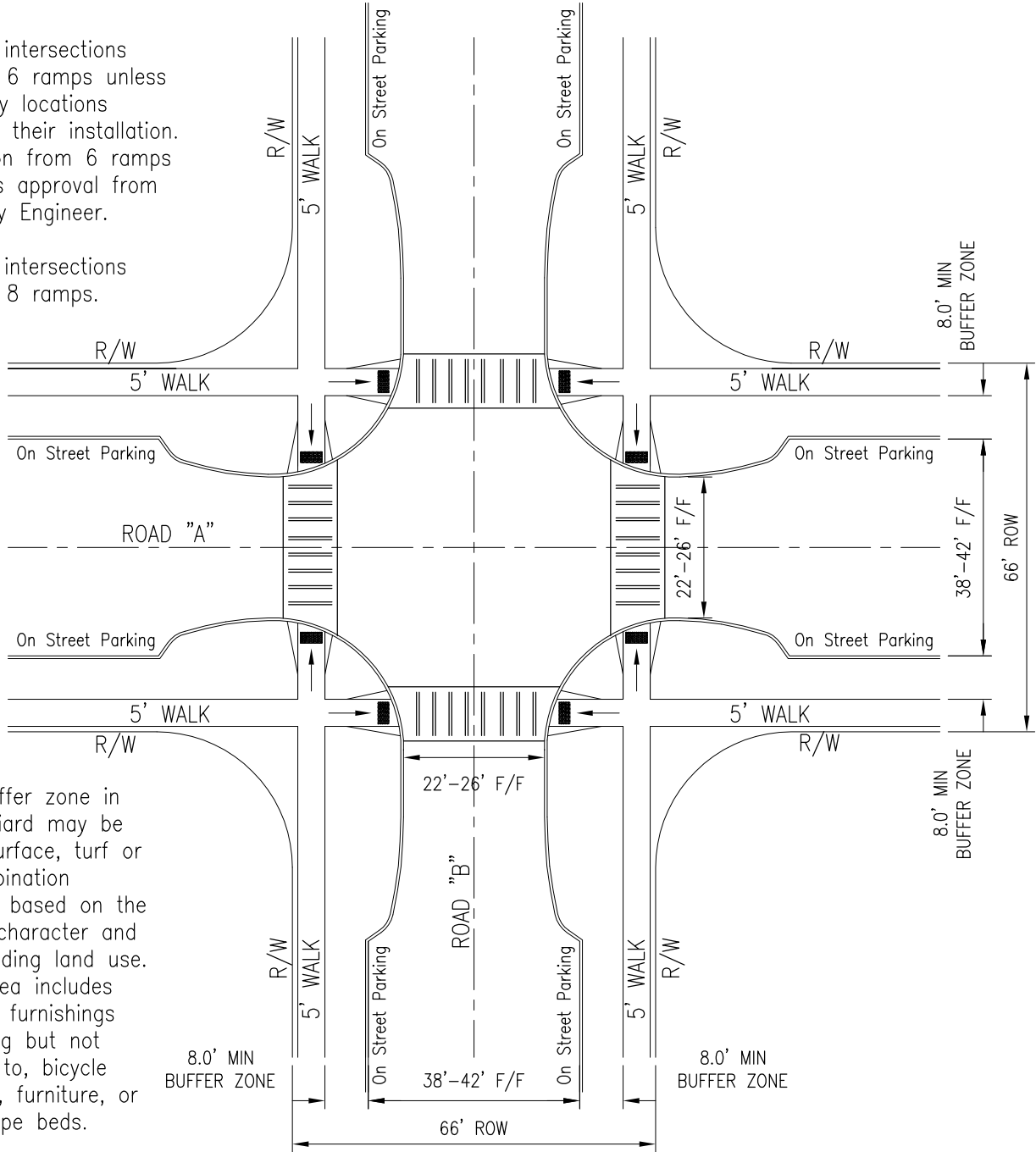
DD-2

F/C Radius = 25' Max.  
 R/W Radius = 25' Min.

NOTES:

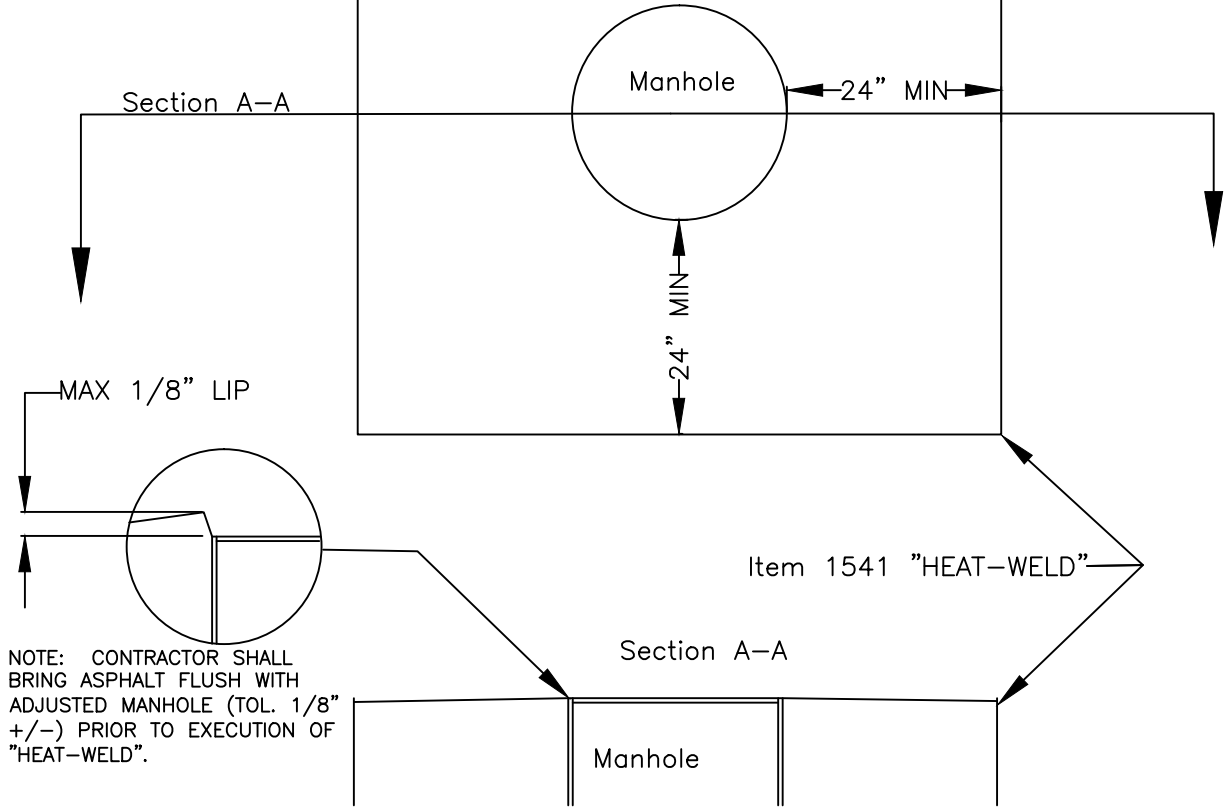
- 3-way intersections require 6 ramps unless driveway locations prohibit their installation. Deviation from 6 ramps requires approval from the City Engineer.
- 4-way intersections require 8 ramps.

- The buffer zone in old Hilliard may be hard surface, turf or a combination thereof based on the street character and surrounding land use. This area includes various furnishings including but not limited to, bicycle parking, furniture, or landscape beds.



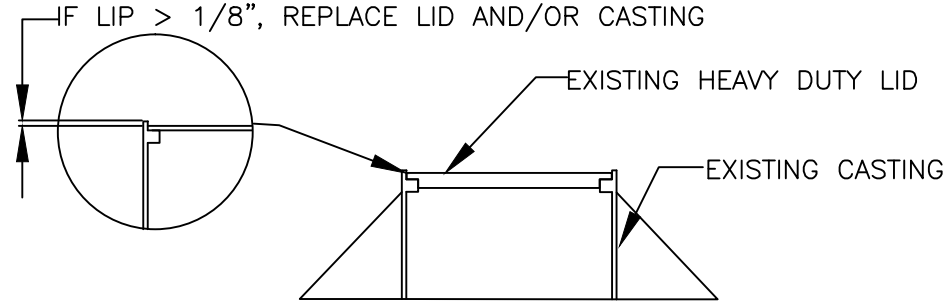
	INTERSECTION DETAIL OLD HILLIARD DISTRICT 66' ROW	CITY OF <b>HILLIARD, OHIO</b>	
DATE: April 16, 2015		STANDARD CONSTRUCTION DRAWING	
SCALE: 1" = 30'		1/1	ID-2

AFTER MANHOLE IS ADJUSTED, AND ASPHALT CONCRETE HAS BEEN BROUGHT TO GRADE, CONTRACTOR SHALL PERFORM A "HEAT-WELD" IN ACCORDANCE WITH COLS SUPPLEMENTAL SPECIFICATION 1541 TO ENSURE A UNIFORM AND FLUSH TRANSITION.



NOTE: CONTRACTOR SHALL BRING ASPHALT FLUSH WITH ADJUSTED MANHOLE (TOL. 1/8" +/-) PRIOR TO EXECUTION OF "HEAT-WELD".

NOTE: IF LID DOES NOT FIT FLUSH (1/8" +/- TOLERANCE), CONTRACTOR SHALL REPLACE CASTING AND/OR LID TO PROVIDE FLUSH FIT (1/16" +/-). REPLACEMENT SHALL FIT SPECIFICATIONS AND PERFORMANCE OF EXISTING STRUCTURE. IF SUITABLE REPLACEMENT DOES NOT EXIST, BOTH CASTING AND LID MUST BE REPLACED.



APPROVED

CITY ENGINEER DATE

NOT TO SCALE

MANHOLE ADJUSTED TO GRADE

CITY OF HILLIARD, OHIO

STANDARD CONSTRUCTION DRAWING

1/1

MHA-1

Notes.


1. Coordination: Coordinate location of transformer and pad with power company.
2. Transformer: Provided, installed and wired by power company.
3. Transformer Pad: Install per power company requirements for size and location. Refer to service enclosure pad for material specifications.
4. Service Enclosure Pad: Structure shall be set not less than 3'-0" nor more than 5'-0" from power company transformer pad. Concrete shall be class "C", 4000 PSI, 5-7% air entrained. Fill all exposed surface voids. Chamfer all edges. Slope top 1/4" to drain water. Hot or cold weather - follow City of Columbus Construction and Material Specifications, Section 1000. Finish - remove all form marks, provide floated and steel troweled finish.
5. Welded Wire Fabric: Provide 6x6-6x6. Mount on all sides and top. Maintain 3" minimum cover.
6. Service Enclosure: Provide a NEMA watertight stainless steel enclosure, 30"H x 18"W x 15"D. Having a single continuous hinged locking door, interior mounting panel. 6" minimum matching floor stand. Concrete and or bolt type anchor and level to pad via stainless steel machine bolt, nuts & lockwashers. Drill bottom of enclosure with 1/4" weep hole at low point.
7. Service Enclosure Finish: A dark bronze approved by the City Engineer. The paint shall be a powder paint finished to a gloss of 35% (at 60 degrees).
8. Service Enclosure Lock:
  - A. Internal: Key all locking mechanisms alike to NEMA traffic signal number 2 key.
  - B. External: All pad locks shall be American Lock, Model No. 1207B, Key No. 43737.
9. Lighting Controller: A class R fusible combination lighting contactor type controller assembly rated according to the total ampacity of the lighting phase, 60HZ with solid neutral, electrically held with control fuse, 120 volt control voltage, 3 position hand - off auto selector switch and photocell control. Mount all devices in a service enclosure less photo control.
 

Approved Manufacturer: Square "D" Night-Master SPG-60, or approved equal.
10. Photocell Controller: Provide an on-off photo-initated controller with sealed cadmium sulfide photocell to operate in -30 degrees F to +140 degrees F temperatures, thermal inertia of 15 seconds minimum, threaded pipe nipple, rated 16 Amps, 2000 Watts at 120V, and single pole single throw switch. Turn-ON shall be 1-3 footcandles and Turn-OFF to Turn-ON ratio is 5 maximum. Provide in weatherproof enclosure. Load shall remain "ON" in case of cell failure. Mount atop first pole from service enclosure.
 

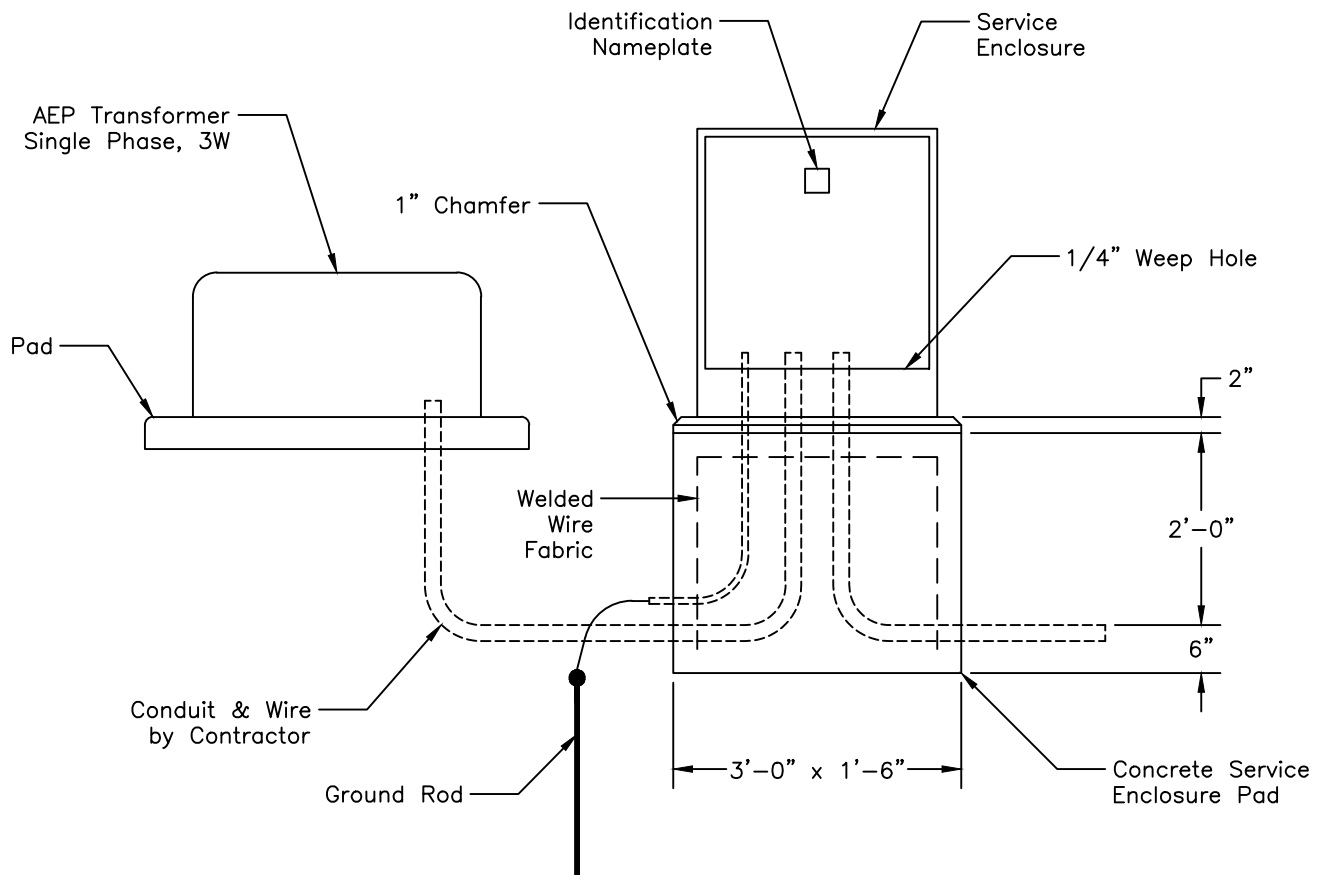
Approved Manufacturer: Tork
11. Grounding: Provide 5/8" x 10'-0" copper weld one piece ground rod. Drive a minimum of 2'-0" below grade. Run #8 AWG solid copper grounding electrode conductor in 3/4" PVC conduit from rod to enclosure ground bar. "Thermo" or "Cad" weld wire connection to rod.
12. Fusing: Service entrance - provide dual element, time delay fuses, UL Class RK-1, 600V, rejection type.
 

Approved Manufacturer: Buss #LPN-RK.
13. Control Circuit: Provide single element, fast acting-type fuse UL Class CC, 250V, rejector type.
 

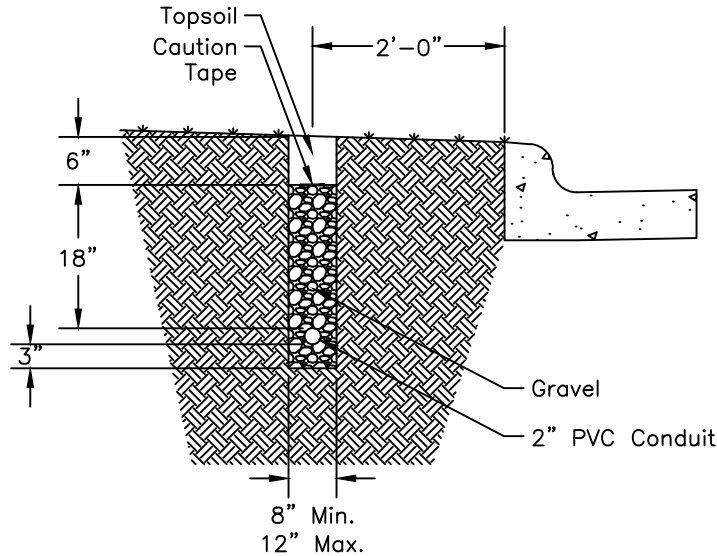
Approved Manufacturer: Buss #KTK-R.

<p>APPROVED</p>  <p style="text-align: right;">9-1-15</p> <hr/> <p>CITY ENGINEER                      DATE</p>	<p>THOROUGHFARE STREET/ OLD HILLIARD SERVICE ENCLOSURE</p>	<p>CITY OF <b>HILLIARD, OHIO</b></p> <hr/> <p>STANDARD CONSTRUCTION DRAWING</p>		
<p>SCALE: N/A</p>		<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">1/2</td> <td style="width: 50%; border: none;">SL-5</td> </tr> </table>	1/2	SL-5
1/2	SL-5			

14. Nameplate: Stainless steel screw attached. Provide permanent weather resistant engraved laminoid nameplate 3" square minimum 3/4" helvetica white letters on a dark bronze background with cabinet circuit embossed into it per plan schedule.
15. Conduit: Shall be heavy wall 2". rigid nonmetallic schedule 40 PVC for use above and below ground or concrete encased. Rated for 90 degrees Celsius conductors and use in direct sunlight. Material shall be UL listed and comply with NEMA TC2-1978 and F.S. #WC-1094A. Provide in 10 foot sections. Seal all joints watertight. Glue joints with PVC cement. Bush all ends. All bends shall use long radius preformed elbows. Extend conduit to minimum 2'-0" below grade. Location to be coordinated with landscaping and utilities.
16. Weatherproofing: Provide penetrating surface applied, 1 coat concrete waterproofing agent. Material shall be clear penetrating, water based, alkyalkoxysilane and contain a minimum of 40% by weight solids and be applied per manufacturer's directions. Coverage shall be 150 square feet per gallon (provide Hydrozo Enviroseal 40 or approved equal). Apply 1 coat to all concrete surfaces above grade.
17. Wiring: Refer to general specifications.



APPROVED	THOROUGHFARE STREET/ OLD HILLIARD SERVICE ENCLOSURE	CITY OF <b>HILLIARD, OHIO</b>	
<i>Clyde R Seidle</i> CITY ENGINEER		STANDARD CONSTRUCTION DRAWING	
SCALE: 1/2" = 1'		2/2	SL-5



CONDUIT PARALLEL TO BACK OF CURB

Notes:

1. Trenching: Conduit trenches shall have vertical walls and be excavated to a depth that permits conduit to be laid at 2'-0" below finished grade with a gravel cover, above and below. Backfill gravel to topsoil limit. Trenches shall be located adjacent to and parallel with curbs or pavements and shall not deviate more than 6" from the lines designated. Trenches shall not exceed 12" in width. Remove excess soil after backfilling.
2. Gravel: Shall be uncrushed washed gravel and pass a 1/2" sieve. Pour in place and compact to 95% standard proctor in layers not exceeding 6" each. City to inspect during construction.
3. Topsoil: Shall be clean, loose friable, loamy topsoil free of subsoil or refuse. Topsoil may be from the site or imported. Topsoil shall be placed and spread over the areas designated to a depth sufficiently greater than that shown so that after natural settlement the compacted work will conform to the elevations shown.
4. Conduit: Shall be heavy wall rigid nonmetallic schedule 40 PVC for use above and below ground or concrete encased. Rated for 90 degrees Celsius conductors and use in direct sunlight. Material shall be UL listed and comply with NEMA TC2-1978 and F.S. #WC-1094A. Provide in 10' sections. Seal all joints watertight. Glue joints with PVC cement. Bush all ends. All bends shall use long radius preformed elbows.
5. Conduit caps: Provide molded plastic or rubber capping device that only permits wire to pass through while preventing dirt, water, etc. from entering.
6. Pull wire: All empty conduit installed for future lighting shall contain a No. 10 AWG copper-clad pull wire.
7. Caution tape: 3" wide red plastic tape with black letters reading "CAUTION BURIED LINE BELOW". Bury above conduit 6" maximum below grade. Run continuous in all trenches not covered by pavement. City to inspect prior to burying.

APPROVED

*Chae R. Seidle*  
 CITY ENGINEER      9-1-15      DATE

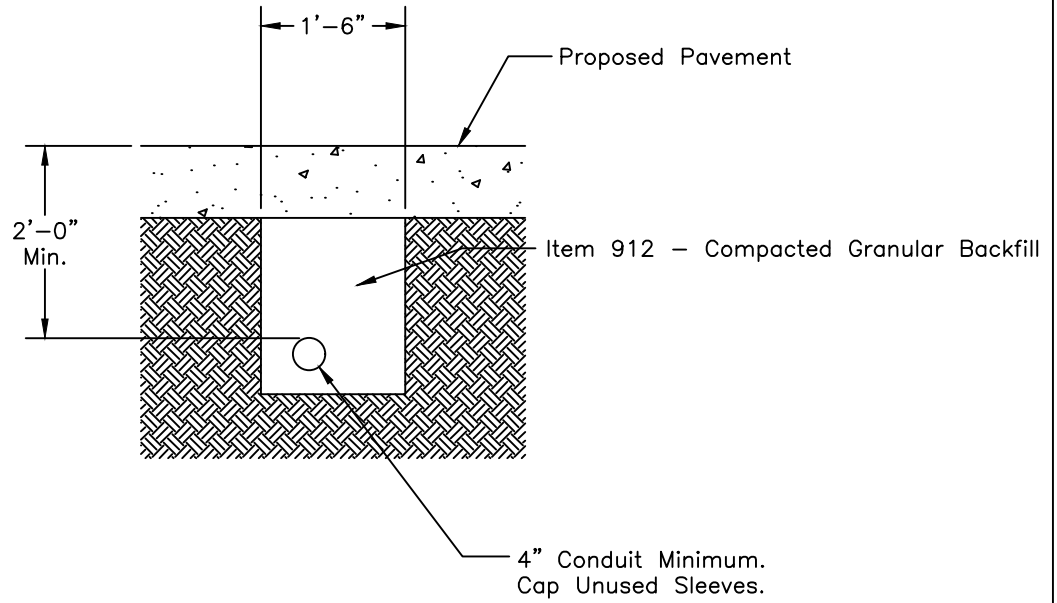
SCALE: 1/2" = 1'

UNDERGROUND  
 CONDUIT/TRENCH DETAILS

CITY OF  
**HILLIARD, OHIO**  
 STANDARD  
 CONSTRUCTION DRAWING

1/3

SL-6



4" CONDUIT UNDER PROPOSED PAVEMENT & UNDER COMMERCIAL DRIVES BY OPEN TRENCH

Notes:

1. Trenching: Sleeve trenches shall have vertical walls and be excavated to a depth that permits sleeves to be laid at 2'-0" below finished grade with 3" concrete encasement around conduit sleeves. Sleeve trenches shall be located perpendicular to the road centerline unless otherwise specifically noted. Maintain in line with conduit setback dimensions at intersections and at curb cuts. gravel cover, above and below.
2. Conduit: Shall be a minimum of 4-inch Schedule 40 PVC conduits and fittings.
3. Conduit caps: Provide molded plastic or rubber capping device that only permits wire to pass through while preventing dirt, water, etc. from entering.
4. Pull wire: All empty conduit installed for future lighting shall contain a No. 10 AWG copper-clad pull wire.

APPROVED

*Clyde R. Seidle*  
 CITY ENGINEER      9-1-15      DATE

SCALE: 1/2" = 1'

UNDERGROUND  
 CONDUIT/TRENCH DETAILS

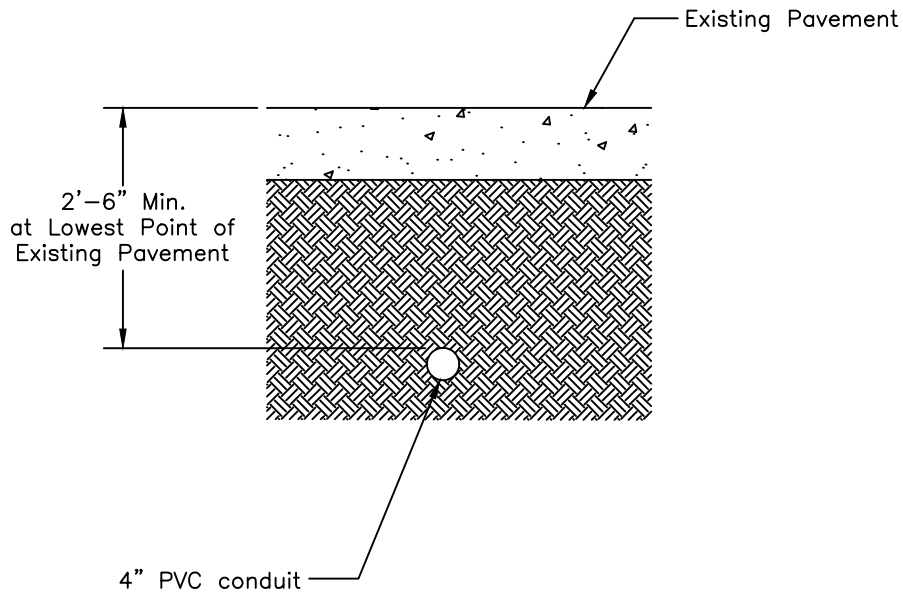
CITY OF  
**HILLIARD, OHIO**

STANDARD  
 CONSTRUCTION DRAWING

2/3

SL-6



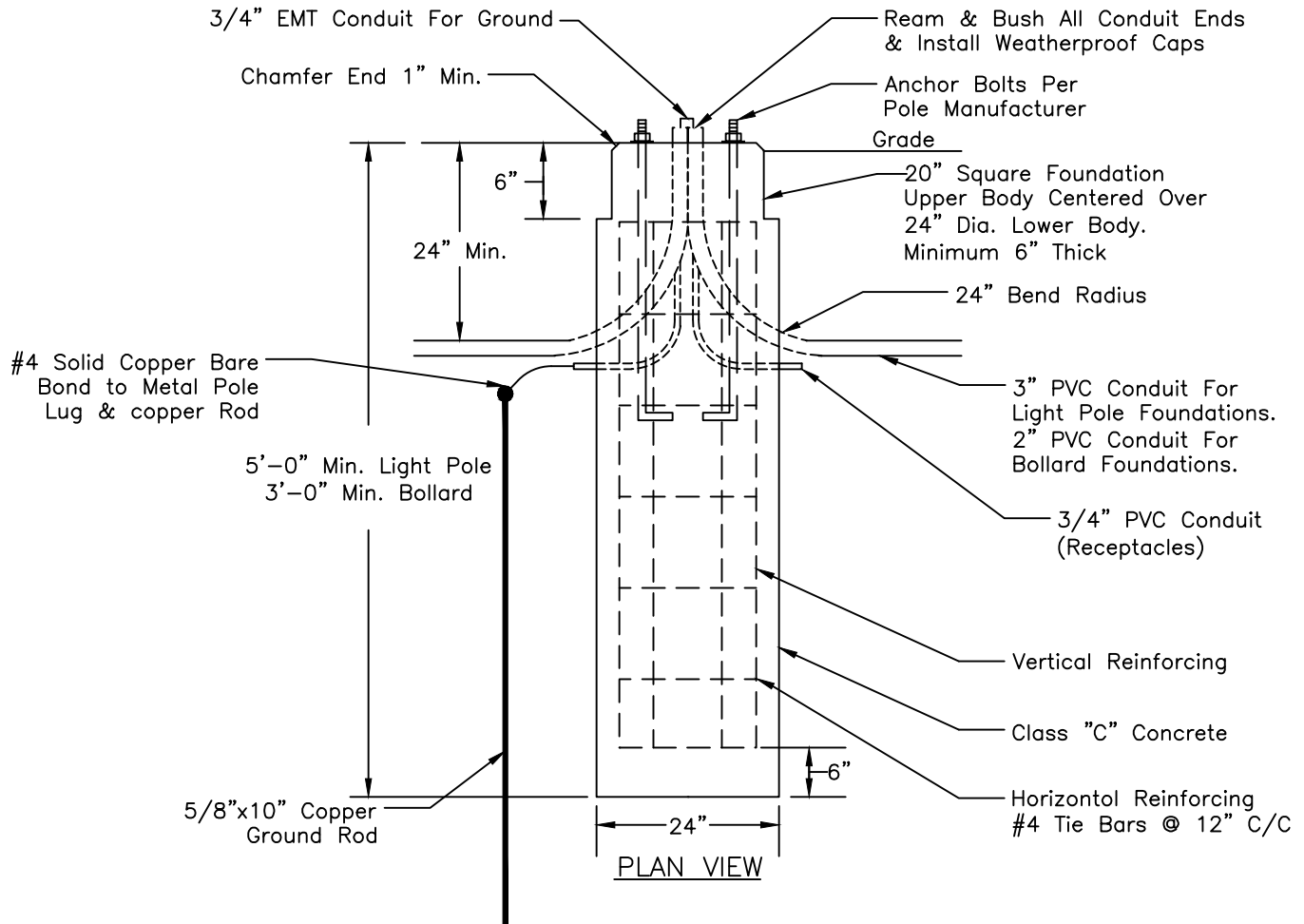
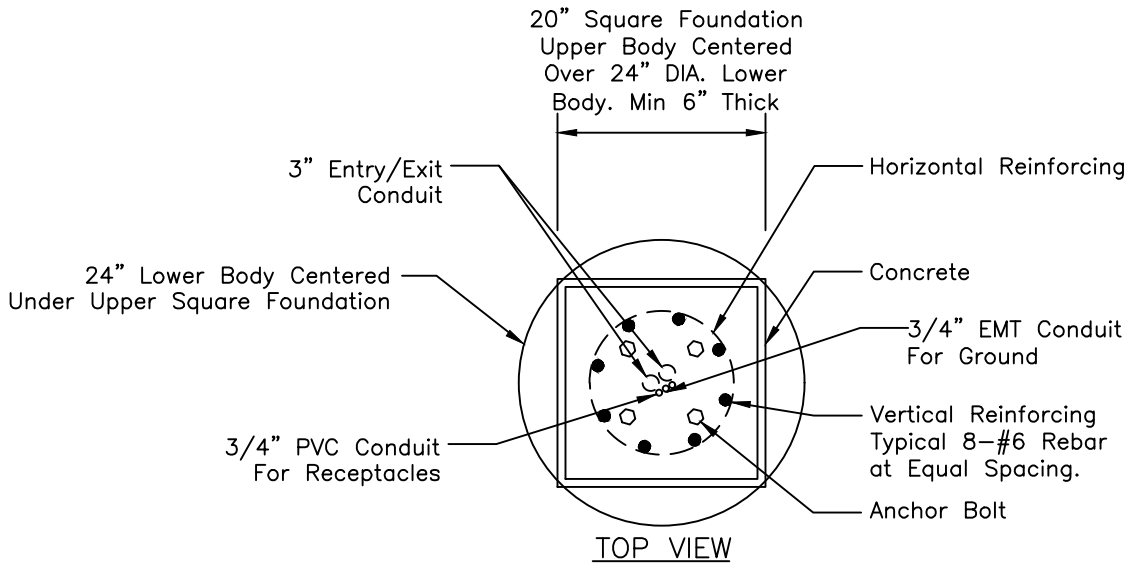


4" CONDUIT UNDER PROPOSED PAVEMENT & UNDER  
COMMERCIAL DRIVES BY HORIZONTAL DRILLING

Notes:

1. Conduit sleeves placed under existing pavement or paved shoulders shall be installed by drilling, subject to approval of the City Engineer. If placed by drilling, the bore shall not exceed the conduit diameter by more than 5 percent. Conduit shall be placed with a minimum amount of disturbance to the roadway.
2. Conduit: Shall be heavy wall rigid nonmetallic Schedule 40 PVC (725.05) for use above and below ground or concrete encased. Rated for 90 degrees Celsius conductors and use in direct sunlight. Material shall be UL listed and comply with NEMA TC2-1978 and F.S. #WC-1094A. Provide in 10' sections. Seal all joints watertight. Glue joints with PVC cement. Bush all ends. All bends shall use long radius preformed elbows.
3. Conduit caps: Provide molded plastic or rubber capping device that only permits wire to pass through while preventing dirt, water, etc. from entering.
4. Pull wire: All empty conduit installed for future lighting shall contain a No. 10 AWG copper-clad pull wire.

APPROVED	UNDERGROUND CONDUIT/TRENCH DETAILS	CITY OF <b>HILLIARD, OHIO</b>	
 CITY ENGINEER      9-1-15      DATE		STANDARD CONSTRUCTION DRAWING	
SCALE: 1/2" = 1'		3/3	SL-6



APPROVED

*Chae R Seidle* 9-1-15  
CITY ENGINEER DATE

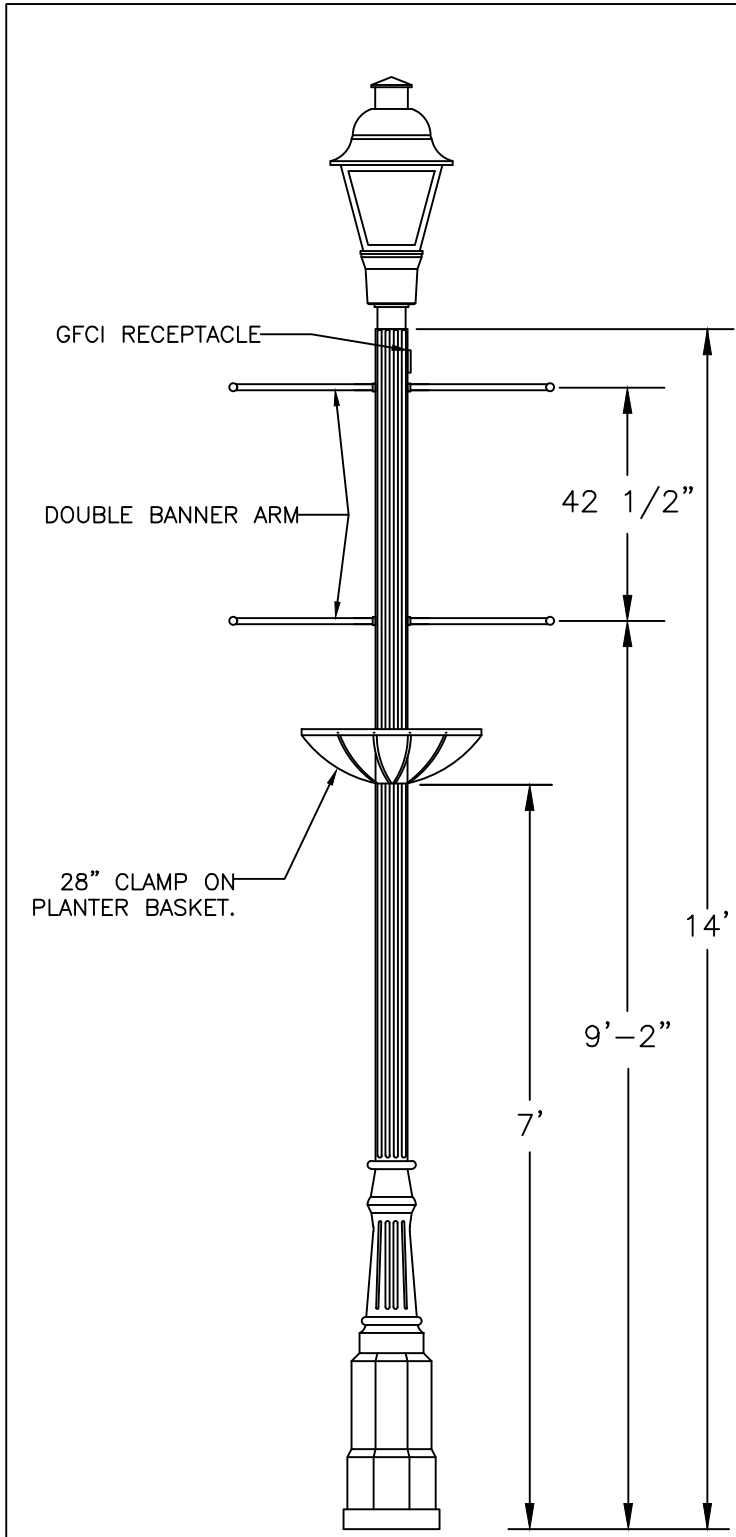
SCALE: 1/2" = 1'

OLD HILLIARD STREET  
POLE BASE, POLE &  
LUMINAIRE

CITY OF  
**HILLIARD, OHIO**  
STANDARD  
CONSTRUCTION DRAWING

1/2

SL-16



Notes:

1. Luminaire assembly: cast aluminum with stainless steel fasteners. Hinged roof. Slipfitter for 4" O.D. Tenon. Architectural Area Lighting Providence LED Model # PROV T2-32LED 4K 700 BLK HSS.
2. Pole: cast aluminum octagonal base with an 8" x 9 1/2" access door, a tapered, fluted upper casting, and a straight, 5" fluted shaft and a wall thickness of 0.188", aluminum alloy 6063-T6 with satin ground finish, black. Provide Double Banner Arms and Ground Fault Interrupter Receptacle with Pole. Sternberg Lighting, Virginia Series, catalog number 3714FP5/GFCI DBA/BK, or approved interchangeable equal.
3. Pole base cable connections: install weatherproof in-line fuseholders with 1 amp fuse, Buss KTK-1 fuse or approved interchangeable equal. Buss HEB-AA on the phase conductor and neutral, or approved interchangeable equal. Provide enough slack cable to allow fuseholders to be pulled out of access hole 12".
4. Clamp on basket: 28" dia. clamp on planter basket with powder coat paint to match pole. Baskets shall be mounted for easy removal from pole. Basket shall be constructed of 6061 or 6063-T6 aluminum.

S:\Public Service - Engineering\Hilliard Standards\Drawings\ACAD\Street Lighting 9-1-15.dwg, 9/18/2015 7:45:55 AM


<p>APPROVED</p> <p><i>Clyde R. Seidle</i></p> <p>CITY ENGINEER      9-1-15      DATE</p>	<p>OLD HILLIARD STREET POLE BASE, POLE &amp; LUMINAIRE</p>	<p>CITY OF <b>HILLIARD, OHIO</b></p> <p>STANDARD CONSTRUCTION DRAWING</p>	
<p>SCALE: 3/8" = 1'</p>		<p>2/2</p>	<p>SL-16</p>

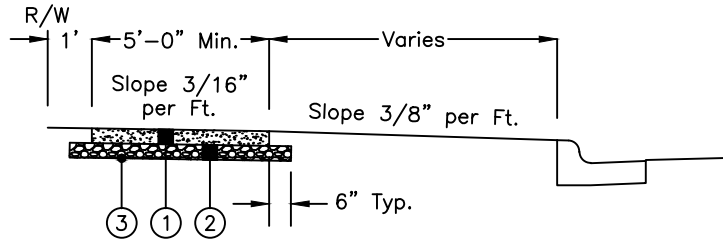
1. Wiring to be 600V type THWN Cu per the table below.

THOROUGHFARE							
Cond. Size	Cond. Material	No. of Fixture	Typical Fixt Spacing	Voltage	Watt / Fixt	Voltage Drop	% Drop
#4	Cu	10	90	480	89	1.3	0.3%
		15	90	480	89	2.9	0.6%
		20	90	480	89	5.2	1.1%
#6	Cu	10	90	480	89	2.0	0.4%
		15	90	480	89	4.4	0.9%
		20	90	480	89	7.8	1.6%
#8	Cu	10	90	480	89	3.1	0.6%
		15	90	480	89	6.9	1.4%

OLD HILLIARD							
Cond. Size	Cond. Material	No. of Fixture	Typical Fixt Spacing	Voltage	Watt / Fixt	Voltage Drop	% Drop
#4	Cu	10	90	240	75	2.5	1.0%
		15	90	240	75	5.6	2.3%
#6	Cu	10	90	240	75	2.5	1.0%
		15	90	240	75	5.6	2.3%
#8	Cu	10	90	240	75	2.5	1.0%
		15	90	240	75	5.6	2.3%

RESIDENTIAL							
Cond. Size	Cond. Material	No. of Fixture	Typical Fixt Spacing	Voltage	Watt / Fixt	Voltage Drop	% Drop
#8	Cu	3	150	120	80	0.5	0.4%

APPROVED	CONDUCTOR DETAILS	CITY OF <b>HILLIARD, OHIO</b>	
 CITY ENGINEER		9-1-15 DATE	STANDARD CONSTRUCTION DRAWING
SCALE: N/A		1/1	SL-17



- ① Item 608 - 4" Concrete Walk
- ② Item Special - 4" Aggregate Base (#57 Stone)
- ③ Item 204 - Subgrade Compaction

Notes:

1. Item numbers refer to the City of Columbus, Ohio Standard Construction and Material Specifications, Division of Engineering, current edition and all work shall be done in accordance with these specifications.
2. Sidewalks shall be constructed with P.C. concrete (Class C, Item 499) which shall contain 5% to 8% entrained air and a 3" maximum slump.
3. Where driveways cross the sidewalk, the concrete shall be 6" thick for residential driveways and 8" thick for commercial driveways. See Hilliard Standard Drawings DD-1 and DD-2.
4. Length and slope of driveway ramps are variable according to the distance of the sidewalk from the curb.
5. All concrete shall be placed in one course and finished with a wood float.
6. Expansion joints shall be placed wherever new concrete touches existing construction and at intervals of 30' or less.
7. Water and gas valve boxes in the sidewalk area shall be adjusted to proper grade.
8. Roof drains shall extend under the sidewalk and through the curb. See Columbus Standard Drawing 2320 Dr. A.
9. Forms shall be made of lumber 2" nominal thickness or of equally rigid metal.
10. Immediately after finishing, concrete shall be cured in an approved manor.
11. Notify the City of Hilliard, Building Department @ 876-7361 at least 24 hours before concrete is to be placed for the inspection of the form work. In no case may concrete be placed without approval of the form work by the City.
12. Concrete shall be protected from freezing in accordance with Section 451.061 of Item 451 when the air temperature is predicted to be below 35°F at any time during the next 72 hours.

APPROVED	SIDEWALK SPECIFICATIONS	CITY OF <b>HILLIARD, OHIO</b>	
CITY ENGINEER _____ DATE _____		STANDARD CONSTRUCTION DRAWING	
SCALE: 1/4" = 1'		1/1	SW-1

**TRAFFIC CONTROL NOTES AND DETAILS**

**GENERAL NOTES**

1. All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.

**GENERAL NOTES**

2. All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.

3. All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.

4. All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.

**TRAFFIC CONTROL NOTES AND DETAILS**

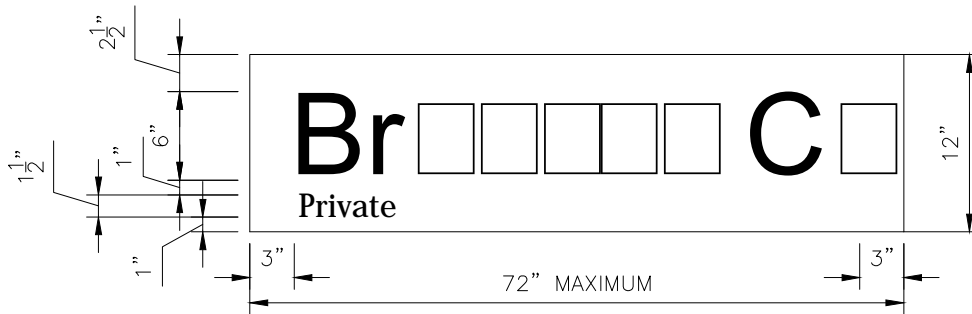
- All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.
- All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.
- All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.
- All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.
- All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.
- All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.
- All work shall be in accordance with the City of Hilliard Standard Specifications for Construction, 2014 Edition, and the Ohio Department of Transportation (ODOT) Standard Specifications for Construction, 2014 Edition.

	<b>TRAFFIC CONTROL NOTES AND DETAILS</b>	<b>CITY OF HILLIARD, OHIO</b>	
DATE: July 30, 2015	<b>STREET NAME SIGNS</b>	STANDARD CONSTRUCTION DRAWING	
SCALE: N.T.S.	GENERAL SPECIFICATIONS	1/10	TC-1

TRAFFIC CONTROL NOTES AND DETAILS

STREET NAME SIGNS

- The word "Private" shall be positioned beneath the private street name as shown in the example.
- A "Private" sign shall be positioned beneath the private street name as shown in the example.



TRAFFIC CONTROL  
NOTES AND DETAILS  
STREET NAME SIGNS

CITY OF  
HILLIARD, OHIO

DATE: July 30, 2015

STANDARD  
CONSTRUCTION DRAWING

SCALE: N.T.S.

GENERAL SPECIFICATIONS

2/10

TC-1

City of Hilliard Street Name Sign Reference Table

Type of Intersection	Speed Limit of Major Street	Installation			Post, Anchor & Bracket			Sign Size & Layout				
		Type of Mounting	Number of signs per intersection (min)	Vertical Clearance of Sign from Street	Post Type (galvanized; black in Old Hilliard)	Anchor Type (galvanized)	Bracket Type (galvanized; black in Old Hilliard)	Sign Blade Height	Sign Blade Max Length	Initial Upper Case Letter Height	1/2-inch Rounded Border	Single or Double Sided
<b>Type A - Signalized - Mast Arm</b> (all new City signal installations)	any	Overhead (On Mast Arm)	one per arm	on arm	N/A	N/A	Band or Cable-Mntd	20"	96"	12"	Yes	Single
<b>Type B - Signalized - Strain Pole</b> (existing signals or former FCEO signals)	Any	Side/Corner (On Strain Pole)	2 signs on 2 poles (opposite corners)	15'	N/A	N/A	2 cantilevered brackets & double-tee stiffeners (4 bands per sign)	20"	72"	9"	No	Double
<b>Type C - Roundabout</b>	Any	2 Posts per sign (in splitter islands)	one sign per splitter island	5'	2" square x 14 gauge galvanized w/ rain caps	2-1/4" square x 42" long; 8" min lap	N/A	16"	72"	7"	Yes (& chevron-arrow)	Single
<b>Type D - Unsignalized - Arterial or Collector - high speed</b> (includes subdivision street at Arterial/Collector - e.g. Dublin Rd cross streets)	40+ MPH	Side/Corner & Cantilevered (On Post)	1 sign @ T intersection; 2 signs @ X intersection	12'	2" square x 12 gauge galvanized w/ rain caps	2-1/4" square x 48" long; 18" min lap	2 cantilevered brackets & double-tee stiffeners	16"	72"	8"	No	Double
<b>Type E - Unsignalized - Arterial or Collector - low speed</b> (includes subdivision street at Arterial/Collector - e.g. Cemetery Rd cross streets)	25 - 35 MPH	Side/Corner & Cantilevered (On Post)	1 sign @ T intersection; 2 signs @ X intersection	12'	2" square x 12 gauge galvanized w/ rain caps	2-1/4" square x 48" long; 18" min lap	2 cantilevered brackets & double-tee stiffeners	12"	72"	6"	No	Double
<b>Type F - Unsignalized - Subdivision</b> (e.g. internal subdivision streets - <u>not</u> primary street intersection with arterial or collector)	25 MPH	Side/Corner & Cross-Mounted (On Post)	One (2 if street name changes at cross street)	10'	2" square x 12 gauge galvanized - <u>without</u> rain caps	2-1/4" square x 30" long; 8" min lap	12" square post bracket & 12" cross piece bracket	9"	60"	5"	Yes	Double

Note:

SNS legends, prefixes, and suffixes shall be printed in FHWA **Clearview Font Type 2-W** using standard horizontal letter spacing and edge spacing. Lettering size and space reductions are permitted only on existing street names. New subdivision street names shall comply with all standards.

TRAFFIC CONTROL  
NOTES AND DETAILS  
STREET NAME SIGNS

CITY OF  
HILLIARD, OHIO

DATE: July 30, 2015

STANDARD  
CONSTRUCTION DRAWING

SCALE: N.T.S.

REFERENCE TABLE

3/10

TC-1



**TYPE E**

TYPE E signs shall be fabricated in accordance with the provisions of the Ohio Revised Code, Chapter 4535, and the applicable provisions of the Ohio Administrative Code, Chapter 307. E signs shall be used on A-Road/Driveway Dr., Dead-End Road/Hwy Driveway Dr., and Suburban Driveway Rd/Hwy Driveway Dr.

Installation. A sign shall be installed in a secure location to avoid damage, or other signs shall be installed nearby. A sign shall be installed in a secure location to avoid damage. The sign shall be installed in a secure location to avoid damage. The sign shall be installed in a secure location to avoid damage. The sign shall be installed in a secure location to avoid damage. The sign shall be installed in a secure location to avoid damage. The sign shall be installed in a secure location to avoid damage.

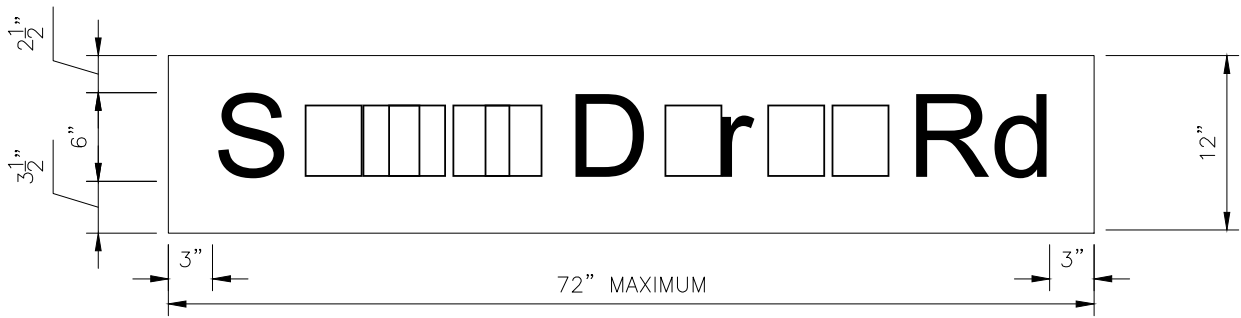
Materials. The sign shall be fabricated from aluminum (6061-T6), stainless steel (304), or fiberglass reinforced plastic.

Anchor. TYPE E signs shall be anchored in accordance with 2-inch diameter or 12 inches square anchors. A break-away anchor shall be used. Anchors shall be 2 1/4-inch square, 48 inches long, and shall be installed in concrete. The sign shall be anchored in concrete. The sign shall be anchored in concrete. The sign shall be anchored in concrete. The sign shall be anchored in concrete. The sign shall be anchored in concrete.

Dimensions. The sign blade shall be 12" high. Maximum sign blade length shall be 72".

Materials. Signs shall be fabricated in accordance with ASTM D4533 Type VIII 3M Duro Duct Grad LDP 300, ACR/Duroflex MVP Pro or T-500, or other approved materials.

Lettering. The initial upper case letter height shall be 6". Prefixes and suffixes shall be the same height as the main text. No border shall be used for the sign. A 3-inch border shall be used for the sign. The sign shall be installed in a secure location to avoid damage. The sign shall be installed in a secure location to avoid damage. The sign shall be installed in a secure location to avoid damage.



DATE: July 30, 2015	<b>TRAFFIC CONTROL NOTES AND DETAILS</b>	<b>CITY OF HILLIARD, OHIO</b>	
		STANDARD CONSTRUCTION DRAWING	
	SCALE: N.T.S.	TYPE E	8/10

**Traffic Control**

**F** shall be used on all streets with a posted speed limit of 25 mph or less. **F** shall be used on streets with a posted speed limit of 25 mph or less. **F** shall be used on streets with a posted speed limit of 25 mph or less.

**I** shall be used on all streets with a posted speed limit of 30 mph or more. **I** shall be used on streets with a posted speed limit of 30 mph or more. **I** shall be used on streets with a posted speed limit of 30 mph or more.

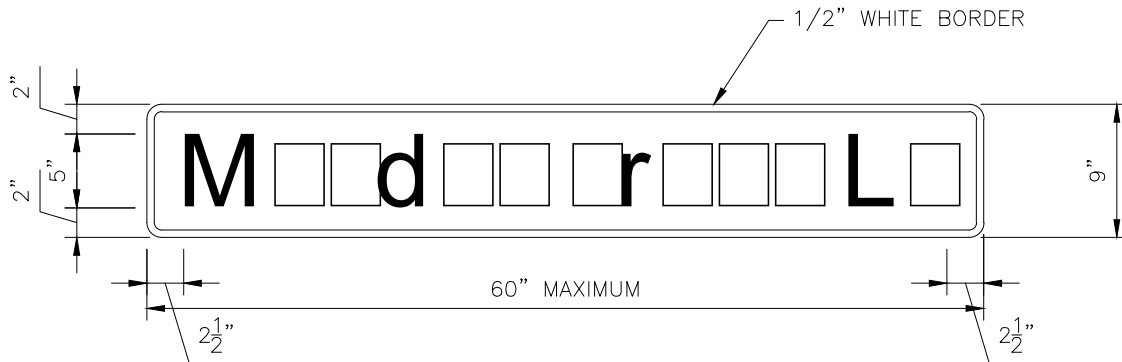
**D** and **E** shall be used on all streets with a posted speed limit of 35 mph or more. **D** and **E** shall be used on streets with a posted speed limit of 35 mph or more. **D** and **E** shall be used on streets with a posted speed limit of 35 mph or more.

**A** shall be used on all streets with a posted speed limit of 35 mph or more. **A** shall be used on streets with a posted speed limit of 35 mph or more. **A** shall be used on streets with a posted speed limit of 35 mph or more.

The sign blade shall be 9" high. Maximum sign blade length shall be 60".

**M** shall be used on all streets with a posted speed limit of 35 mph or more. **M** shall be used on streets with a posted speed limit of 35 mph or more. **M** shall be used on streets with a posted speed limit of 35 mph or more.

**L** shall be used on all streets with a posted speed limit of 35 mph or more. **L** shall be used on streets with a posted speed limit of 35 mph or more. **L** shall be used on streets with a posted speed limit of 35 mph or more.



	<b>TRAFFIC CONTROL NOTES AND DETAILS</b>  <b>STREET NAME SIGNS</b>  TYPE F	<b>CITY OF HILLIARD, OHIO</b>	
DATE: July 30, 2015		STANDARD CONSTRUCTION DRAWING	
SCALE: N.T.S.		9/10	TC-1

Anchor Bolt Specifications

**Part Description** 1 3/8" Dia. 30" Long Steel Support Anchor (Type A) Part P

**Part Use** Part E

Part P is a steel support anchor used for mounting a sign to a steel support structure. The anchor is made of steel and is 1 3/8" in diameter and 30" long. The anchor is threaded at the bottom and has a break-away top. The anchor is used to secure a sign to a steel support structure. The anchor is used to secure a sign to a steel support structure. The anchor is used to secure a sign to a steel support structure.

**Type A** is a steel support anchor used for mounting a sign to a steel support structure. The anchor is made of steel and is 1 3/8" in diameter and 30" long. The anchor is threaded at the bottom and has a break-away top. The anchor is used to secure a sign to a steel support structure.

**Type B** is a steel support anchor used for mounting a sign to a steel support structure. The anchor is made of steel and is 1 3/8" in diameter and 30" long. The anchor is threaded at the bottom and has a break-away top. The anchor is used to secure a sign to a steel support structure.

**Type C** is a steel support anchor used for mounting a sign to a steel support structure. The anchor is made of steel and is 1 3/8" in diameter and 30" long. The anchor is threaded at the bottom and has a break-away top. The anchor is used to secure a sign to a steel support structure. The anchor shall be 2 1/4-inch square, 42 inches long, and embedded such that 2 inches of the anchor remains above ground level. The anchor shall be made of steel and shall be threaded at the bottom. For mounting to a steel support structure, the anchor shall be embedded in a hole drilled in the steel support structure. The hole shall be 2 inches in diameter and 42 inches deep. The anchor shall be threaded at the bottom and shall have a break-away top. The anchor shall be used to secure a sign to a steel support structure.

**Type D** is a steel support anchor used for mounting a sign to a steel support structure. The anchor is made of steel and is 1 3/8" in diameter and 30" long. The anchor is threaded at the bottom and has a break-away top. The anchor is used to secure a sign to a steel support structure. The anchor shall be 2 1/4-inch square, 48 inches long, and shall be threaded at the bottom. The anchor shall be used to secure a sign to a steel support structure.

**Type E** is a steel support anchor used for mounting a sign to a steel support structure. The anchor is made of steel and is 1 3/8" in diameter and 30" long. The anchor is threaded at the bottom and has a break-away top. The anchor is used to secure a sign to a steel support structure. The anchor shall be 2 1/4-inch square, 48 inches long, and shall be threaded at the bottom. The anchor shall be used to secure a sign to a steel support structure.

**Type F** is a steel support anchor used for mounting a sign to a steel support structure. The anchor is made of steel and is 1 3/8" in diameter and 30" long. The anchor is threaded at the bottom and has a break-away top. The anchor is used to secure a sign to a steel support structure. The anchor shall be 2 1/4-inch square, 30 inches long, and shall be threaded at the bottom. The anchor shall be used to secure a sign to a steel support structure.

**Old Hardware** - The Old Hardware Drawing, the anchor shall be made of steel and shall be threaded at the bottom. The anchor shall be used to secure a sign to a steel support structure.

**Corner Hardware** - The Corner Hardware Drawing, the anchor shall be made of steel and shall be threaded at the bottom. The anchor shall be used to secure a sign to a steel support structure. The anchor shall be 3/16" in diameter.

	<b>TRAFFIC CONTROL NOTES AND DETAILS</b>	<b>CITY OF HILLIARD, OHIO</b>	
DATE: July 30, 2015	<b>STREET NAME SIGNS</b>	STANDARD CONSTRUCTION DRAWING	
SCALE: N.T.S.	SUPPORT & ANCHOR SPECIFICATIONS	10/10	TC-1

**REGULATORY, WARNING AND GUIDE SIGNS**

Plastic Dimples 1/2" 30 S, F.S. S.A.S.T.M. T. A.P. P.

Plastic U.P. SF

Plastic P. P. S, F.S. S.A.S.T.M. T. A.P. P. C.H. d.

A. C.H. d. S. 14-334-2355

M. S. ASTM D45 T VIII 3M D. Grd LDP 300, A. D. MVP Pr. T-500, C.H.

- S. L.
- C/W. d.
- P. B. W.
- STOP. /
- YIELD. d.

S. ASTM D45 T IV 3M H. Pr. 300, A. D. H. Pr. T-500, C.H.

R. 2- d. C.H.

	<b>TRAFFIC CONTROL NOTES AND DETAILS</b>	<b>CITY OF HILLIARD, OHIO</b>	
DATE: July 29, 2015	<b>REGULATORY, WARNING &amp; GUIDE SIGNS</b>	STANDARD CONSTRUCTION DRAWING	
SCALE: N.T.S.	GENERAL SPECIFICATIONS	1/2	TC-2

**REGULATORY NOTES AND DETAILS**  
**TRAFFIC CONTROL**

30 Graduated Message Signs, Signs, and Poles  
 Uniform Pole Location Factors

Poles shall be poles of 8-inches diameter or 10-inches diameter poles shall be 8-inches diameter. Poles shall be 20-feet high. Poles shall be 20-feet high. Poles shall be 20-feet high. Poles shall be 20-feet high.

Signs shall be 24-inches wide by 14-inches high. Signs shall be 24-inches wide by 14-inches high. Signs shall be 24-inches wide by 14-inches high. Signs shall be 24-inches wide by 14-inches high.

**Anchors.** Anchors shall be 2 1/4-inch square, 42 inches long, and embedded such that 2 inches of anchor shall be embedded in concrete. For anchors embedded in concrete or masonry, a 2-inch PVC sleeve shall be embedded around the anchor. The PVC sleeve shall be embedded around the anchor in concrete or masonry. A 2-inch PVC sleeve shall be embedded around the anchor in concrete or masonry.

**Vertical Clearance.** Signs shall be 5-feet high. Signs shall be 5-feet high. Signs shall be 5-feet high. Signs shall be 5-feet high.

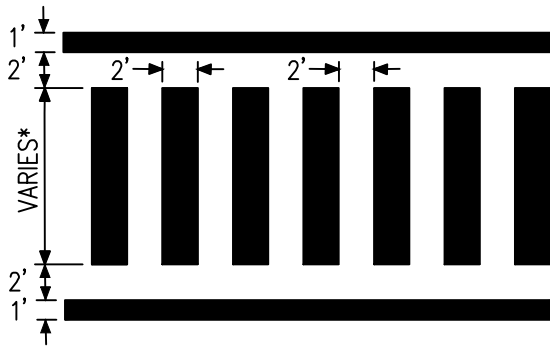
**Horizontal Clearance.** Horizontal clearance shall be 5-feet. Horizontal clearance shall be 5-feet. Horizontal clearance shall be 5-feet. Horizontal clearance shall be 5-feet.

**Old Hardware.** Old hardware shall be replaced. Old hardware shall be replaced. Old hardware shall be replaced. Old hardware shall be replaced.

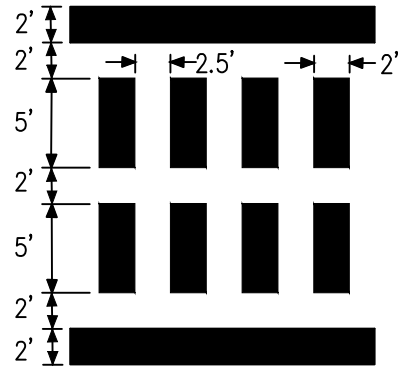
**Color.** Color shall be as specified. Color shall be as specified. Color shall be as specified. Color shall be as specified.

	<b>TRAFFIC CONTROL NOTES AND DETAILS</b>	<b>CITY OF HILLIARD, OHIO</b>	
DATE: July 29, 2015	<b>REGULATORY, WARNING &amp; GUIDE SIGNS</b>	STANDARD CONSTRUCTION DRAWING	
SCALE: N.T.S.	SUPPORT & ANCHOR SPECS	2/2	TC-2

HIGH-VISIBILITY  
CROSSWALK DETAIL

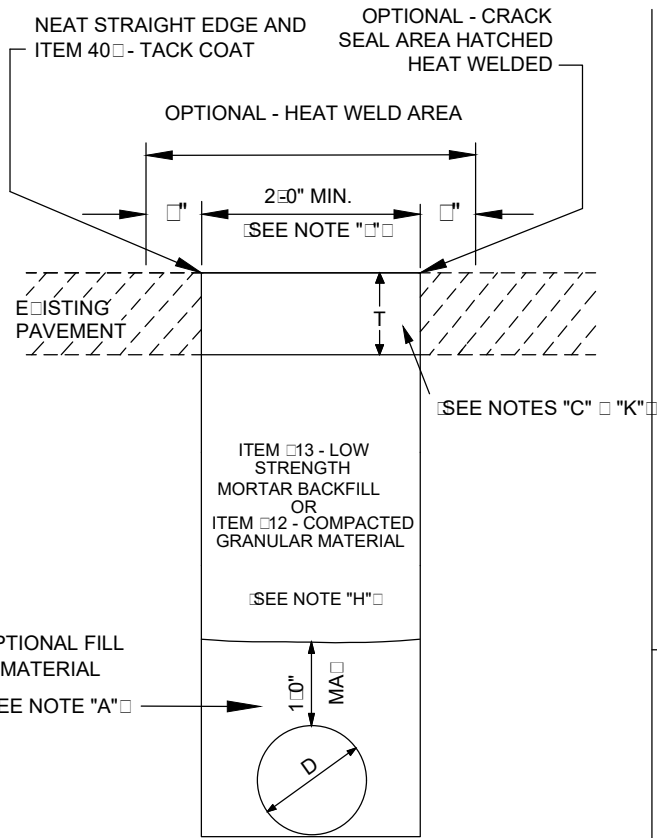


HIGH-VISIBILITY  
CROSSWALK DETAIL AT MAJOR  
TRAIL CROSSINGS

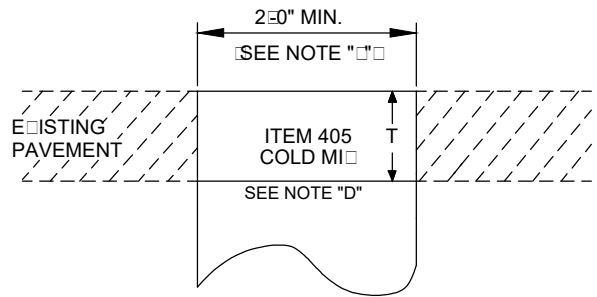


\*LENGTH OF LADDER STRIPE IS  
DEPENDENT ON WIDTH OF CROSSING  
AND AMOUNT OF PED/BIKE TRAFFIC.  
6' MIN. FOR SIDEWALK CROSSINGS.

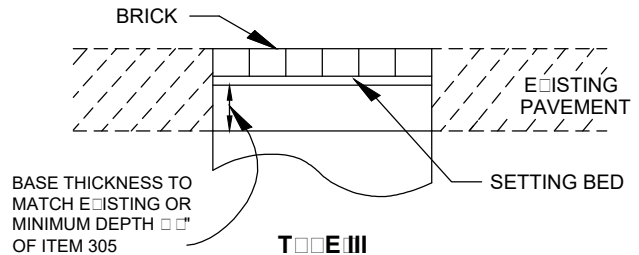
<p>DATE: June 14, 2016</p> <p>SCALE: N.T.S.</p>		<p>HIGH VISIBILITY CROSSWALK DETAILS</p>		<p>CITY OF HILLIARD, OHIO</p>	
				<p>STANDARD CONSTRUCTION DRAWING</p>	
				<p>1/1</p>	<p>TC-5</p>



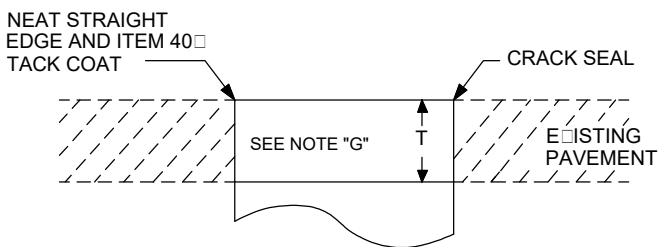
**TYPE I**  
**STANDARD CURB**  
**REPAIR**



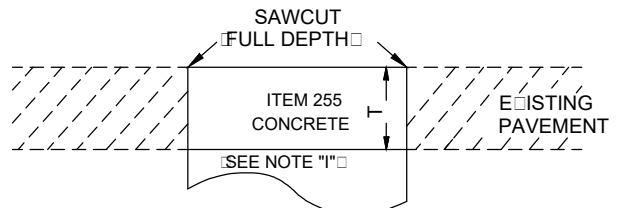
**TYPE II**  
**CURB WITH COLD MIX**  
**REPAIR**



**TYPE III**  
**BRICK CURB**  
**REPAIR**



**TYPE IV**  
**ALLEY**  
**REPAIR**



**TYPE V**  
**CONCRETE CURB**  
**REPAIR**

BACKFILL FOR ALL TYPES SHALL MEET THE REQUIREMENTS SHOWN IN TYPE I ABOVE.

T MATCH EXISTING PAVEMENT THICKNESS, HOWEVER, MINIMUM OF 10" ON ALL STREET CUTS AND 4" ON ALL ALLEYS.

# PAVEMENT & UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC SERVICE  
 DIVISION OF DESIGN AND CONSTRUCTION

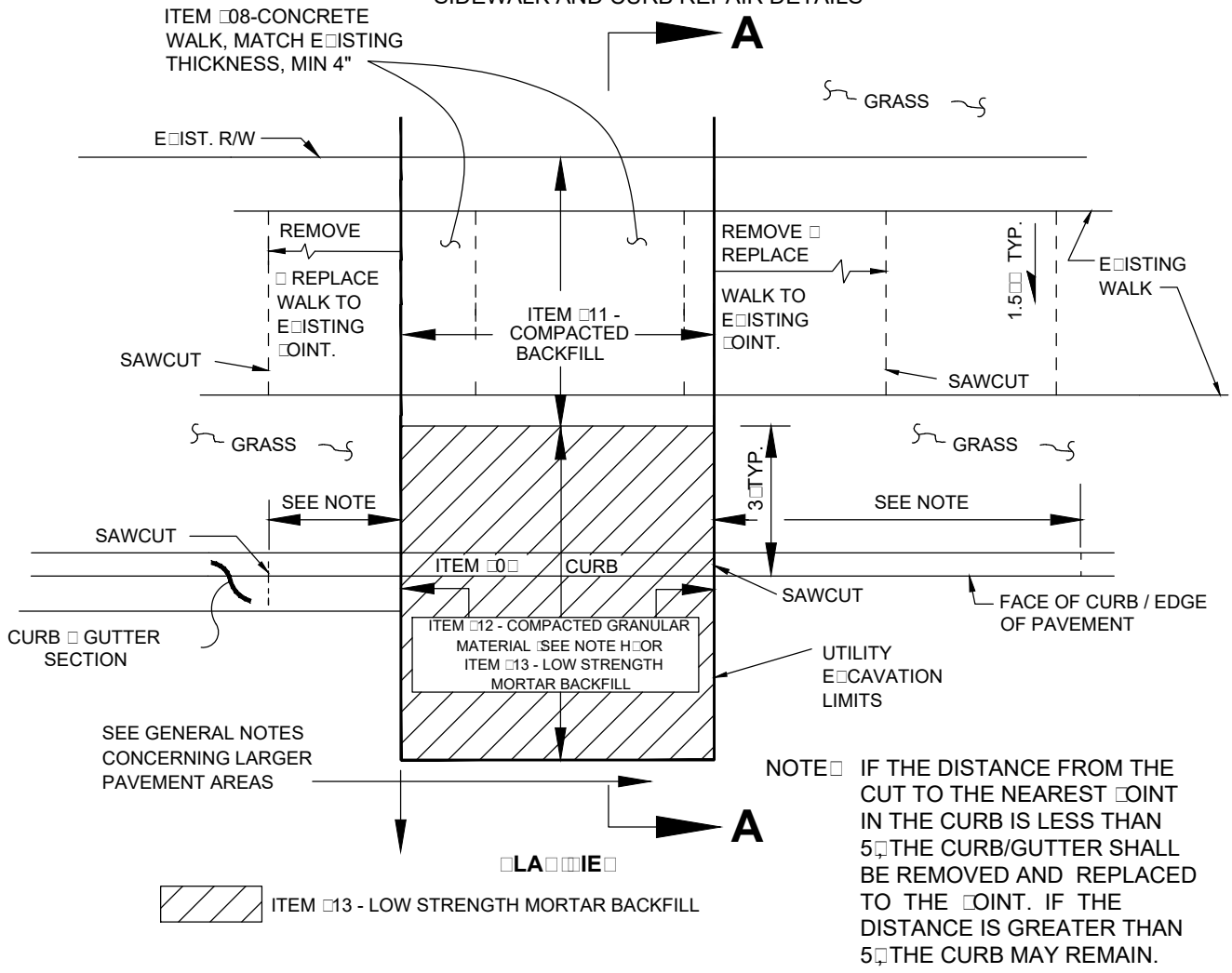
STD DWG  
 1441

CITY ENGINEER

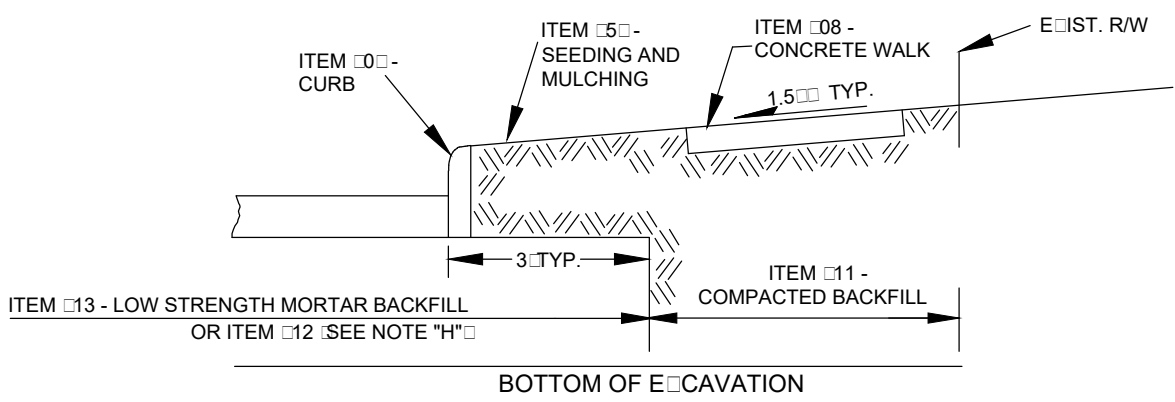
3/4/2010

SHT 1 OF 13

**SIDEWALK AND CURB REPAIR DETAILS**



**DETAIL A**



ALL GRASS AREAS SHALL BE SEEDED IN ACCORDANCE WITH ITEM 5 - SEEDING AND MULCHING.

**PAVEMENT & UTILITY CUT REPAIR STANDARDS**

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>1441</b> 3/4/201 SHT 2 OF 13
---	---



**GENERAL NOTE**

CAVATION PERMIT REQUIRED A CITY OF COLUMBUS STREET CAVATION PERMIT IS REQUIRED FOR ALL CAVATIONS WITHIN THE PUBLIC RIGHT-OF-WAY, AS SET FORTH BY COLUMBUS CITY CODE, CHAPTER 03 AND ISSUED IN ACCORDANCE WITH PROVISIONS IN THE GENERAL RULES AND REGULATIONS OF THE DEPARTMENT OF PUBLIC SERVICE DPS

**RE**

THE CONTRACTOR SHALL FULLY COMPLY WITH THE CITY OF COLUMBUS ADA RULES AND REGULATIONS AND THE CITY OF COLUMBUS CONSTRUCTION AND MATERIAL SPECIFICATIONS, CURRENT EDITION.

THIS WORK SHALL CONSIST OF PAVEMENT REMOVAL, NECESSARY CAVATION, AND PAVEMENT REPLACEMENT IN ACCORDANCE WITH THE DETAILS SHOWN HEREIN. ALL WORK AND MATERIALS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT CITY OF COLUMBUS CONSTRUCTION AND MATERIALS SPECIFICATION CMSC

PROCEDURES USED FOR THE PAVEMENT REMOVAL AND REPLACEMENT SHALL NOT CAUSE SPALLING OR CRACKING OF ADJACENT PAVEMENT.

WHEN THE PAVEMENT IS REMOVED AND THE CONTRACTOR IS UNABLE TO COMPLETE THE REQUIRED REPLACEMENT IN TIME FOR IT TO BE OPENED TO TRAFFIC AS INDICATED ON THE PERMIT, THE CAVATION SHALL BE FILLED WITH THOROUGHLY COMPACTED ITEM 405 BITUMINOUS COLD MIX WITH A DURABLE SURFACE OR APPROVED BITUMINOUS MATERIAL OR PROPERLY PLATED PER CHAPTER 03 AND SHEETS 12 AND 13 OF THIS STANDARD DRAWING. THE CONTRACTOR WILL BE REQUIRED TO MAINTAIN THESE TEMPORARY MEASURES WHILE THEY ARE IN SERVICE. THE COST OF PLACING, MAINTAINING, REMOVING AND DISPOSING OF THE TEMPORARY PATCHES OR PLATES WILL BE AT THE CONTRACTOR'S EXPENSE.

WHEN ITEM 13 LOW STRENGTH MORTAR BACKFILL LSMB IS USED AS A BACKFILL, NO PAVEMENT SHALL BE PLACED UNTIL BLEED WATER HAS BEEN EVAPORATED FROM THE LSMB SURFACE OR HAS BEEN DRAINED OR REMOVED FROM THE SURFACE. ITEM 13 LSMB IS NOT PERMITTED AS A TEMPORARY DRIVING SURFACE OR WITHIN THE DEPTH OF THE PAVEMENT REPAIR. LSMB SHALL NOT BE PLACED HIGHER THAN THE SUBGRADE ELEVATION AND NOT EXTEND INTO THE PAVEMENT BUILD-UP.

THE PAVEMENT REPAIR SHALL BE PERFORMED BY THE CONTRACTOR OR PERMITTEE IN ACCORDANCE WITH CITY SPECIFICATIONS. IF DESIRED, ANY OR ALL OF THIS WORK CAN BE PERFORMED BY THE CITY OF COLUMBUS. THE CITY SHALL COLLECT APPROPRIATE FEES AT THE TIME THE PERMIT IS ISSUED FOR SAID WORK. PAVEMENT RESTORATION MAY TRIGGER REQUIRED ADA IMPROVEMENTS PER CITY OF COLUMBUS ADA RULES AND REGULATIONS.

REPAIRS TO ALLEYS, STREETS, AND DRIVEWAYS SHALL BE COMPLETED BY THE CITY OF COLUMBUS. CONSTRUCTION ACTIVITY COMPLETED DECEMBER THROUGH APRIL SHALL BE RESOLVED NO LATER THAN MAY 31ST. ADDITIONAL PERMITS SHALL NOT BE ISSUED UNTIL THE VIOLATIONS ARE CORRECTED TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC SERVICE. IN ADDITION, EACH VIOLATION MAY BE ENFORCED IN ACCORDANCE WITH SECTION 03.03 OF THE COLUMBUS CITY CODE.

**EMERGENCY REPAIRS**

A THREE YEAR MORATORIUM SHALL BE ENFORCED FOR ALL NEW PAVEMENT OR REPAVEMENT/RESURFACING. PERMITS FOR ALL REPAVEMENT, REPAIRS, AND REPAIRS TO ALLEYS, STREETS, AND DRIVEWAYS SHALL BE COMPLETED BY THE CITY OF COLUMBUS. CONSTRUCTION ACTIVITY COMPLETED DECEMBER THROUGH APRIL SHALL BE RESOLVED NO LATER THAN MAY 31ST. ADDITIONAL PERMITS SHALL NOT BE ISSUED UNTIL THE VIOLATIONS ARE CORRECTED TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC SERVICE. IN ADDITION, EACH VIOLATION MAY BE ENFORCED IN ACCORDANCE WITH SECTION 03.03 OF THE COLUMBUS CITY CODE.

A THREE YEAR MORATORIUM SHALL BE ENFORCED FOR ALL NEW PAVEMENT OR REPAVEMENT/RESURFACING. PERMITS FOR ALL REPAVEMENT, REPAIRS, AND REPAIRS TO ALLEYS, STREETS, AND DRIVEWAYS SHALL BE COMPLETED BY THE CITY OF COLUMBUS. CONSTRUCTION ACTIVITY COMPLETED DECEMBER THROUGH APRIL SHALL BE RESOLVED NO LATER THAN MAY 31ST. ADDITIONAL PERMITS SHALL NOT BE ISSUED UNTIL THE VIOLATIONS ARE CORRECTED TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC SERVICE. IN ADDITION, EACH VIOLATION MAY BE ENFORCED IN ACCORDANCE WITH SECTION 03.03 OF THE COLUMBUS CITY CODE.

**PAVEMENT UTILITY CUT REPAIR STANDARDS**

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
**1441**

3/4/2010

SHT 3 OF 13

**CONTINUED FROM PREVIOUS SHEET**

**SPECIAL IMPROVED STREET**

SPECIAL IMPROVED STREETS, AS APPROVED BY THE DIRECTOR OF PUBLIC SERVICE, CITY ENGINEER OR DESIGNEE SHALL HAVE FIVE (5) YEAR MORATORIUM. NO PERMIT SHALL BE GRANTED FOR THE PURPOSE TO MAKE ANY OPENING ON ANY HARD SURFACE AREAS SUCH AS PAVEMENT, SIDEWALK, CURB, ETC., WITHIN THE RIGHT OF WAY OF SPECIAL IMPROVED STREET FOR A PERIOD OF NO LESS THAN FIVE (5) YEARS AFTER COMPLETION OF SUCH HARD SURFACE AREA. EMERGENCY REPAIRS OR PAVEMENT OPENINGS WITHIN THE FIVE (5) MORATORIUM SHALL HAVE ADDITIONAL AND SPECIFIC REQUIREMENTS BEYOND THE MINIMUM REQUIREMENTS OF STD DWG 1441 AND APPROVED ONLY BY THE DIRECTOR OF THE PUBLIC SERVICE AND CITY ENGINEER OR DESIGNEE.

**CURB RAMP INSTALLATION**

ALL CURB RAMPS SHALL BE INSTALLED PER STANDARD DRAWINGS 2300, 2310 AND DPS ADA RULES AND REGULATIONS.

**SPECIAL AEMENT AREA ADJUSTMENT AREA**

WHEN PAVEMENT CUTS OR REPAIRS IMPACT NON-CONVENTIONAL PAVEMENT BUILDUPS, THE CITY ENGINEER OR DESIGNEE WILL PROVIDE DIRECTION ON THE REQUIRED RESTORATION. IF THE NON-CONVENTIONAL PAVEMENT IS NOT IDENTIFIED IN THE DESIGN STAGE, IT IS THE PERMIT HOLDER'S RESPONSIBILITY TO BRING THIS TO THE ATTENTION OF THE DEPARTMENT OF PUBLIC SERVICE. SOME EXAMPLES OF NON-CONVENTIONAL PAVEMENT INCLUDE, FABRICS AND GRIDS USED TO STABILIZE SUBGRADE AND PAVEMENT, SPECIALITY BACKFILL AND SOIL SUPPORT STRUCTURES, PERMEABLE PAVEMENT AND STORMWATER BEST MANAGEMENT PRACTICES (BMPs)

**TRAFFIC CONTROL**

WHEN PAVEMENT CUTS OR REPAIRS REMOVE EXISTING STRIPING OR OTHERWISE RENDER STRIPING UNSERVICEABLE AS DETERMINED BY THE ENGINEER, TEMPORARY PAVEMENT MARKINGS PER CMSC 14 SHALL APPLY. TEMPORARY CLASS II MARKINGS SHALL BE PLACED IMMEDIATELY. CLASS II MARKINGS ARE ONLY FOR LANE LINES, CENTERLINES AND GORE MARKINGS AND PLACED FOR A MAXIMUM OF 14 DAYS. ALL TEMPORARY MARKINGS PLACED FOR A PERIOD LONGER THAN 14 DAYS BUT LESS THAN 30 DAYS SHALL BE ITEM 42 CLASS III MARKINGS. PERMANENT THERMOPLASTIC OR SPRAY THERMOPLASTIC SHALL BE PLACED WITHIN 30 DAYS ON A SURFACE COURSE. WHEN THERMOPLASTIC OR SPRAY THERMOPLASTIC IS TO BE INSTALLED, TEMPORARY MARKINGS SHALL BE CLASS III. ALL OVER WINTER TEMPORARY MARKINGS SHALL BE TYPE 1. ALL TEMPORARY PAVEMENT MARKINGS ON CONCRETE SHALL BE AS PER 40.0, TYPE I. PERMANENT PAVEMENT MARKINGS ON CONCRETE SHALL MATCH THE EXISTING PAVEMENT MARKINGS DIRECTED BY THE ENGINEER.

**PAVEMENT UTILITY  
CUT REPAIR  
STANDARDS**

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

**1441**

3/4/2010

SHT 4 OF 13

## SPECIAL NOTES

### TEA LOW STRENGTH MORTAR BACKFILL

WHEN USING LOW STRENGTH MORTAR BACKFILL (LSMB), THE OPTIONAL FILL AREA OVER THE CONDUIT MAY BE BACKFILLED WITH SAND, GRANULAR MATERIAL, OR OTHER SUITABLE #12 MATERIAL, FOR A DISTANCE NOT TO EXCEED 1 FT. A PROTECTIVE BARRIER OF VISQUEEN OR SIMILAR MATERIAL IS PERMITTED.

### TE CRACK SEALING METHODS

FOR TYPE I PAVEMENT REPAIR SEALING OPTIONS - THE FOLLOWING METHODS ARE PERMITTED

1. CRACK SEALING METHOD - SEAL THE PERIMETER SURFACE OF THE REPAIRED AREA BY APPLYING A NOMINAL 4 INCH STRIP OF APPROVED ITEM 423 - CRACK SEALING, TYPE II OR III.
2. HEAT WELD METHOD - FOR PAVEMENT REPAIR LOCATIONS, THE AREA TO BE HEAT WELDED IS TO INCLUDE THE CUT AND EXTEND FOR 4 INCHES BEYOND EACH SIDE OF THE CUT FOR A NOMINAL DEPTH OF 2 INCHES.

### TE CRACK SEALING METHODS

FOR TYPE I PAVEMENT REPAIR APPLICATIONS, THE FOLLOWING METHODS ARE PERMITTED

1. IF LANE WIDTH TO BE RESURFACED - USE ITEM 441 ASPHALT CONCRETE, INTERMEDIATE COURSE, TYPE 2, BINDER MATCHING SURFACE COURSE - PLACED IN LIFTS NOT EXCEEDING 3 INCHES TO REPAIR PAVEMENT TO THE SURFACE. DURING THE LATER MILL AND ASPHALT OVERLAY OPERATION, USE ITEM 441 ASPHALT CONCRETE SURFACE COURSE, TYPE 1.
2. IF NO LANE WIDTH RESURFACING - USE ITEM 441 ASPHALT CONCRETE, INTERMEDIATE COURSE, TYPE 2, PLACED IN LIFTS NOT EXCEEDING 3 INCHES AND ITEM 441 ASPHALT CONCRETE, SURFACE COURSE, TYPE 1 PLACED AT A MAXIMUM 1.5 INCH LIFT THICKNESS. THE INTERMEDIATE COURSE MATERIAL IS NOT PERMITTED AS THE FINAL SURFACE COURSE.

THE ASPHALT BINDER FOR INTERMEDIATE AND SURFACE COURSE ASPHALT SHALL BE PG #0-22 ON ARTERIAL ROADWAYS, BUS ROUTES, AND WHERE SPECIFIED BY THE PERMIT OFFICE. ALL OTHER ROADS SHALL BE PG #4-22.

TRENCHES THAT REQUIRE FULL LANE RESURFACING SHALL INCLUDE FULL LANE RESURFACING ON ALL CONNECTING TRENCHES AND ASSOCIATED VALVE OR CASTING WORK AREAS ALONG ADJACENT STREETS. UTILITY SERVICE REPAIRS SHALL BE AS PER SHEETS # 10 AND 11. REGARDLESS OF THE LENGTH OF THE CONNECTING TRENCH.

WHEN AN EXCAVATION EXCEEDS 100 FT IN LENGTH, THE REPAIR SHALL INCLUDE ITEM 254 PLANING OF A FULL LANE WIDTH OR ANY OTHER LANE WIDTH AS DIRECTED BY THE DEPARTMENT OF PUBLIC SERVICE TO A DEPTH OF 1- 1/2 INCHES FOR THE ENTIRE LENGTH OF THE EXCAVATION. THE RESURFACING SHALL NOT INTRODUCE ANY LONGITUDINAL PAVEMENT JOINTS. WHEN RESURFACING OUTSIDE LANES, RESURFACING SHALL EXTEND TO THE FACE OF CURB OR EDGE OF PAVEMENT. IF PAVEMENT PLANING DOES NOT PROVIDE A UNIFORM PLANED SURFACE DUE TO THE EXISTING PAVEMENT CONDITION, THE DEPTH OF THE PAVEMENT REMOVAL AND RESURFACING SHALL BE ADJUSTED ACCORDINGLY. WHERE THE PROPOSED RESURFACING IS IN CLOSE PROXIMITY TO AN EXISTING LONGITUDINAL JOINT, THE RESURFACING SHALL BE EXTENDED TO MEET OR OVERLAP THAT JOINT. WHEN RESURFACING ADJOINS AN AREA WITH EXISTING OVERLAID GUTTER, THE RESURFACING SHALL EXTEND THE FULL LANE WIDTH TO THE EXISTING PAVEMENT EDGE AT THE FACE OF CURB. THE PLANED AREA SHALL BE TACKED USING ITEM 40#02 MATERIAL PRIOR TO PLACING AND COMPACTING APPROVED ASPHALT CONCRETE WITH A PAVER IN ACCORDANCE WITH CURRENT CITY STANDARD SPECIFICATIONS. ITEM 423 -CRACK SEALING, TYPE II OR III SHALL BE APPLIED TO EXPOSED JOINTS ONCE THE PAVING OPERATION HAS BEEN COMPLETED.

## PAVEMENT & UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/2011

SHT 5 OF 13

## EMERALD T

WHEN AN EXCAVATION CROSSES LANES, ALL LANES AFFECTED SHALL REQUIRE PLANING AND RESURFACING AS DESCRIBED ABOVE. THIS WORK SHALL INCLUDE ALL OF THE AFFECTED PAVEMENT AREA. WHEN EXCAVATION WORK FOR LATERALS CROSS LANES AT A FREQUENCY OF 2 OR MORE TRENCHES WITHIN 100 FT OF ROADWAY, THE REPAIR SHALL INCLUDE THE RESURFACING OF A FULL LANE WIDTH AS DESCRIBED ABOVE FOR THE AFFECTED LANES EXTENDING A MINIMUM OF 2 FT BEYOND THE LATERAL EXCAVATIONS LOCATED FARTHEST APART.

FULL LANE WIDTH RESURFACING OUTSIDE TRAVEL LANES SHALL EXTEND TO THE EDGE OF PAVEMENT FACE OF CURB UNLESS A SHOULDER WIDER THAN 4 FEET IS SEPARATED BY AN EXISTING LONGITUDINAL JOINT.

WHEN 2 OR MORE PAVEMENT REPAIRS ARE LOCATED WITHIN 100 FT OF EACH OTHER IN THE SAME LANE, THE REPAIR SHALL INCLUDE THE RESURFACING OF A FULL LANE WIDTH AS DESCRIBED ABOVE OF THE AFFECTED LANES EXTENDING A MINIMUM OF 2 FT BEYOND THE PAVEMENT REPAIRS LOCATED FARTHEST APART.

IF APPROVED BY THE CITY OF COLUMBUS, WHEN A PAVEMENT REPAIR AREA IS GREATER THAN 5 FT IN WIDTH AND/OR GREATER THAN 100 FT IN LENGTH, THE PAVEMENT REPAIR SECTION MAY CONFORM TO 3 INCHES OF ITEM 441 ASPHALT CONCRETE ON 4 INCHES OF ITEM 301 ASPHALT CONCRETE BASE PLACED IN 2 LIFTS. LANE WIDTH RESURFACING REQUIREMENTS STILL APPLY. THIS OPTION MUST BE NOTED ON THE PERMIT APPLICATION AND APPROVED BY THE CITY OF COLUMBUS.

### TEMPERATURE II ITEM I COLD MIXED LEME T

COLD MIX SHALL BE ITEM 405 BITUMINOUS COLD MIX OR OTHER COLD MIX APPROVED BY THE CITY OF COLUMBUS. IN LIEU OF COLD MIX, THE CONTRACTOR MAY USE STOCKPILED ITEM 441 ASPHALT CONCRETE AND REHEAT IT TO PLACE IN CUT AS TEMPORARY PAVEMENT REPAIR. TYPE II PAVEMENT REPLACEMENT SHALL CONSIST OF FULL DEPTH ITEM 405 COLD MIX FOR SMALL EXCAVATIONS.

### TEMPERATURE II ITEM RAR I COLD MIXED LEME T

THE TEMPORARY COLD MIX IS TO BE REPLACED WITH ITEM 441 ASPHALT CONCRETE FOLLOWING PAVEMENT REPAIR PROCEDURES. THIS WORK SHALL BE PERFORMED AS SOON AS ASPHALT IS AVAILABLE.

### TEMPERATURE III REPAIR RIRI STREET

1. THE CITY OF COLUMBUS MAINTAINS TWO TYPES OF BRICK STREETS: 1. HISTORICAL BRICK STREETS; AND 2. NEWER STYLE ROADWAY PAVER STREETS THAT COMPLY WITH SUPPLEMENTAL SPECIFICATION 1524. WHEN EXCAVATING AND REPAIRING BRICK STREETS, THE MATERIAL USED FOR REPLACEMENT SHALL MATCH THE EXISTING.
2. BRICKS OR PAVERS REMOVED FROM A REPAIR AREA SHALL BE STORED IN A SAFE PLACE BY THE CONTRACTOR FOR REUSE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ANY BRICKS OR PAVERS THAT ARE STOLEN OR DAMAGED, AT NO ADDITIONAL COST TO THE CITY.
3. IF BRICKS OR PAVERS ARE SUPPLIED BY THE CONTRACTOR, THEY MUST CLOSELY MATCH THE EXISTING BRICKS OR PAVERS AND FIRST BE APPROVED BY THE CITY BEFORE THEY ARE USED. SEE THE DEPARTMENT OF PUBLIC SERVICE APPROVED PRODUCERS / PRODUCTS LISTS THAT CAN BE FOUND AT THE "DOCUMENT LIBRARY ON DEPARTMENT OF PUBLIC SERVICE WEBSITE"
4. SAW CUTTING ALL PARTIAL BRICKS SHALL BE SAWCUT. FURTHER, NO BRICK WILL BE PERMITTED TO BE CUT, FOR REPLACEMENT, TO A LENGTH LESS THAN 1/2 ITS ORIGINAL LENGTH. THIS MAY REQUIRE SAW CUTTING OF ADJACENT UNDISTURBED BRICKS.
5. DURING REMOVAL OF THE EXISTING BASE MATERIAL, IT SHALL BE CUT BACK TO AS NEARLY VERTICAL AS POSSIBLE. IF SHEARING OF THE ADJACENT BASE RESULTS, THE CONTRACTOR SHALL REMOVE ADDITIONAL BASE MATERIAL UNTIL A VERTICAL FACE IS ACHIEVED.

## PAVEMENT UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/2013

SHT 1 OF 13

## SPECIAL NOTES

- DURING INSTALLATION, THE BRICK IS TO BE RESET IN REASONABLY CLOSE CONFORMITY TO THE PATTERN OF THE EXISTING BRICK PAVEMENT ON A SETTING BED OVER ITEM 305 CONCRETE BASE. THE SETTING BED FOR HISTORICAL BRICK STREETS SHALL CONSIST OF 1 INCH OF SAND; WHEREAS, 3/4-INCH BITUMINOUS SETTING BED FOR NEWER STYLE ROADWAY PAVERS. THE CONCRETE BASE THICKNESS SHALL MATCH THE EXISTING BASE OR A MINIMUM OF 4 INCHES.
  
- A. HISTORICAL BRICKS WITHOUT SPACING LUGS □ THE MAXIMUM WIDTH OF A BRICK JOINT SHALL BE 1/2 INCH. THIS RESTRICTION SHALL ALSO APPLY TO THE JOINT FORMED ADJACENT TO THE PERIMETER OF A REPAIR AREA, WHERE THE ROWS MAY NOT BE PARALLEL TO ONE ANOTHER. ALL JOINTS SHALL BE FILLED WITH POLYMERIC SAND FROM THE APPROVED MATERIALS LIST FOLLOWING MANUFACTURER'S INSTRUCTIONS. THIS MAY REQUIRE MORE THAN ONE APPLICATION. FURTHER, MECHANICAL VIBRATION WILL BE REQUIRED FOR CONSOLIDATION OF DRY MORTAR MIX.
  
- B. NEWER STYLE ROADWAY PAVERS □ INSTALLATION AND MATERIALS SHALL MEET WITH THE REQUIREMENTS OF COLUMBUS SUPPLEMENTAL SPECIFICATION 1524.

## PAVEMENT □ UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/2011

SHT 1 OF 13

## □ □ E □ I A L □ □ T E □

### □ □ T E □ □ T □ □ E □ □ A L L E □ □ R E □ A I R

FOR ALLEY REPAIRS, THE PAVEMENT REPLACEMENT SHALL CONFORM TO THE TYPE AND THICKNESS OF THE EXISTING PAVEMENT. CHIP AND SEAL TYPE ALLEYS SHALL REQUIRE MATCHING THE EXISTING THICKNESS OF PAVEMENT WITH THE APPROPRIATE COMBINATION OF MATERIALS BASED ON THE SIZE OF THE EXCAVATION. THE MINIMUM PAVEMENT THICKNESS SHALL CONSIST OF 4 INCHES OF ITEM 441 ASPHALT CONCRETE. FINISHED CONCRETE PAVEMENT IS NOT PERMITTED. MATERIALS USED SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT CMSC.

IF MORE THAN 1/3 OF THE WIDTH OF AN ALLEY IS REMOVED, THE PAVEMENT SHALL BE REPLACED AS PER TYPE 1 AND THEN OVERLAYED OVER THE TOTAL WIDTH OF PAVEMENT AND LENGTH OF TRENCH.

### □ □ T E □ □ I T E M □ □ □ □ □ □ □ □ M □ A □ T E D □ □ R A □ □ L A R M A T E R I A L

THIS METHOD OF BACKFILL CAN ONLY BE USED WITH FULL TIME CITY INSPECTION. AN INSPECTION FEE MUST BE POSTED WHEN THE PERMIT IS ISSUED.

### □ □ T E □ □ □ □ □ □ R E T E □ □ A □ E □ □ R □ □ L L D E □ T □ □ □ □ □ □ R E T E □ □ A □ E M E □ T

FULL DPTH CONC T PAV MNT

IF THE UTILITY TRENCH CUT IS WITHIN 4 FT OF A TRANSVERSE OR LONGITUDINAL JOINT, THE LIMITS OF THE REPAIR SHALL EXTEND TO THE JOINT. THIS MAY REQUIRE THE ENTIRE PANEL TO BE REPLACED. AT A MINIMUM, THE LIMITS OF THE CONCRETE REPAIR SHALL EXTEND 1 FT BEYOND THE LIMITS OF THE TRENCH.

IF MAINTENANCE OF TRAFFIC REQUIREMENTS ALLOW FOR SUFFICIENT CURING TIME SO THAT FAST SETTING CONCRETE IS NOT NEEDED, STANDARD CONCRETE BASE OR FULL DEPTH CONCRETE PAVEMENT MAY BE PLACED AS PER CMSC ITEM 255. THIS OPTION MUST BE NOTED ON THE PERMIT APPLICATION AND APPROVED BY THE CITY OF COLUMBUS. THE ENTIRE IMPACTED CONCRETE PANEL SHALL BE REPLACED WHEN THE UTILITY CUT IS LOCATED IN THE DOWNTOWN BUSINESS DISTRICT.

PAV MNT WITH A CONC T AS THE NEW CONCRETE BASE THICKNESS SHALL MATCH THE EXISTING 4 INCHES MINIMUM AND IT SHALL BE PLACED TO THE LEVEL OF THE ADJACENT CONCRETE BASE WITH 1-1/2 INCHES OF ITEM 441 ASPHALT CONCRETE OVERLAY. LANE WIDTH RESURFACING REQUIREMENTS OF TYPE 1 STILL APPLY.

### □ □ T E □ □ □ □ M I □ M □ M T R E □ □ □ □ R E □ T □ R A T I □ □ □ □ I D T □

THE TRENCH WIDTH FOR SMALL PIPES AND CONDUITS SHALL BE OF SUFFICIENT WIDTH TO ALLOW FOR THE PROPER PLACEMENT OF THE BACKFILL MATERIAL. THE PAVEMENT PORTION OF THE TRENCH SHALL BE A MINIMUM OF 2 FT IN WIDTH. THIS IS TO ALLOW FOR THE PROPER COMPACTION OF THE ASPHALT PAVEMENT. IF THE TRENCH FOR PLACING CONDUIT IS NARROWER THAN 2 FT THEN THE PAVEMENT PORTION SHALL BE CUT BACK TO PROVIDE THE 2 FT MINIMUM FOR PAVING OPERATIONS.

### □ □ T E □ □ □ □ T E M □ □ R A R □ □ □ □ □ R E T E □ □ A □ E M E □ T

CONCRETE MAY BE USED AS A PAVEMENT REPAIR OPTION AND A TEMPORARY PAVEMENT SURFACE FOR TYPE 1 PAVEMENT REPAIR IF APPROVED BY THE CITY. THE CONCRETE SHALL BE PLACED PER CMSC ITEM 255 AND FOLLOW THE REQUIREMENTS OF TYPE V PAVEMENT REPAIR. 1-1/2 INCHES OF ITEM 441 ASPHALT OVERLAY WILL BE REQUIRED OVER THE CONCRETE WHEN WORK IS COMPLETED. THIS OPTION MUST BE NOTED ON THE PERMIT APPLICATION APPROVED BY THE CITY OF COLUMBUS.

### □ □ T E □ □ □ □ □ □ R □ A □ E □ R □ E □ A □ I □ □ □ A □ E □ (SEE SHEET 11)

THE SURFACE REPAIR OF ALL IRREGULAR-SHAPED EXCAVATIONS SHALL ALWAYS BE A RECTANGLE WITH PARALLEL SIDES THAT ARE PERPENDICULAR TO THE DIRECTION OF TRAVEL OF THE ROADWAY.

# PAVEMENT □ UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/201□

SHT 8 OF 13

# ACCEPTABLE UTILITY CUT REPAIRS

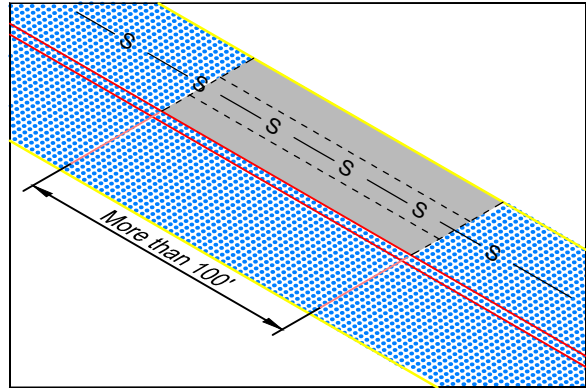
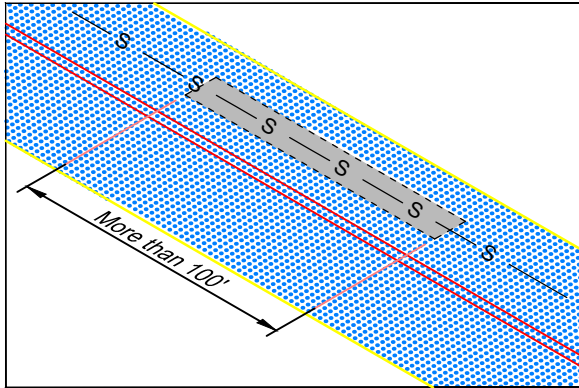
## EXCAVATION EXCEEDING 100' IN LENGTH LOCATED WITHIN LANE

WHEN AN EXCAVATION EXCEEDS 100 FT IN LENGTH, THE REPAIR SHALL INCLUDE ITEM 254 PAVEMENT PLANING OF A FULL LANE WIDTH (OR ANY OTHER LANE WIDTH AS DIRECTED BY THE DEPARTMENT OF PUBLIC SERVICE) TO A DEPTH OF 1-1/2 INCHES FOR THE ENTIRE LENGTH OF THE EXCAVATION. THE PLANED AREA SHALL BE THOROUGHLY CLEANED AND DRY, THEN TACKED USING ITEM 407 TACK COAT MATERIAL PRIOR TO PLACING AND COMPACTING APPROVED ASPHALT CONCRETE WITH A PAVER IN ACCORDANCE WITH CURRENT CITY STANDARD SPECIFICATIONS. ITEM 423 CRACK SEALING, TYPE II OR III, SHALL BE APPLIED TO EXPOSED JOINTS ONCE THE PAVING OPERATION HAS BEEN COMPLETED.

NOT ACCEPTABLE

SEE NOTE "C"

ACCEPTABLE



FOR AN EXCAVATION IN A SINGLE LANE, PERFORM A FULL-LANE-WIDTH PLANE AND REPAIR.

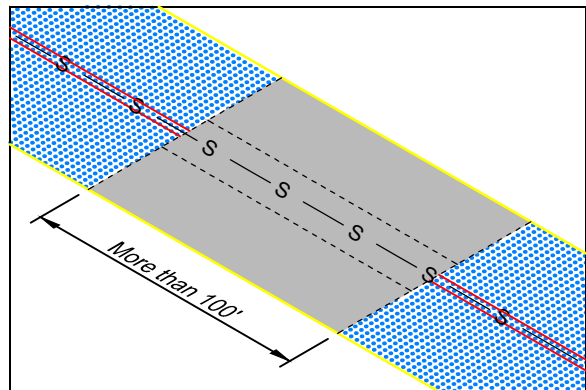
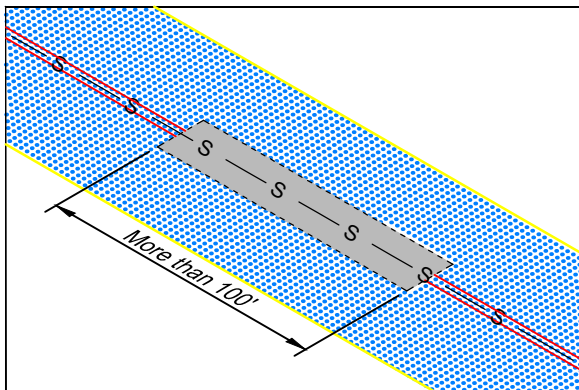
## EXCAVATION EXCEEDING 100' IN LENGTH BETWEEN OR CROSSING LANES

WHEN AN EXCAVATION CROSSES LANES, ALL AFFECTED LANES SHALL REQUIRE PLANING AND RESURFACING AS DESCRIBED ABOVE. THIS WORK SHALL INCLUDE ALL OF THE PAVEMENT AREA WITHIN THE AFFECTED LANES FOR THE LIMITS OF THE EXCAVATION.

NOT ACCEPTABLE



SEE NOTE "C"

ACCEPTABLE



FOR AN EXCAVATION IN MULTIPLE LANES, PERFORM A FULL-LANE-WIDTH PLANE AND REPAIR FOR ALL IMPACTED LANES.

### LEGEND

-  EXISTING PAVEMENT
-  NEW PAVEMENT REPAIR

NOTE  
EXCAVATIONS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS SECTION AND PROFILE SHEETS FOR CONSTRUCTION PROCEDURES AND WIDTHS.

## PAVEMENT UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/2010

SHT 0 OF 13

# ACCEPTABLE UTILITY CUT REPAIRS

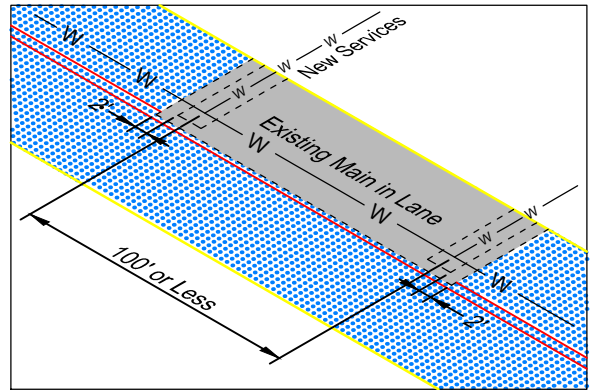
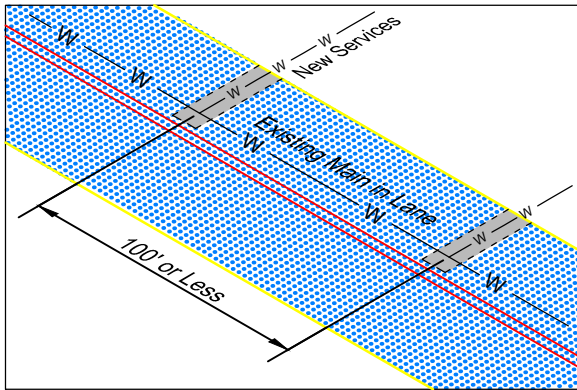
## UTILITY EXCAVATIONS CROSSING ONE LANE WITHIN 100'

WHEN EXCAVATION WORK FOR LATERALS CROSSES A LANE AT A FREQUENCY OF 2 OR MORE LATERAL EXCAVATIONS WITHIN 100 FEET OF EACH OTHER, THE REPAIR SHALL INCLUDE ITEM 254 PAVEMENT PLANING FOR THE FULL LANE WIDTH TO A DEPTH OF 1- 1/2 INCHES AND FOR A MINIMUM OF 2 FEET BEYOND THE FURTHEST LATERAL EXCAVATIONS. THE PLANED AREA SHALL BE THOROUGHLY CLEANED AND DRY, THEN TACKED USING ITEM 407 TACK COAT MATERIAL PRIOR TO PLACING AND COMPACTING APPROVED ASPHALT CONCRETE WITH A PAVER IN ACCORDANCE WITH CURRENT CITY STANDARD SPECIFICATIONS. ITEM 423 CRACK SEALING, TYPE II OR III, SHALL BE APPLIED TO EXPOSED JOINTS ONCE THE PAVING OPERATION HAS BEEN COMPLETED.

NOT ACCEPTABLE

SEE NOTE "C"

ACCEPTABLE



FOR MULTIPLE EXCAVATIONS WITHIN 100', PERFORM A FULL-LANE-WIDTH PLANE AND REPAIR.

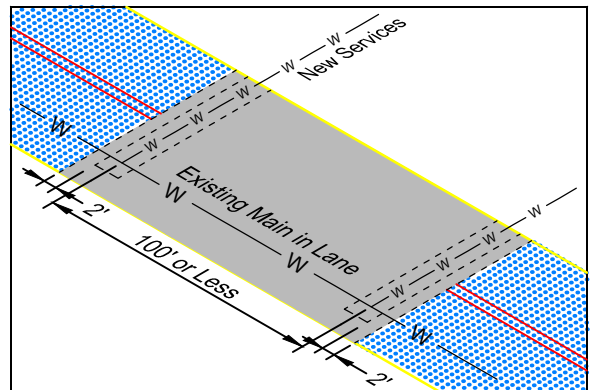
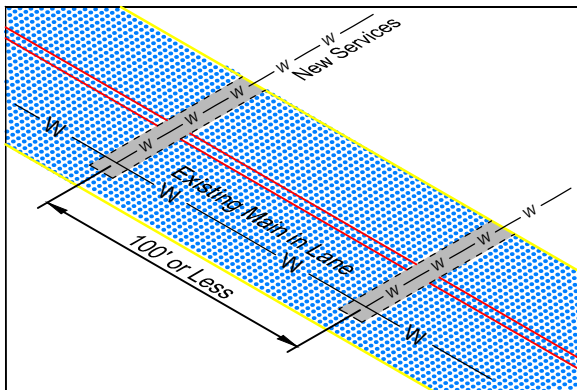
## UTILITY EXCAVATIONS CROSSING MULTIPLE LANES WITHIN 100'

WHEN EXCAVATION WORK CROSSES MULTIPLE LANES, ALL AFFECTED LANES SHALL REQUIRE PLANING AND RESURFACING AS DESCRIBED ABOVE. THIS WORK SHALL INCLUDE ALL OF THE PAVEMENT AREA WITHIN THE AFFECTED LANES FOR THE LIMITS OF THE LATERAL EXCAVATIONS.

NOT ACCEPTABLE



SEE NOTE "C"

ACCEPTABLE



FOR MULTIPLE EXCAVATIONS WITHIN 100' IN MULTIPLE LANES, PERFORM A FULL-LANE-WIDTH PLANE AND REPAIR FOR ALL IMPACTED LANES.

### LEGEND

-  EXISTING PAVEMENT
-  NEW PAVEMENT REPAIR

NOTE  
EXCAVATIONS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS SECTION AND PROFILE SHEETS FOR CONSTRUCTION PROCEDURES AND WIDTHS.

## PAVEMENT UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/2010

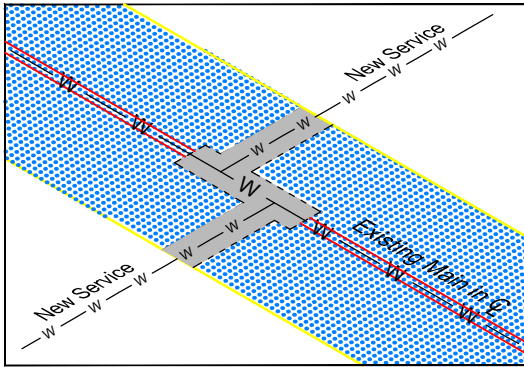
SHT 10 OF 13



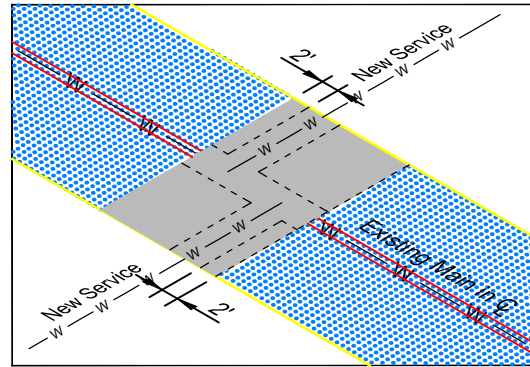
# ACCEPTABLE UTILITY CUT REPAIRS

SEE NOTE "C"

NOT ACCEPTABLE

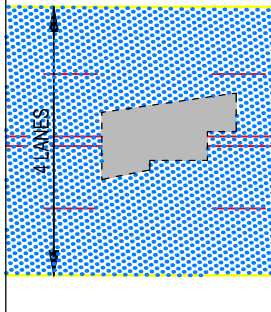


ACCEPTABLE

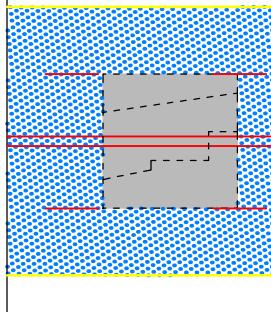


IRREGULAR SHAPES - SEE NOTE "L"

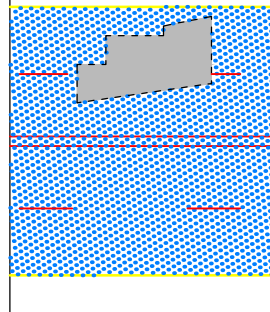
NOT ACCEPTABLE



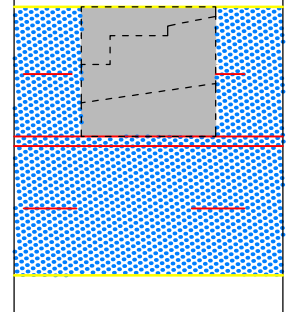
ACCEPTABLE



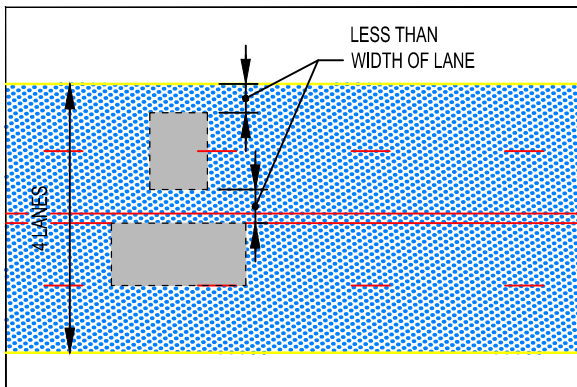
NOT ACCEPTABLE



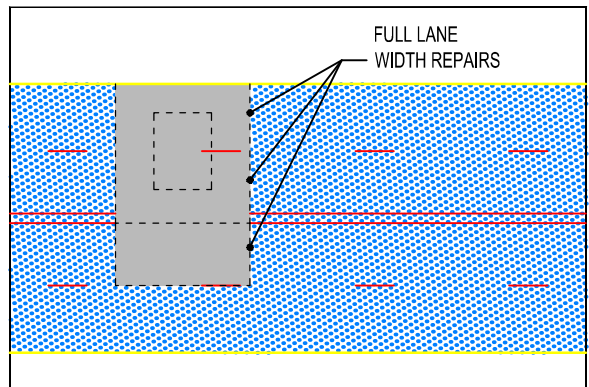
ACCEPTABLE





NOT ACCEPTABLE



ACCEPTABLE



LEGEND

-  EXISTING PAVEMENT
-  NEW PAVEMENT REPAIR

NOTE  
 EXCAVATIONS ARE CONCEPTUAL ONLY. SEE DETAILED CROSS SECTION AND PROFILE SHEETS FOR CONSTRUCTION PROCEDURES AND WIDTHS.

## PAVEMENT UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC SERVICE  
 DIVISION OF DESIGN AND CONSTRUCTION

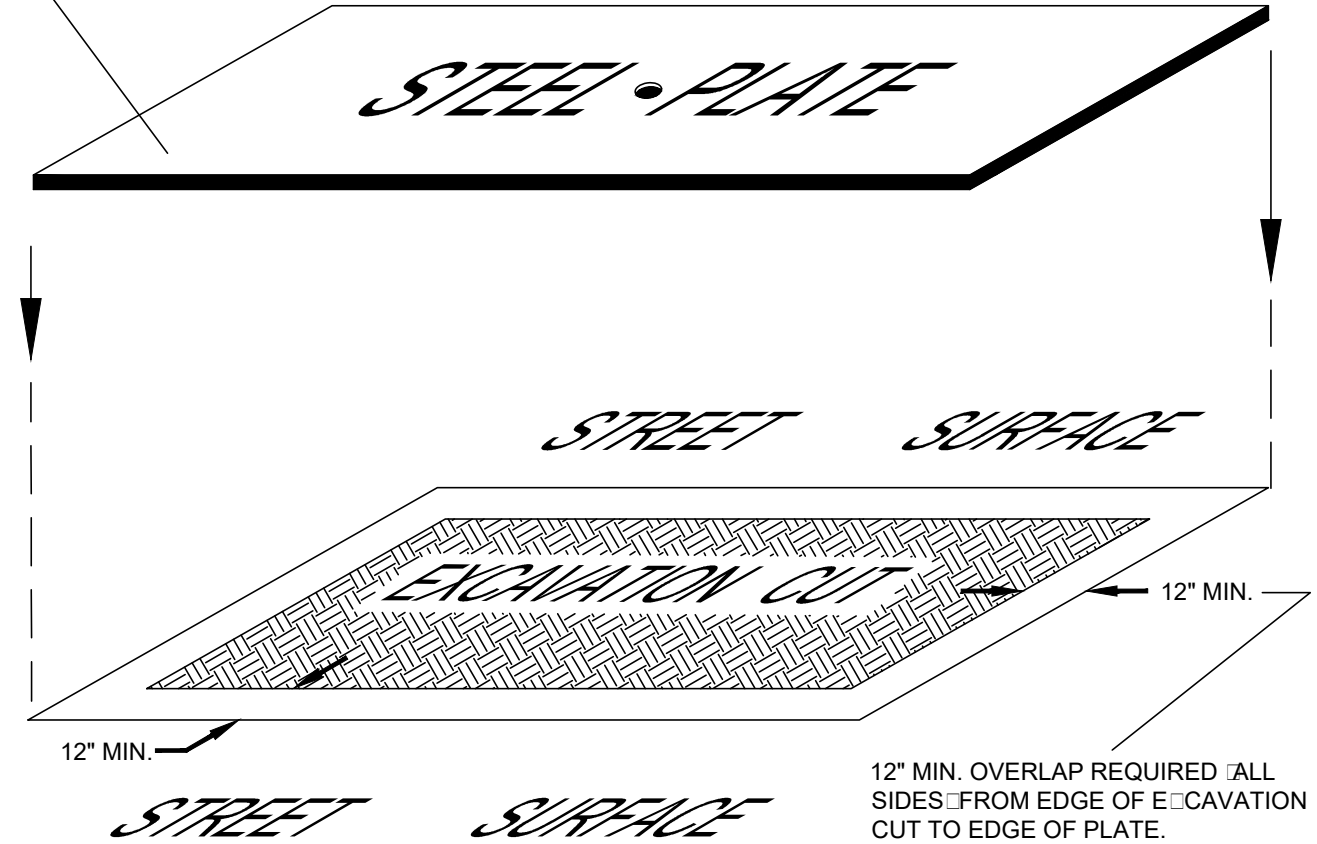
STD DWG

1441

3/4/2011

SHT 11 OF 13

1. OWNER'S NAME.
2. A 24 HOUR EMERGENCY CONTACT PHONE NUMBER.



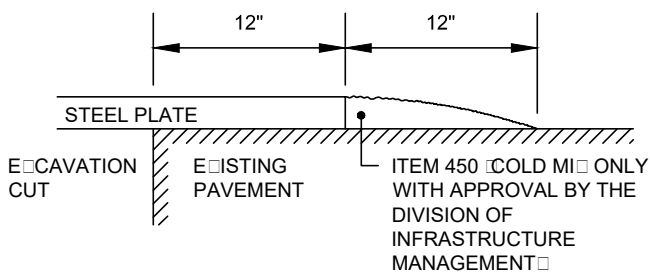
ALL STEEL PLATES MUST HAVE THE FOLLOWING INFORMATION CLEARLY AND LEGIBLY ETCHED INTO THEIR TOP SURFACE

1. OWNER'S NAME.
2. A 24 HOUR EMERGENCY CONTACT PHONE NUMBER.
3. CONTACT CITY OF COLUMBUS DIVISION OF INFRASTRUCTURE MANAGEMENT TO REPORT LOCATION OF STEEL PLATE 614-45-5550

MINIMUM THICKNESS OF STEEL PLATES	
SIZE OF PLATE	THICKNESS
4' x 4'	1/2"
4' x 6'	3/4"
LARGER	1"

NO STEEL PINS ARE PERMITTED.

SEE SHEET 13 FOR SIGNING REQUIREMENTS.



## STEEL PLATE REQUIREMENTS

# PAVEMENT & UTILITY CUT REPAIR STANDARDS

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/2010

SHT 12 OF 13

SIGNS ARE TO BE 30" X 30" FOR RESIDENTIAL AND DOWNTOWN AREAS AND 48" X 48" ON MULTI-LANE, HIGH SPEED 45 MPH OR GREATER ROADWAYS.

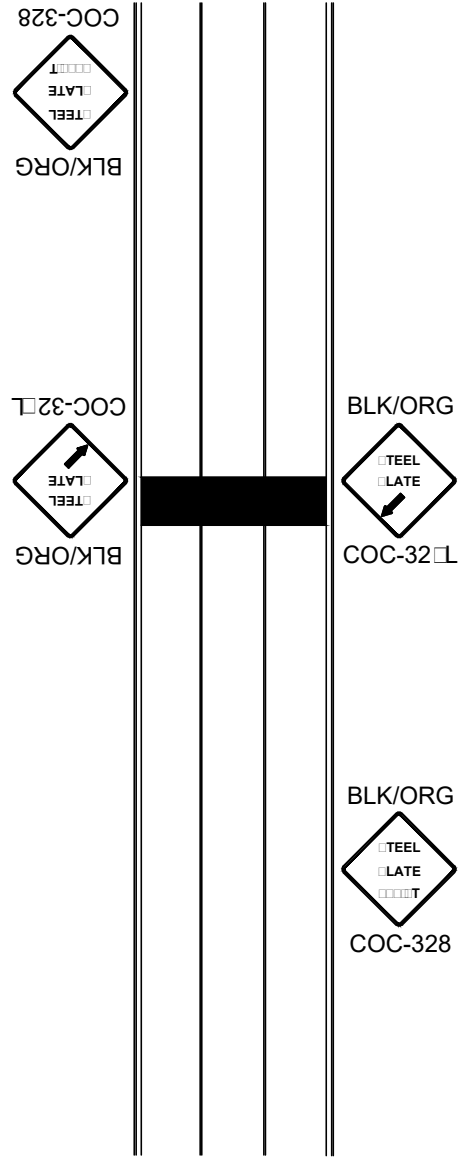
SIGN COC-32 (R/L) IS REQUIRED AT ALL PLATE LOCATIONS. SIGN COC-328 IS REQUIRED WHEN POSTED SPEED IS 35 MPH OR GREATER.

SIGNS SHOULD BE PLACED IN ALL DIRECTIONS THAT ARE AFFECTED. SIGN SPACING SHALL INCREASE TO 250' WHEN SPEED EXCEEDS 45 MPH.

SIGNS SHOULD BE DUAL MOUNTED ON MULTI-LANE, ONE-WAY ROADWAYS.

ALL SIGNS SHALL BE MOUNTED IN ACCORDANCE WITH THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

SIGNS SHALL NOT BE PLACED IN A MANNER THAT WOULD BLOCK PARKING, BIKE LANES, OR RESTRICT A PEDESTRIAN FROM USING ANY SIDEWALK INCLUDING CURB RAMPS. PAR SHALL BE MAINTAINED AT ALL TIMES.



STEEL PLATE REQUIREMENTS

PAVEMENT & UTILITY  
CUT REPAIR  
STANDARDS

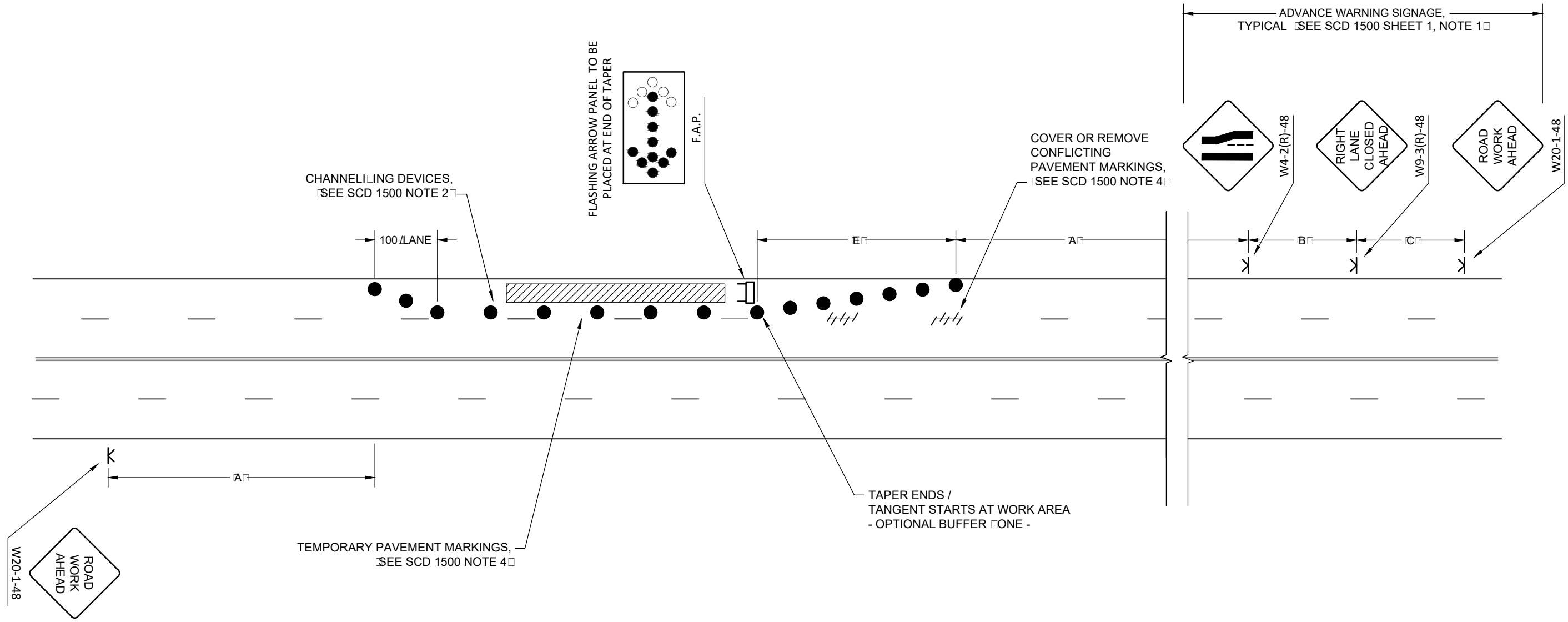
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

1441

3/4/2010

SHT 13 OF 13



**SCD 1500 NOTES**

1A. SEE SCD 1500 NOTE 3. TAPER LENGTHS ARE TO BE CALCULATED USING FORMULAS FROM THE SCD 1500, TABLE 1 TAPER LENGTHS FOR TEMPORARY TRAFFIC CONTROL ZONES.

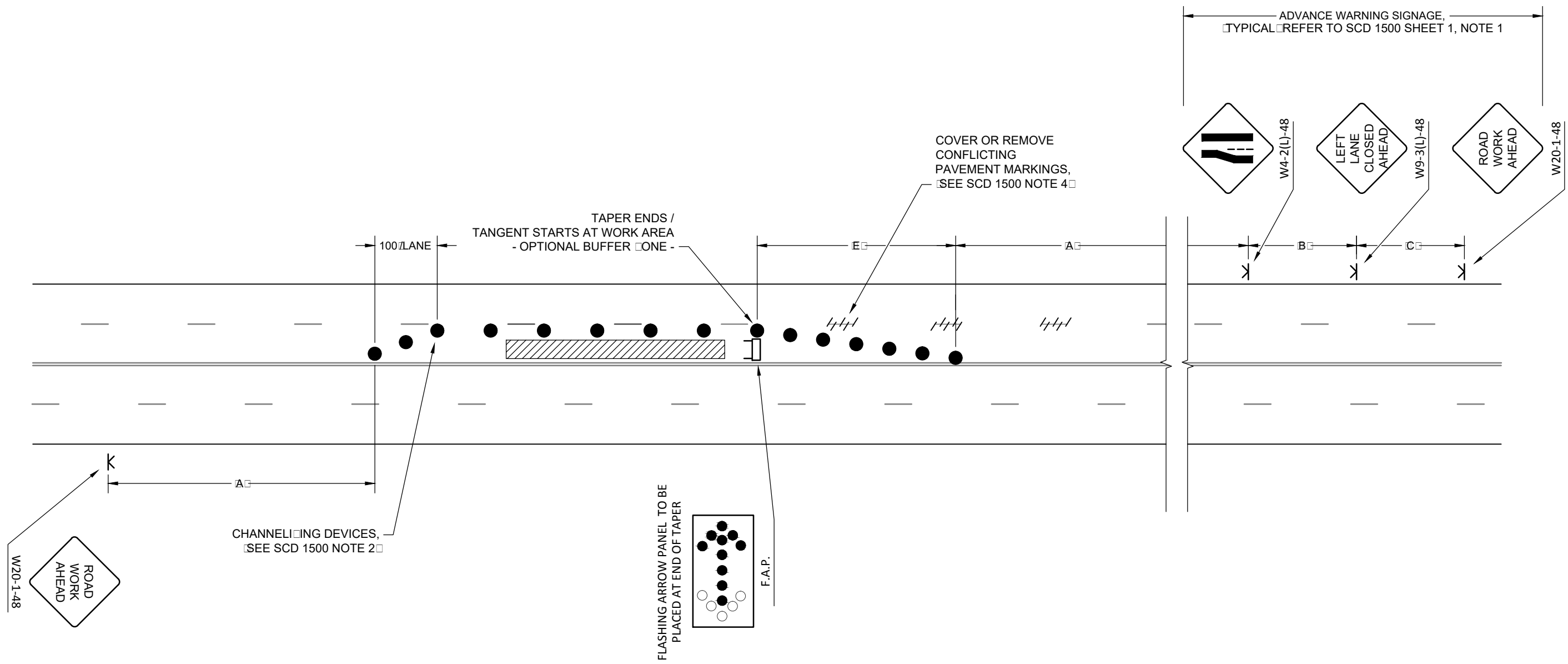
**NOTES**

1. FOR ADDITIONAL NOTES, TABLES, AND SYMBOL LEGEND SEE CITY OF COLUMBUS STANDARD CONSTRUCTION DRAWING 1500.

RIGHT LANE

**LANE CLOSURES**

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	STD DWG <b>1510</b> 1/15/2015
<i>Hassan Zahran</i> CITY ENGINEER	SHT 1 OF 5



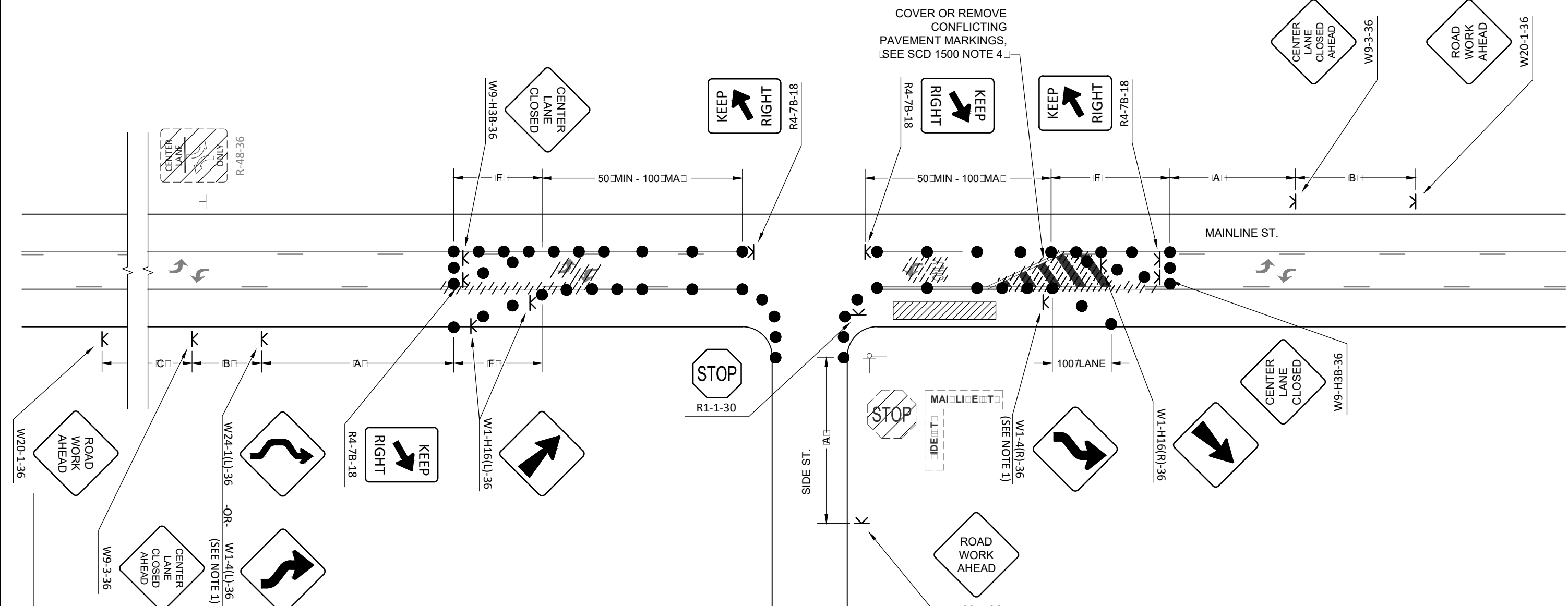
**SCD 1500 NOTES**

1A. SEE SCD 1500 NOTE 3. TAPER LENGTHS ARE TO BE CALCULATED USING FORMULAS FROM THE SCD 1500, TABLE 1 TAPER LENGTHS FOR TEMPORARY TRAFFIC CONTROL ZONES.

LET LA

**LANE CLOSURES**

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION		STD DWG <b>1510</b>
<i>Hassan Zahran</i> CITY ENGINEER		15/2015
		SHT 2 OF 5



**SCD 1500 NOTES**

1A. SEE SCD 1500 NOTE 3. TAPER LENGTHS ARE TO BE CALCULATED USING FORMULAS FROM THE SCD 1500, TABLE 1 TAPER LENGTHS FOR TEMPORARY TRAFFIC CONTROL ZONES.

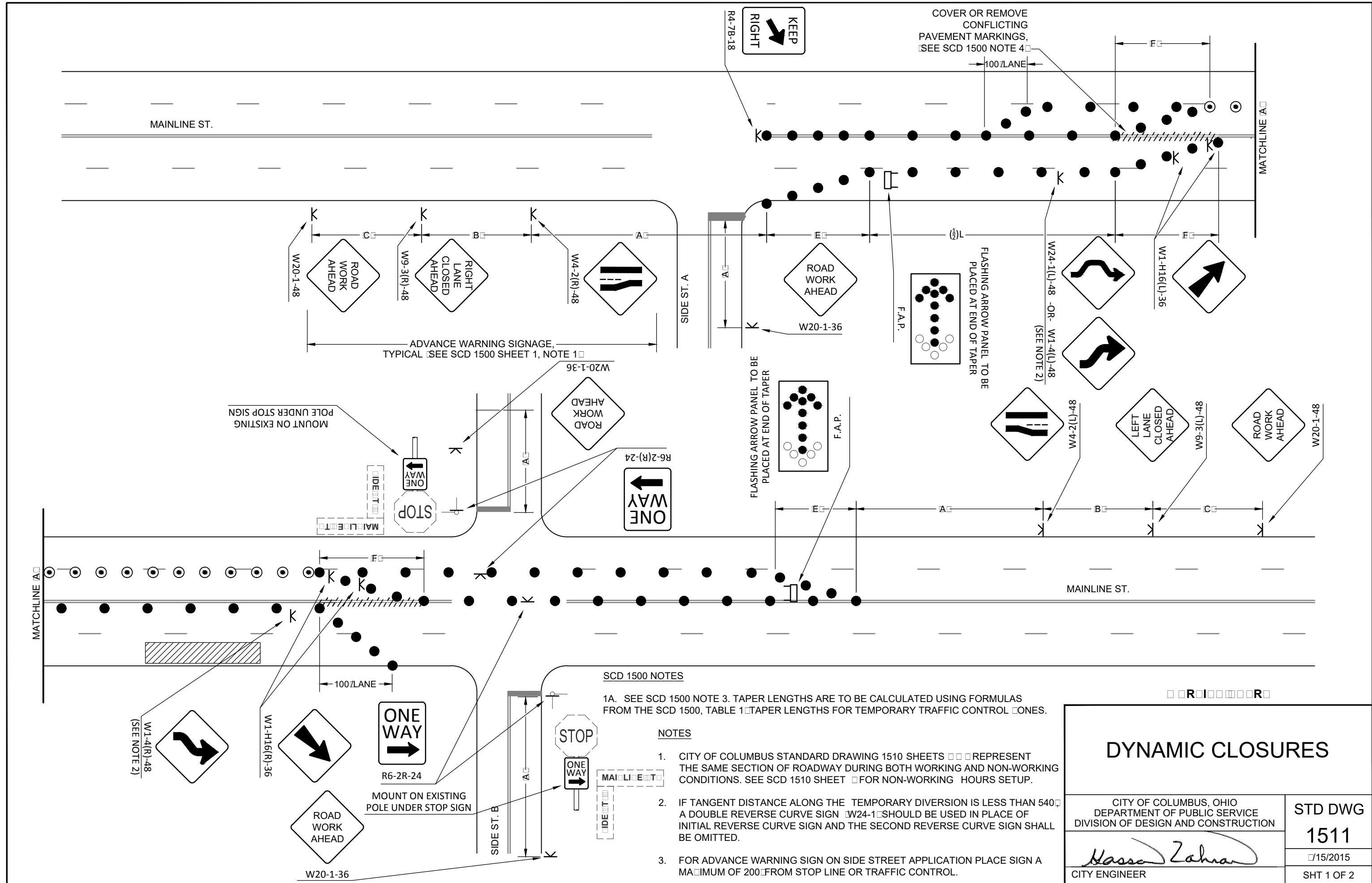
**NOTES**

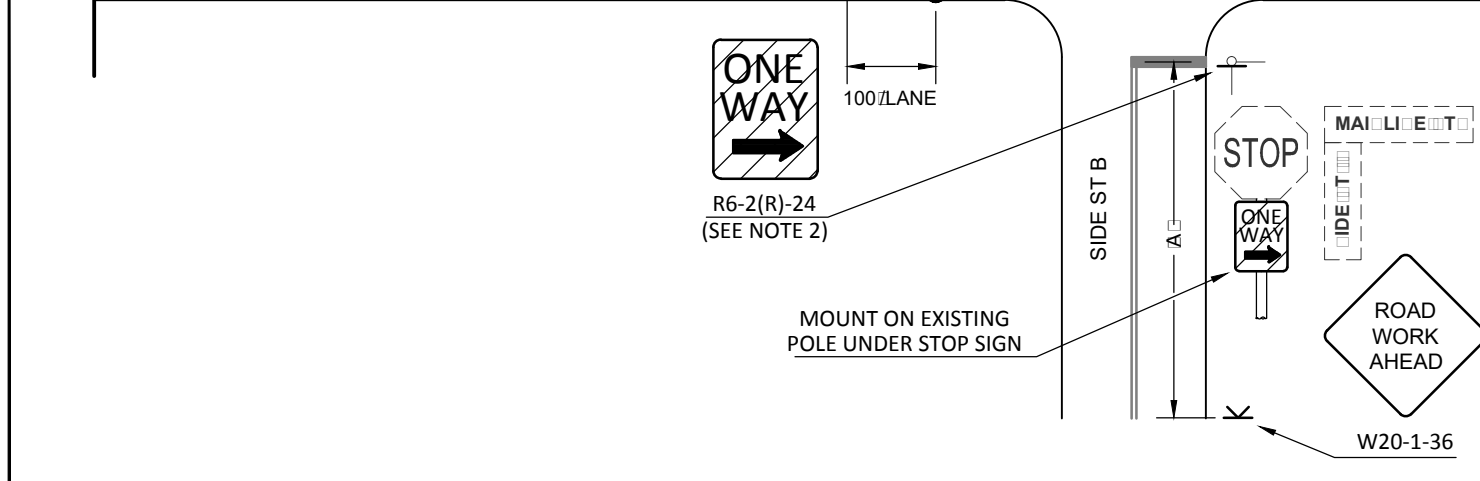
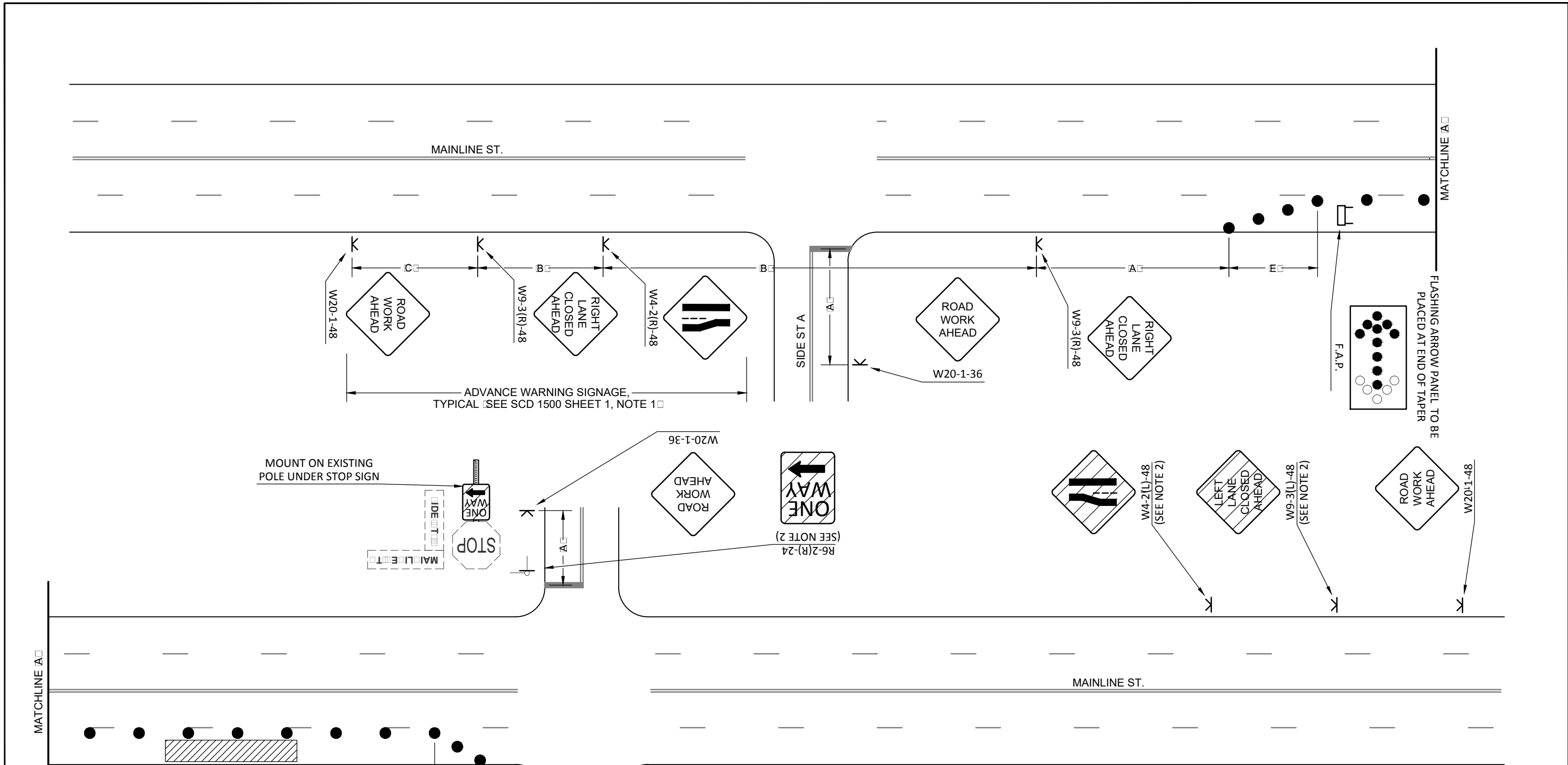
- IF TANGENT DISTANCE ALONG THE TEMPORARY DIVERSION IS LESS THAN 540, A DOUBLE REVERSE CURVE SIGN (W24-1) SHOULD BE USED IN PLACE OF INITIAL REVERSE CURVE SIGN AND THE SECOND REVERSE CURVE SIGN SHALL BE OMITTED.
- FOR ADVANCE WARNING SIGN ON SIDE STREET APPLICATION PLACE SIGN A MAXIMUM OF 200' FROM STOP LINE OR TRAFFIC CONTROL.

LA E E TI IT

**LANE CLOSURES**

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION		STD DWG <b>1510</b>
<i>Hassan Zahran</i> CITY ENGINEER		1/15/2015
		SHT 3 OF 5





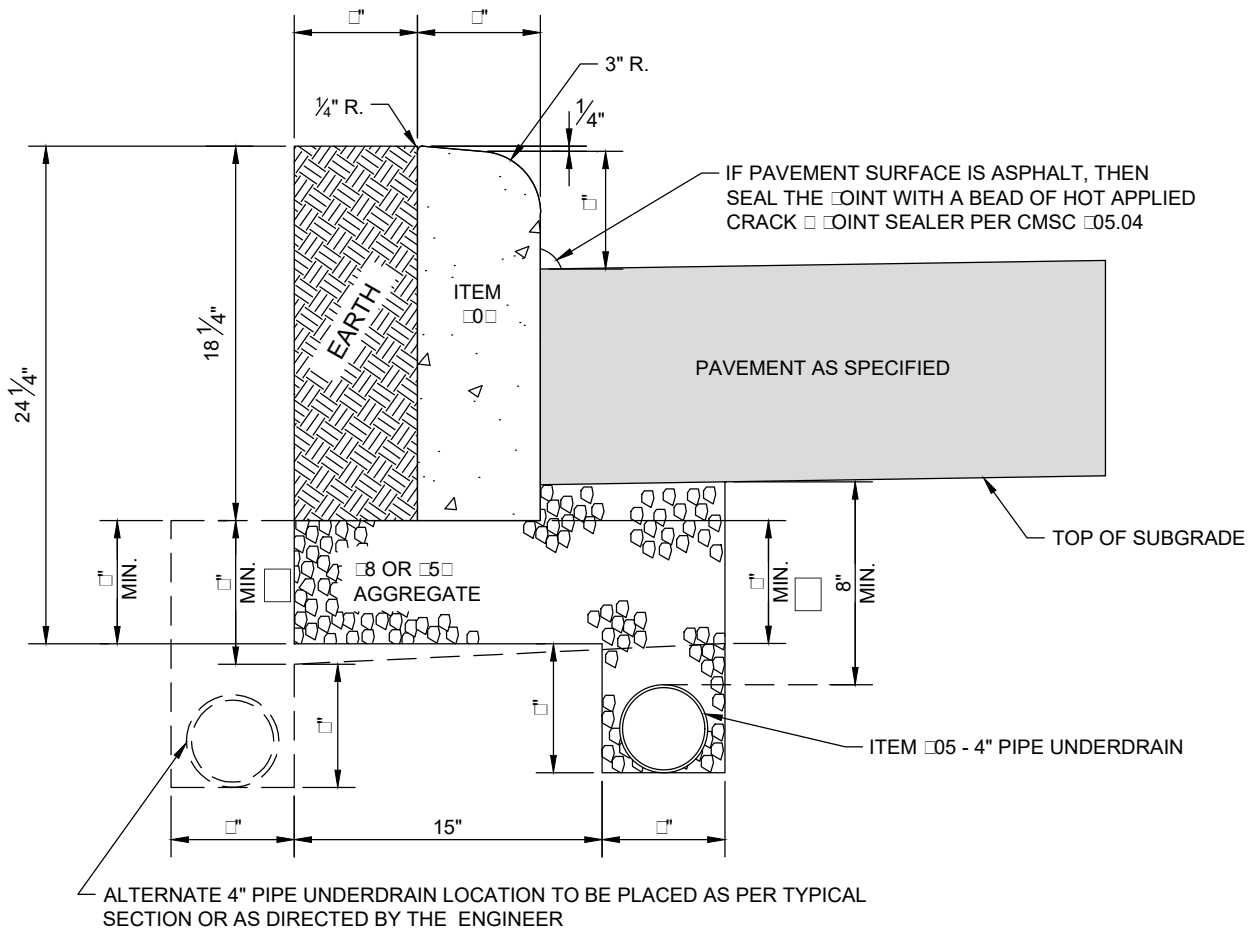
- SCD 1500 NOTES**
- 1A. SEE SCD 1500 NOTE 3. TAPER LENGTHS ARE TO BE CALCULATED USING FORMULAS FROM THE SCD 1500, TABLE 1. TAPER LENGTHS FOR TEMPORARY TRAFFIC CONTROL ZONES.
- NOTES**
1. CITY OF COLUMBUS STANDARD DRAWING 1510 SHEETS □□□ REPRESENT THE SAME SECTION OF ROADWAY DURING BOTH WORKING AND NON-WORKING CONDITIONS. SEE SCD SHEET □ FOR WORKING HOURS SETUP.
  2. REMOVE OR COVER CONFLICTING SIGNAGE DURING NON-WORKING HOURS.
  3. NON-WORKING HOURS SETUP ONLY TO BE USED AS DIRECTED IN PLANS.
  4. FOR ADVANCE WARNING SIGN ON SIDE STREET APPLICATION PLACE SIGN A MINIMUM OF 200' FROM STOPLINE OR TRAFFIC CONTROL.

□□□□ □R□□□□□R□

## DYNAMIC CLOSURES

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>1511</b>
<i>Hassan Zahran</i> CITY ENGINEER	□/15/2015 SHT 2 OF 2





CURB AGGREGATE COURSE-WHERE THE ROADWAY PAVEMENT HAS AGGREGATE BASE, MATCH THE BOTTOM OF THE CURB AGGREGATE COURSE TO THE TOP OF SUBGRADE. ENSURE ROADWAY SUB BASE MEETS UNDERDRAIN AGGREGATE.

IF THE TOP OF THE SUBGRADE IS BELOW THE BOTTOM OF THE CURB, THE UNDERDRAIN SHALL BE ADJUSTED TO KEEP THE TOP OF THE UNDERDRAIN AT LEAST 8" BELOW THE TOP OF THE SUBGRADE; AGGREGATE DEPTH BETWEEN BOTTOM OF CURB AND TOP OF UNDERDRAIN MAY VARY IF THIS OCCURS.

SUBGRADE COMPACTION SHALL BE COMPLETED BEFORE UNDERDRAIN INSTALLATION.

WHEN A CURB AND GUTTER INLET IS INSTALLED, THE TOP OF THE CASTING SHALL BE THE SAME AS THE TOP OF CURB ELEVATION. THE EDGE OF PAVEMENT ELEVATION SHALL BE 3/8" HIGHER THAN THE GRATE WHEREVER THEY MEET.

FOR REPLACEMENT WORK, THE CURB SHALL BE REMOVED AT AN EXISTING JOINT OR NO CLOSER THAN 5 FEET FROM AN EXISTING JOINT.

1/2" EXPANSION MATERIAL WILL BE INSTALLED BEHIND THE CURB WHEN A CONCRETE WALK, DRIVE, OR OTHER CONCRETE ITEM IS ADJOINING IT.

UNDERDRAIN IS NOT REQUIRED WHEN CURB IS ALONG CONCRETE MEDIAN.

0.04 C.F. CONCRETE PER L.F.

## CURB, STRAIGHT 18"

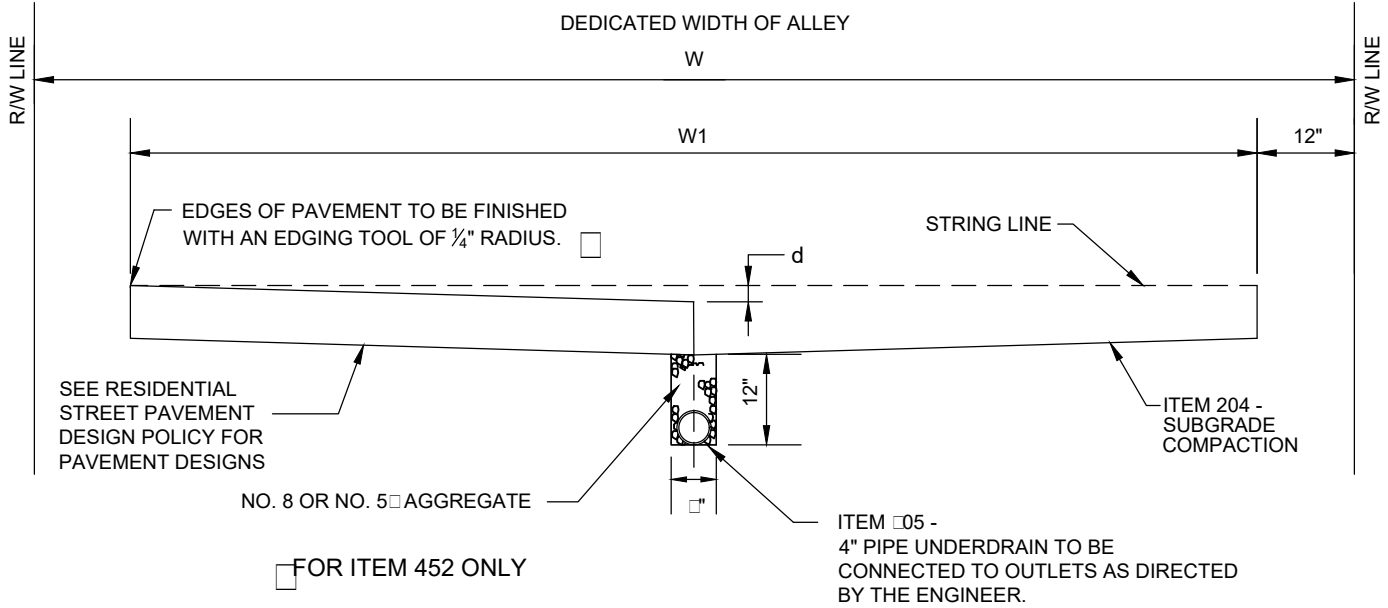
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
2000

CITY ENGINEER

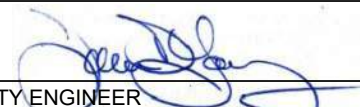
3/30/2018

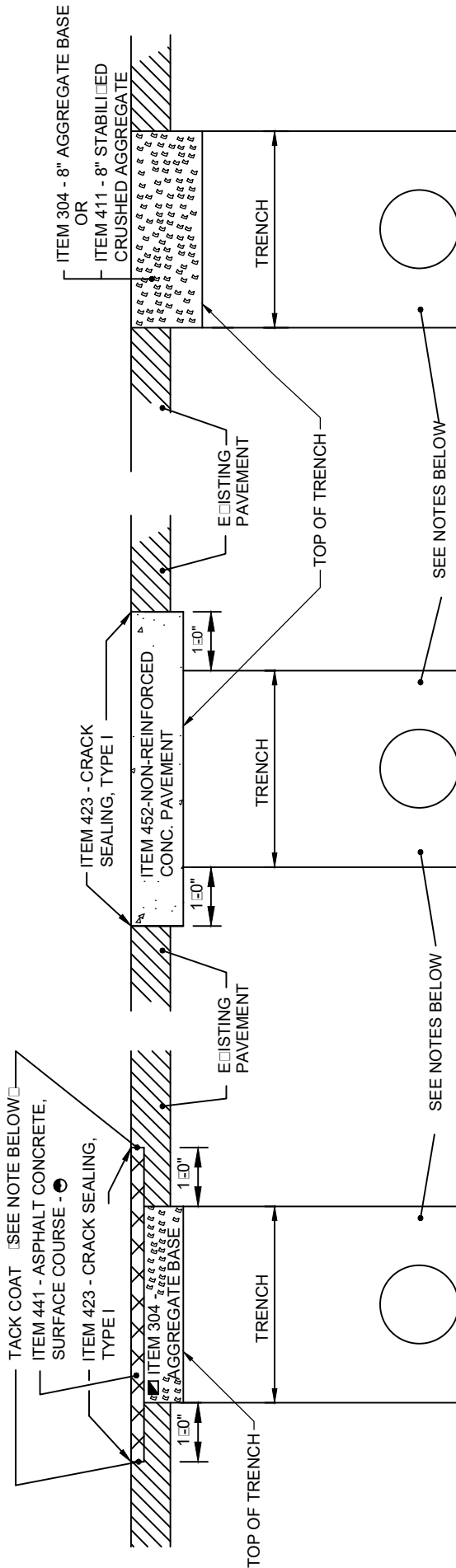
SHT 1 OF 1



INCHES	INCHES	d
15	13	2 3/4"
1	14	3"
18	1	3 1/4"
20	18	3 1/2"
OVER 20	20	3 3/4"
OVER 24	24	4 1/2"

TYPICAL SECTION

<h1>ALLEY</h1>	
CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>2151</b>
CITY ENGINEER 	4/30/2018
	SHT 1 OF 1



TYPE III A FOR ASPHALT  
 ● 3" - DRIVEWAYS RES.  
 4" - DRIVEWAYS NON-RES.  
 ■ 8" - DRIVEWAYS NON-RES.

TYPE III B FOR CONCRETE  
 ITEM 452 THICKNESS  
 □ FOR RESIDENTIAL  
 8" FOR NON-RESIDENTIAL

TYPE III C FOR GRAVEL

BACKFILL FOR ALL TRENCHES SHALL BE IN ACCORDANCE WITH APPLICABLE SPECIFICATIONS.

PERMANENT REPAVING SHALL NOT BE DONE UNTIL SO ORDERED OR APPROVED BY THE ENGINEER. THE EDGE SHALL BE CUT VERTICAL AND TRIMMED TO PROVIDE A STRAIGHT LINE.

ITEM 40 - TACK COAT SHALL BE APPLIED AT A RATE OF 0.08 GAL/SY.

ALL EXISTING CONCRETE WALKS OR CONCRETE PAVEMENTS BEING REPLACED SHALL BE REMOVED AT AN EXISTING JOINT AND REPLACED PER STANDARD DRAWING.

DRIVEWAY PAVEMENT SHALL BE REPLACED BY EITHER MATCHING THE EXISTING MATERIALS OR THICKNESS, OR BY USING THE ABOVE THICKNESS, WHICHEVER IS GREATER.

IF COMPLETE DRIVE APPROACH IS BEING REBUILT REFERENCE THE STANDARD DRAWING APPLICABLE TO THE DRIVE.

<h1>DRIVEWAY REPLACEMENT</h1>	
CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	
CITY ENGINEER	 12/31/2018
STD DWG <b>2100</b> SHT 1 OF 1	

GENERAL

GENERAL NOTES AND DETAILS SHOWN ON THIS DRAWING SHALL BE CONSIDERED IN CONJUNCTION WITH AND SUPPLEMENTAL TO THE PERTINENT SPECIFICATIONS FOR PORTLAND CEMENT CONCRETE PAVEMENT AND BASES, AND RELATED INCIDENTALS.

INTENTION: THIS DRAWING IS INTENDED FOR USE WITH A UNIFORM DEPTH PAVEMENT. WHEN THE PROJECT INVOLVES THE PLACING OF VARIABLE DEPTH PAVEMENT, THE JOINT COMPONENTS SHALL BE HELD IN PLACE IN ACCORDANCE WITH THE METHOD SHOWN IN THE PLANS OR AS APPROVED BY THE ENGINEER.

CONTRACTION JOINTS OF THE TYPE SPECIFIED SHALL BE SPACED IN ACCORDANCE WITH THE CONTRACTION JOINT SPACING TABLE.

CONTRACTION JOINTS	
ITEM	THICKNESS (IN)
ITEM 451 - REINFORCED CONCRETE PAVEMENT	21
ITEM 452 - NON-REINFORCED CONCRETE PAVEMENT	15
ITEM 305 - CONCRETE BASE	15
ITEM 300 - RCC	30

CONTRACTION JOINTS IN ITEM 305 - CONCRETE BASE, A CONSTRUCTION JOINT SHALL NOT BE LOCATED CLOSER THAN 10' TO ANOTHER PARALLEL JOINT.

KERF AND SEAL CONFORMING IN ALL ASPECTS TO DETAILS SHOWN FOR CONTRACTION JOINTS SHALL BE PROVIDED AT EACH CONSTRUCTION JOINT IN CONCRETE PAVEMENT AND BASE.

JOINT DETAILS FOR  
PORTLAND CEMENT  
CONCRETE PAVING

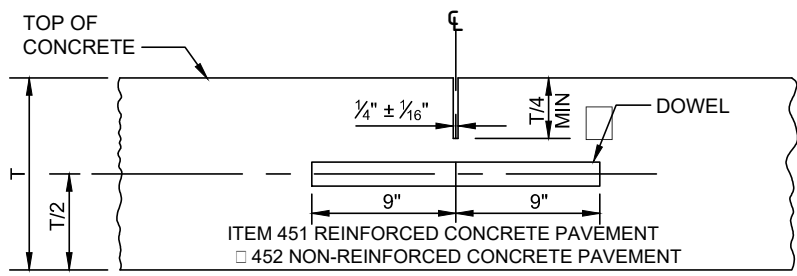
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
2100

CITY ENGINEER

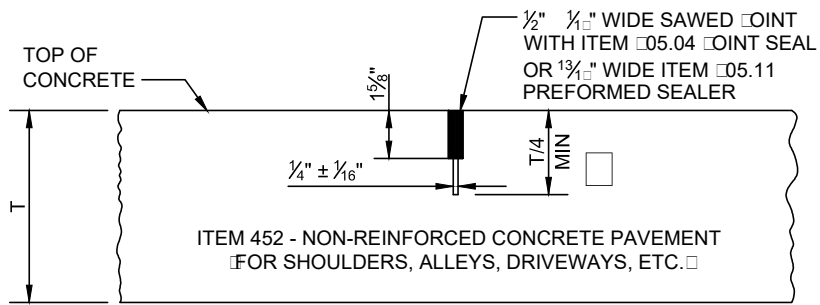
04/30/18

SHT 1 OF 1

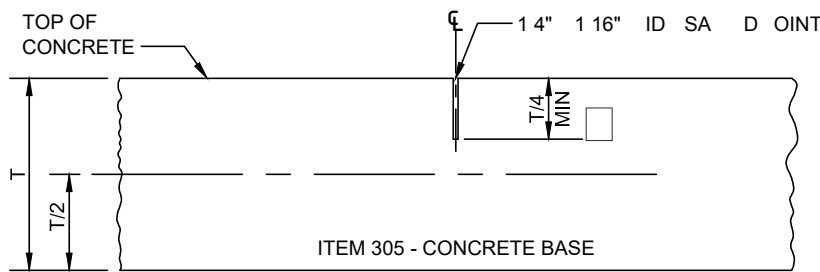


ITEM 451 REINFORCED CONCRETE PAVEMENT

452 NON-REINFORCED CONCRETE PAVEMENT  
DOWEL BAR OMITTED FOR SHOULDERS, ALLEYS, DRIVEWAYS, ETC.



ITEM 452 - NON-REINFORCED CONCRETE PAVEMENT FOR SHOULDERS, ALLEYS, DRIVEWAYS, ETC.



ITEM 305 - CONCRETE BASE

WHERE T ≤ 10", THE SAWCUT DEPTH SHALL BE T/3.

### CONTRACTION JOINT SECTIONS

## JOINT DETAILS FOR PORTLAND CEMENT CONCRETE PAVING

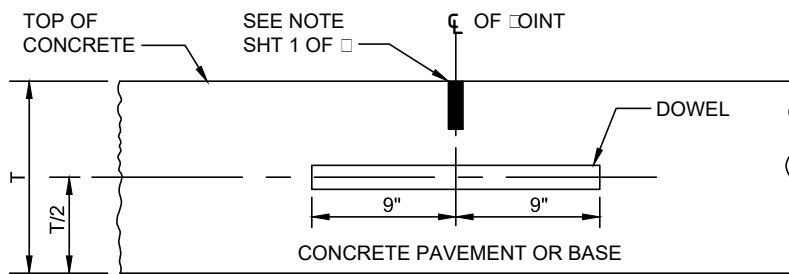
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

210

04/30/18

SHT 2 OF 2



□E□TI□□T□R□□□□□□□□TR□□TI□□□□I□T

CONSTRUCTION JOINT

JOINT DETAILS FOR  
PORTLAND CEMENT  
CONCRETE PAVING

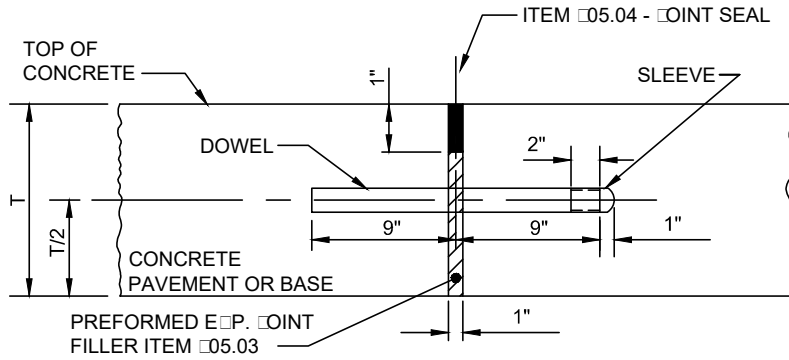
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

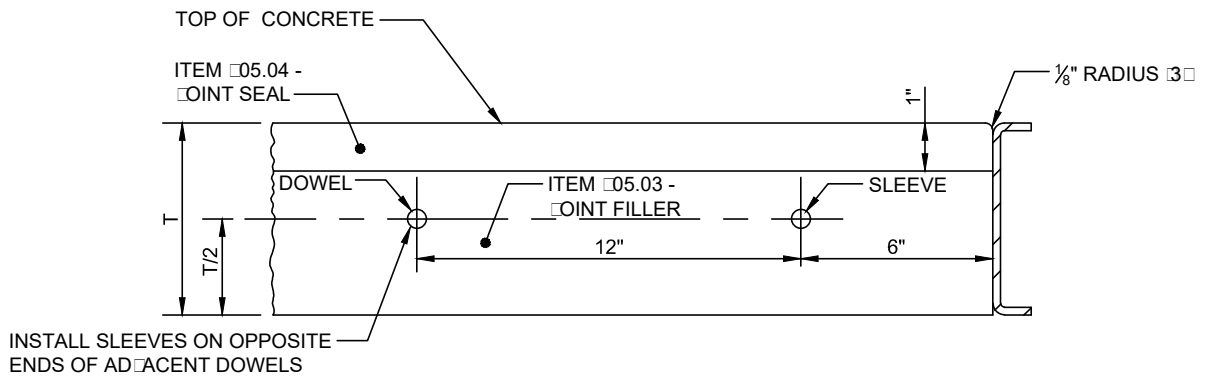
21 □ 0

04/30/18

SHT 3 OF □



IDELEATI E A I T



INSTALL SLEEVES ON OPPOSITE ENDS OF ADJACENT DOWELS

IDELEATI E A I T  
THROUGH CONCRETE PAVEMENT OR BASE

EXPANSION JOINTS

JOINT DETAILS FOR  
PORTLAND CEMENT  
CONCRETE PAVING

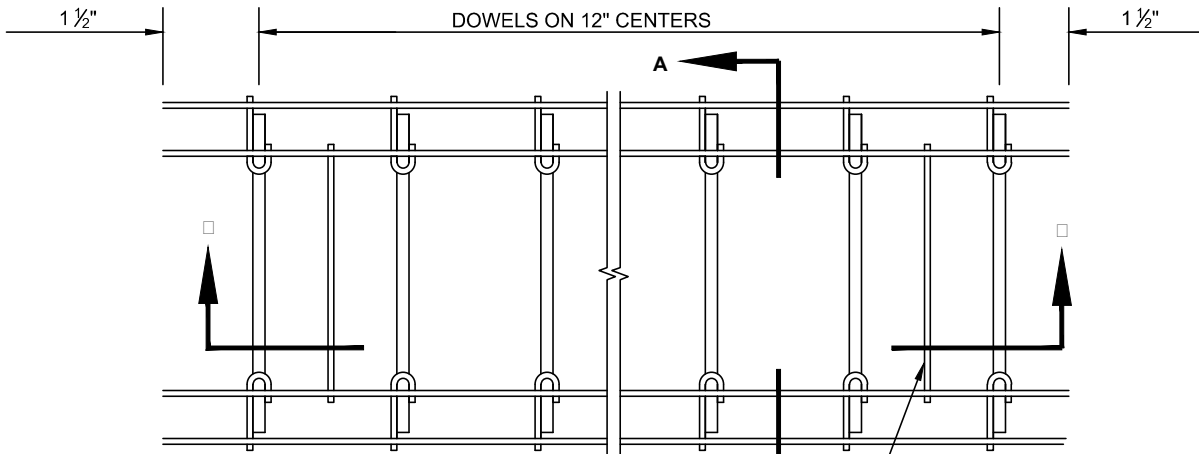
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

210

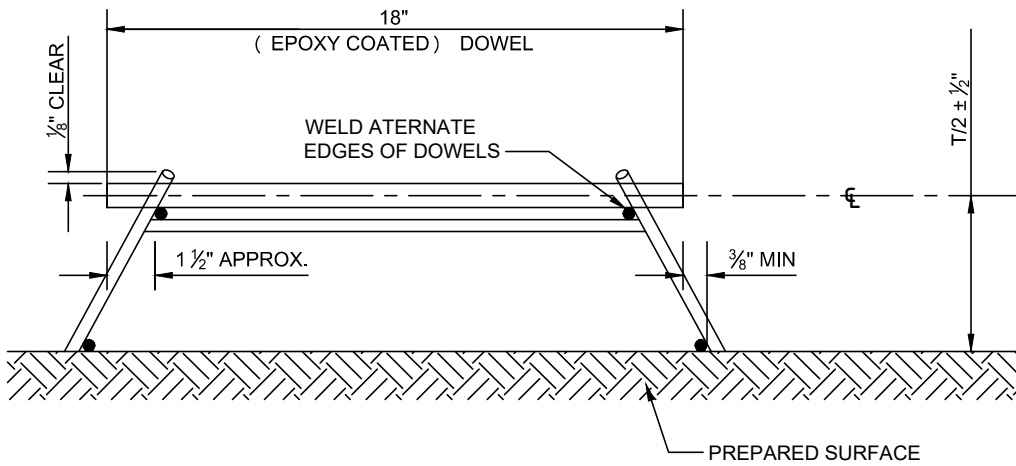
04/30/18

SHT 4 OF 4

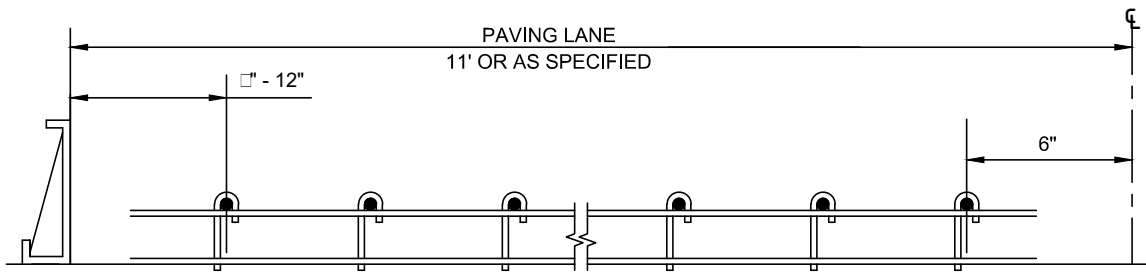


LA IE

GAUGE #0.1" DIA. SHIPPING AND SPACER WIRES. REMOVE SPACER WIRES AFTER STAKING ASSEMBLY TO GRADE.



ETI AA



ETI

DOWEL BASKET ASSEMBLY

JOINT DETAILS FOR PORTLAND CEMENT CONCRETE PAVING

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

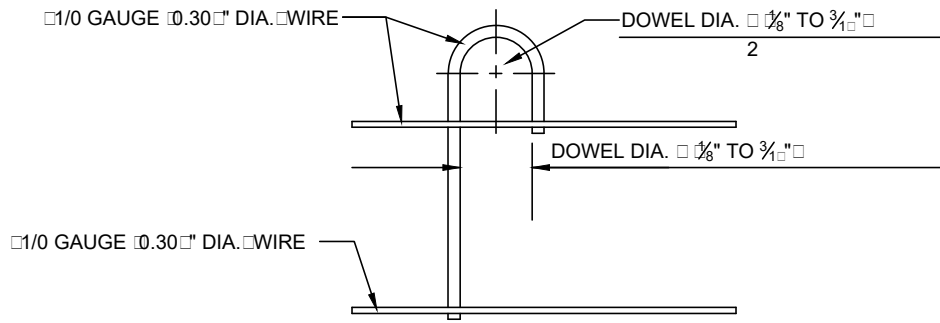
STD DWG

210

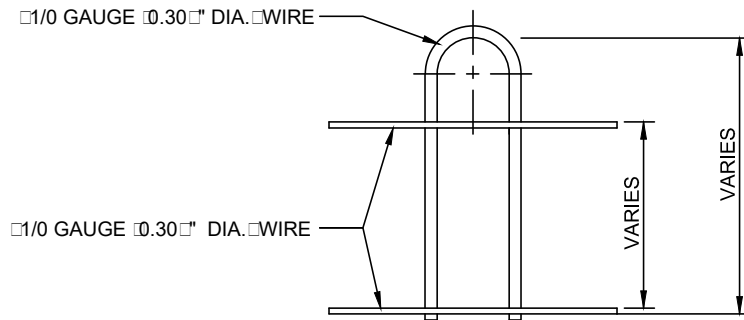
04/30/18

SHT 5 OF 5





LE DETAIL  
 ALTERATE



LE DETAIL

REFER TO CMSC 451.0 B AND 0 13 FOR DOWEL SPECIFICATIONS.

WIRE SIZES SHOWN ARE MINIMUM REQUIRED.

ALL WIRE INTERSECTIONS ARE TO BE WELDED.

STAKES TYPICALLY APPLIED AT WORKING ENDS OF DOWEL.

TOLERANCES

- A) 1/4" PER FOOT UNLESS OTHERWISE SPECIFIED.
- B) CENTERLINE OF INDIVIDUAL DOWELS SHALL BE PARALLEL TO EACH OTHER, THE SURFACE AND THE CENTERLINE OF THE SLAB.
- C) ON CENTER S SHOULD 1/2".
- D) DOWELS SHOULD BE PLACED AT MID-DEPTH OF SLAB.

LEG OR U-LEG TO BE INSTALLED ON INSIDE OR OUTSIDE OF SUBFRAME.

DOWEL BASKET ASSEMBLY

JOINT DETAILS FOR  
 PORTLAND CEMENT  
 CONCRETE PAVING

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC SERVICE  
 DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

21 0

04/30/18

SHT OF

FOR USE ON A PARCEL WITH A SINGLE DWELLING

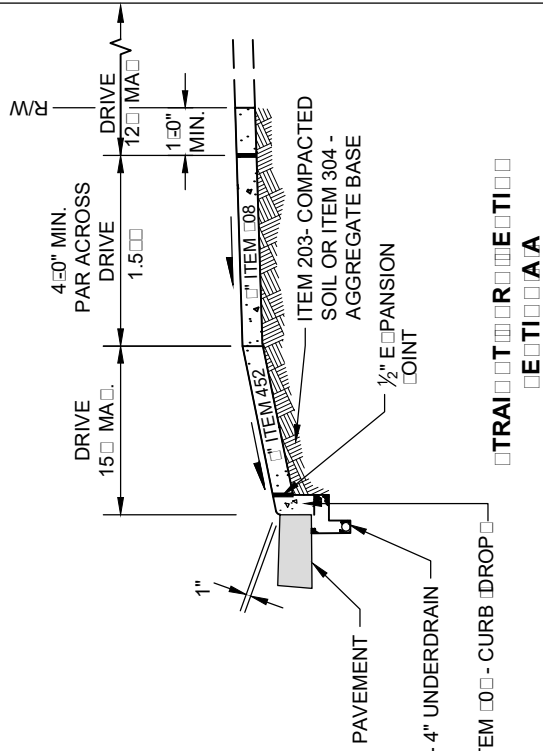
CURB OR COMBINED CURB AND GUTTER SHALL BE TAKEN OUT AND REPLACED WITH CONCRETE, SEPARATED FROM THE DRIVE BY 1/2" PREMOLDED EXPANSION JOINT. WHEN LESS THAN 5 FT. OF A CURB SECTION REMAINS AFTER THE CURB CUT IS LOCATED, IT SHALL ALSO BE REMOVED AND REPLACED. CURB SHALL BE CONSTRUCTED IN MINIMUM 5 FT. SECTIONS AND MAXIMUM 10 FT. SECTIONS.

SIDEWALK WIDTH SHALL BE PER STANDARD DRAWING 2300. SIDEWALK THICKNESS SHALL BE CONCRETE TO ONE FULL PANEL MIN. 5 FT. BEYOND THE EDGE OF THE FULL WIDTH SECTION OF THE DRIVE.

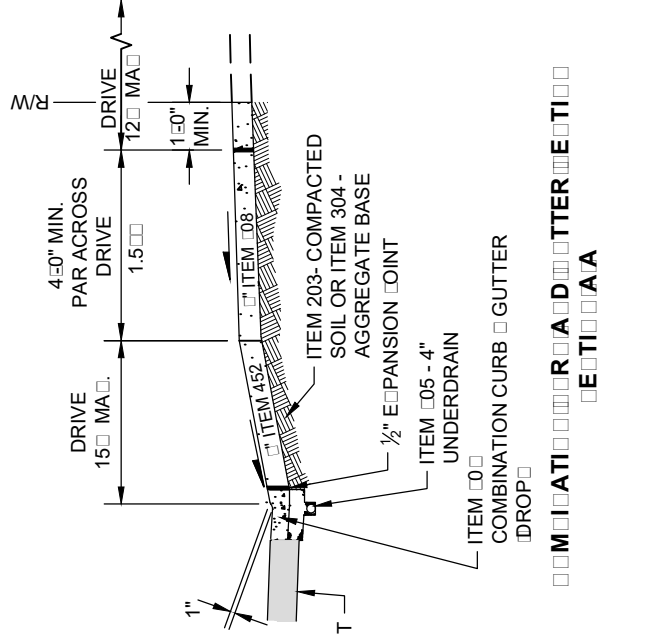
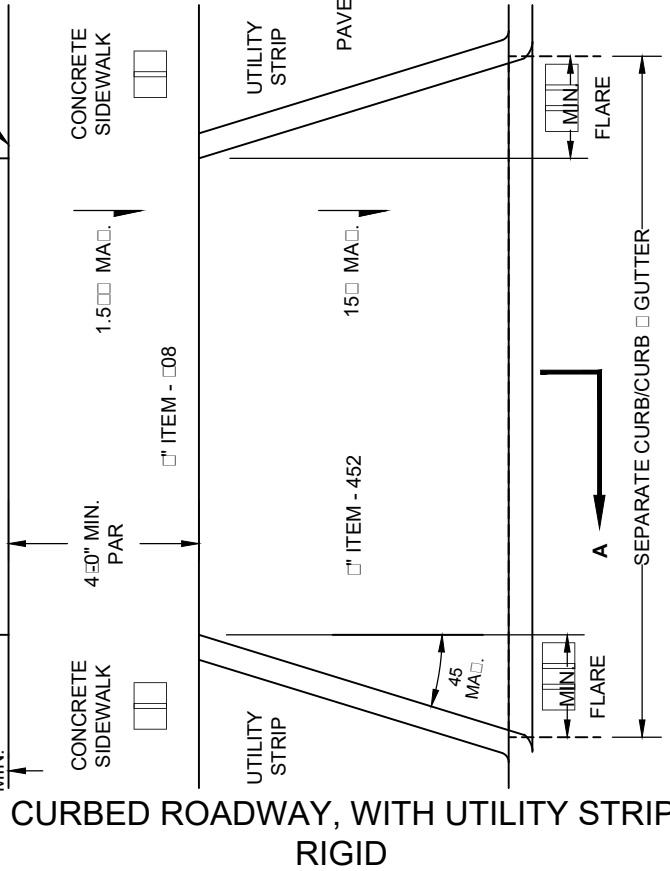
5 FT. ON ROADWAYS WITH 35 MPH SPEED LIMIT, 2 FT. FOR SPEED LIMITS LESS THAN 35 MPH.

PEDESTRIAN ACCESS ROUTE. SET PAR THROUGH APPROACH AT SIDEWALK GRADE TO AVOID RAMP OR TRANSITION. IF NOT POSSIBLE, THEN MINIMUM TRANSITION FROM SIDEWALK TO APPROACH.

WHEN A CURB OR CURB AND GUTTER ARE PRESENT ALL DRIVEWAYS SHALL BE ITEM 452 CONCRETE PAVEMENT



TRAJECTORY



COMBINATION CURB & GUTTER DROP

## DRIVEWAY, RESIDENTIAL

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

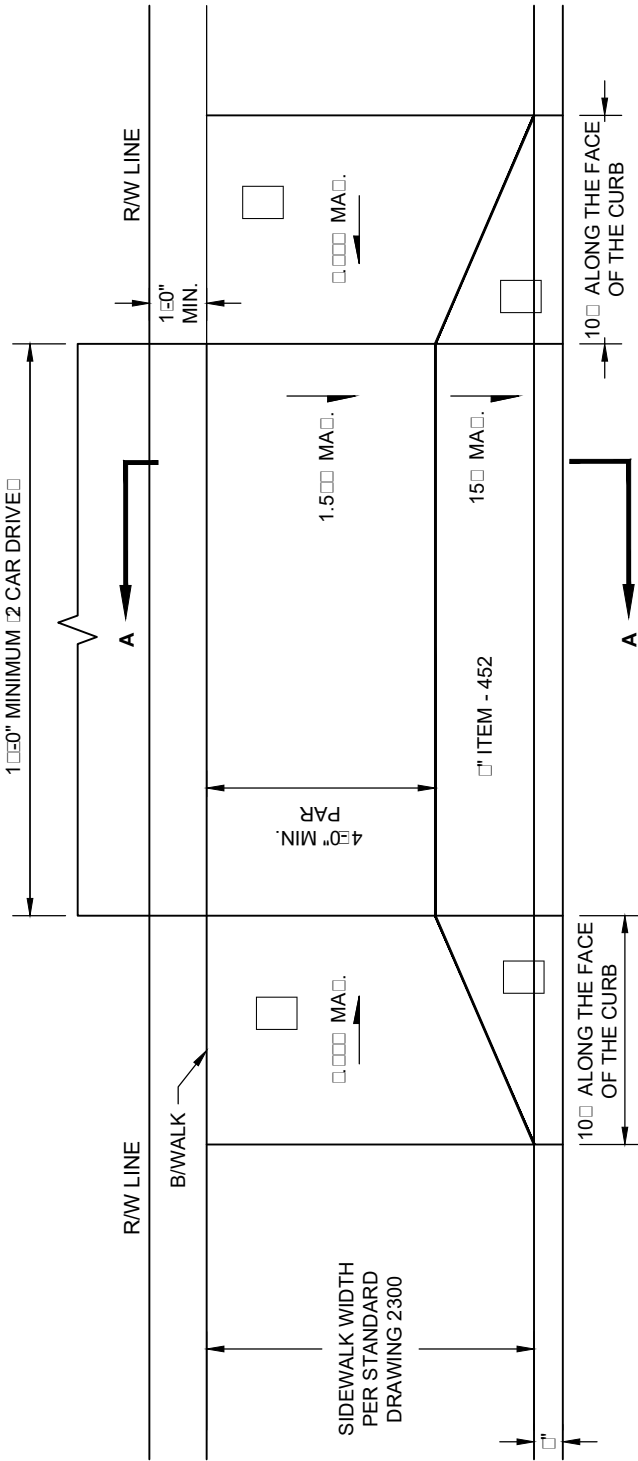
STD DWG  
**2201**

CITY ENGINEER

12/31/18

SHT 1 OF 1

THE FIRST FULL PANEL AT THE EDGE OF THE FULL WIDTH SECTION OF THE DRIVE INCLUDING THE DRIVE FLARE SHALL BE ITEM 08



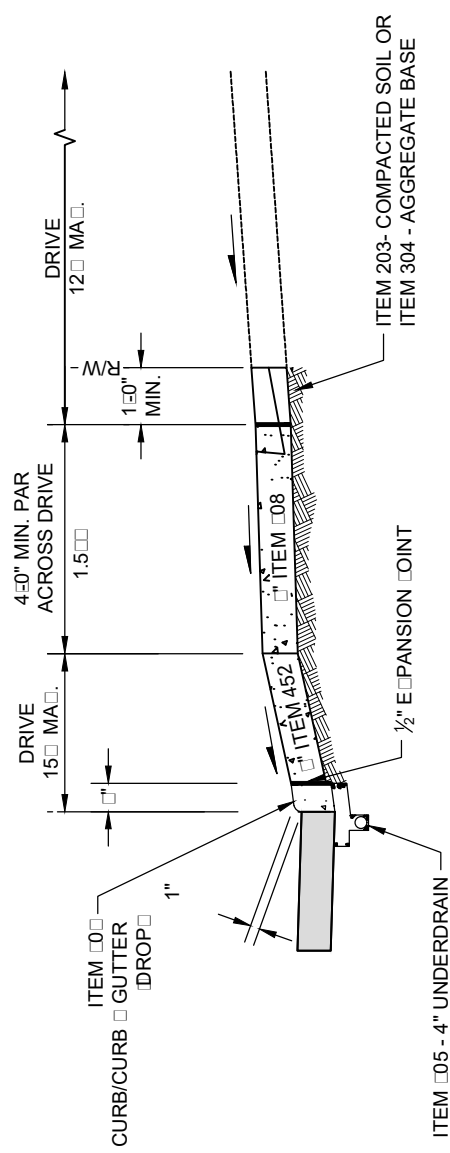
SIDEWALK WIDTH PER STANDARD DRAWING 2300

**CURBED ROADWAY, TYPE A, RIGID**

**DRIVEWAY, RESIDENTIAL**

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
**2201**  
12/03/18  
SHT 2 OF 2



SEE SHEET 1 OF 2 FOR NOTES

FOR USE ON A PARCEL WITH A SINGLE DWELLING

REPLACEMENT OF EXISTING DRIVES SHALL MATCH PAVEMENT TYPE, DESIGN KIND TO EXISTING DRIVE. NEW DRIVES SHALL BE PAVEMENT TYPE, DESIGN SIMILAR TO MAIN ROADWAY TYPE, DESIGN

DRIVE PAVEMENT TYPE, FLEIBLE

ITEM 441 - 1.5" ASPHALT CONCRETE, SURFACE COURSE, TYPE 1 PG 4-22

ITEM 441 - 2.5" ASPHALT CONCRETE, INTERMEDIATE COURSE, TYPE 2, 448

ITEM 304 - 4" AGGREGATE BASE

SIDEWALK SHALL BE PER STANDARD DRAWING 2300. SIDEWALK THICKNESS SHALL BE 4" CONCRETE TO ONE FULL PANEL MIN. 5 FT. BEYOND THE EDGE OF THE FULL WIDTH SECTION OF THE DRIVE.

PAR PEDESTRIAN ACCESS ROUTE. SET PAR THROUGH APPROACH AT SIDEWALK GRADE TO AVOID RAMP OR TRANSITION. IF NOT POSSIBLE, THEN MINIMIZE TRANSITION FROM SIDEWALK TO APPROACH.

WHEN CONDITIONS EXIST USE THE FOLLOWING:  
IF THE DISTANCE FROM THE SIDEWALK TO THE EDGE OF PAVEMENT IS

5'----- HOLD THE FLARE TO 45° AND ADJUST THE WIDTH ACCORDINGLY, MAINTAIN THE MINIMUM 2' WIDE PERPENDICULAR AREA OF THE APPROACH

5'----- MAINTAIN THE 5' MAXIMUM FLARE WIDTH, VARY THE ANGLE, AND MAINTAIN THE MINIMUM 2' WIDE PERPENDICULAR AREA OF THE APPROACH

----- DECREASE THE 45° ANGLE ADJUST ACCORDINGLY MAINTAIN THE MINIMUM 2' WIDE PERPENDICULAR AREA OF THE APPROACH

NON-CURBED ROADWAY,  
DRIVE PAVEMENT FLEIBLE

DRIVEWAY, RESIDENTIAL

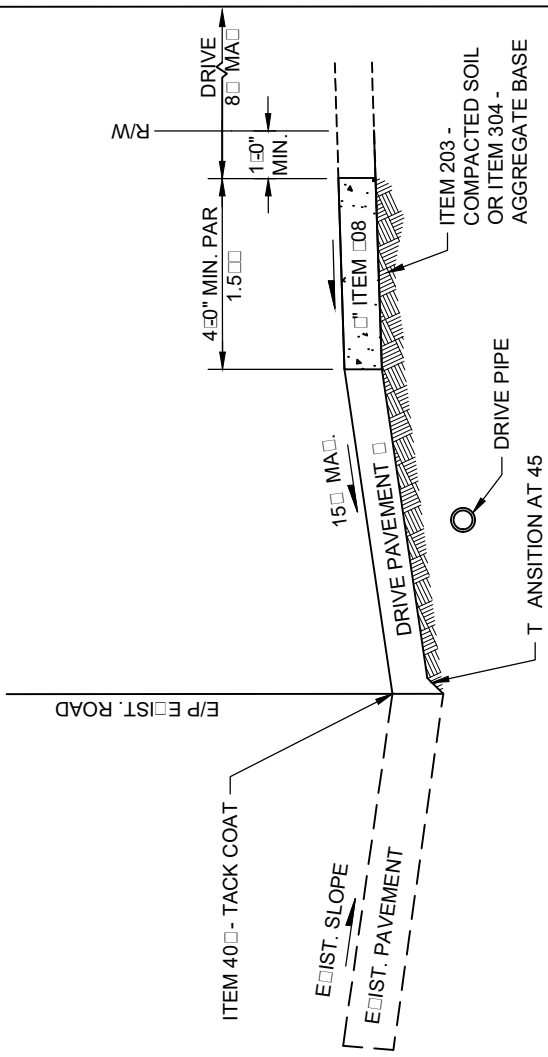
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

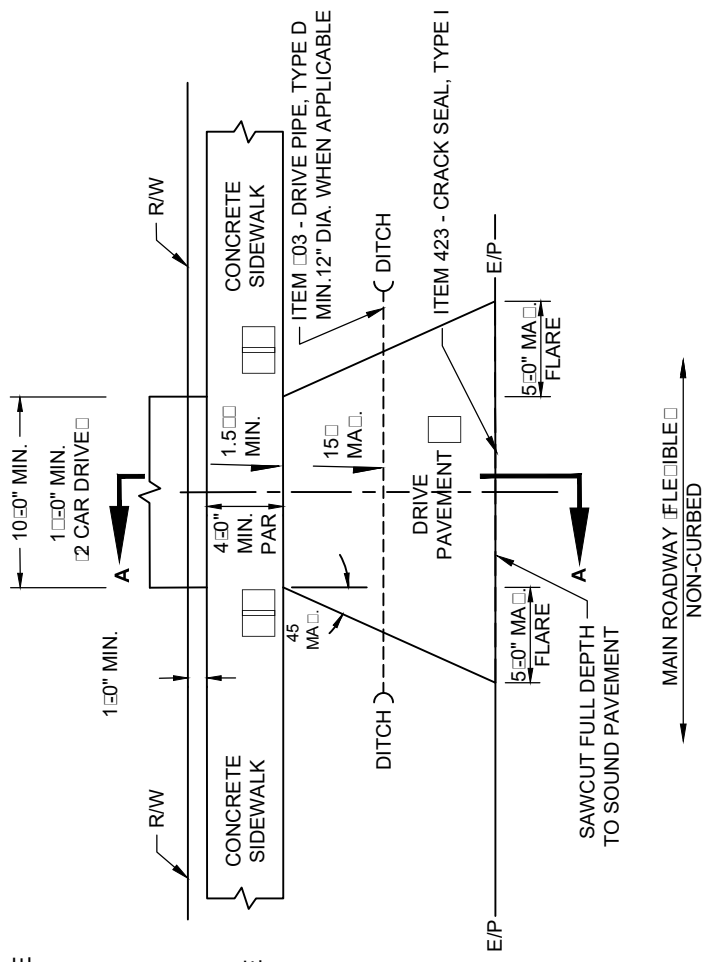
2201

12/31/18

SHT 5 OF 6



ITEM 40



MAIN ROADWAY FLEIBLE  
NON-CURBED

FOR USE ON A PARCEL WITH A SINGLE DWELLING

DRIVE PAVEMENT TYPE, RIGID  
 ITEM 452 - NON-REINFORCED PORTLAND CEMENT CONCRETE

SIDEWALK SHALL BE PER STANDARD DRAWING 2300. SIDEWALK THICKNESS SHALL BE CONCRETE TO ONE FULL PANEL MIN. 5 FT. BEYOND THE EDGE OF THE FULL WIDTH SECTION OF THE DRIVE.

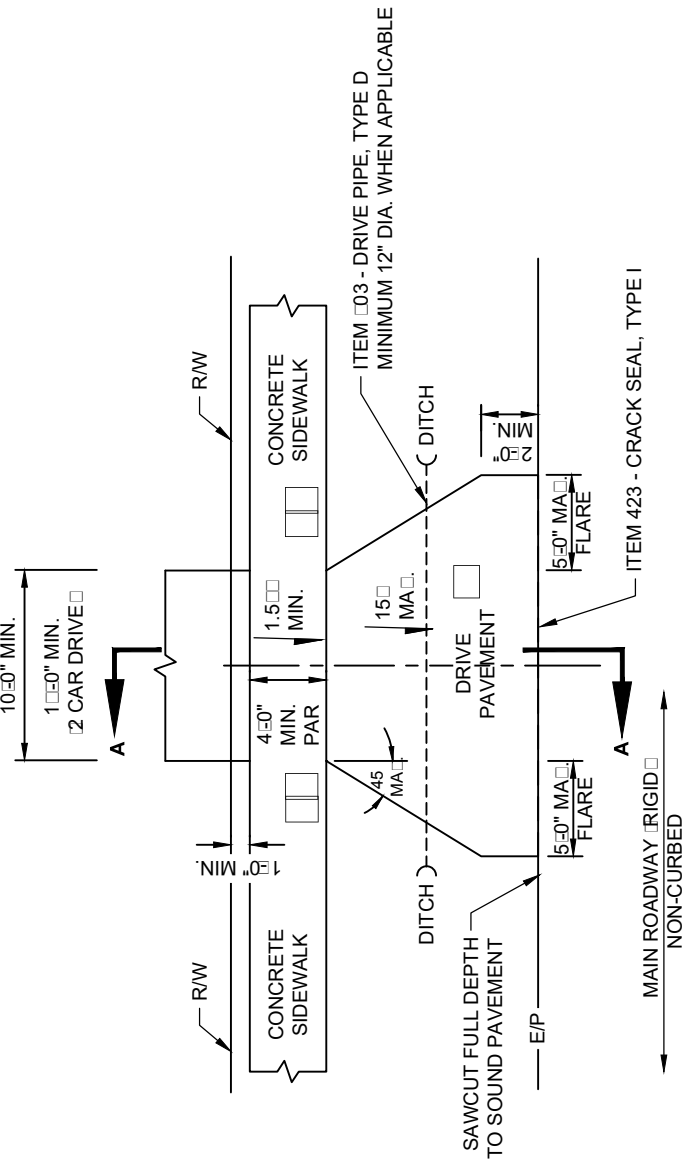
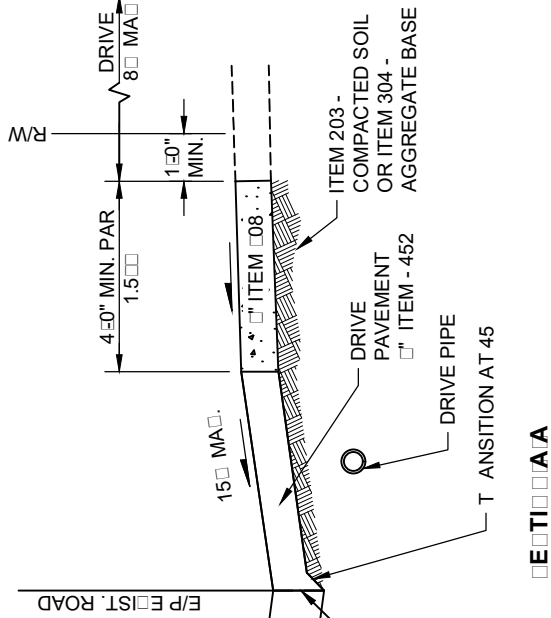
PAR PEDESTRIAN ACCESS ROUTE. SET PAR THROUGH APPROACH AT SIDEWALK GRADE TO AVOID RAMP OR TRANSITION. IF NOT POSSIBLE, THEN MINIMIE TRANSITION FROM SIDEWALK TO APPROACH.

WHEN CONDITIONS EIST USE THE FOLLOWING;

IF THE DISTANCE FROM THE SIDEWALK TO THE EDGE OF PAVEMENT IS

- 5----- HOLD THE FLARE TO 45 AND ADJUST THE WIDTH ACCORDINGLY, MAINTAIN THE MINIMUM 2 WIDE PERPENDICULAR AREA OF THE APPROACH
- 5----- MAINTAIN THE 5 MAXIMUM FLARE WIDTH, VARY THE ANGLE, AND MAINTAIN THE MINIMUM 2 WIDE PERPENDICULAR AREA OF THE APPROACH
- DECREASE THE 45 ANGLE ADJUST ACCORDINGLY MAINTAIN THE MINIMUM 2 WIDE PERPENDICULAR AREA OF THE APPROACH

DO NOT CUT INTO PAINTED EDGELINE. PAVEMENT RESTORATION MAY BE REQUIRED AS DETERMINED BY INSPECTOR BASED ON FIELD CONDITIONS



# DRIVEWAY, RESIDENTIAL

## NON-CURBED ROADWAY DRIVE PAVEMENT, RIGID

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC SERVICE  
 DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
**2201**  
 12/31/18  
 SHT OF

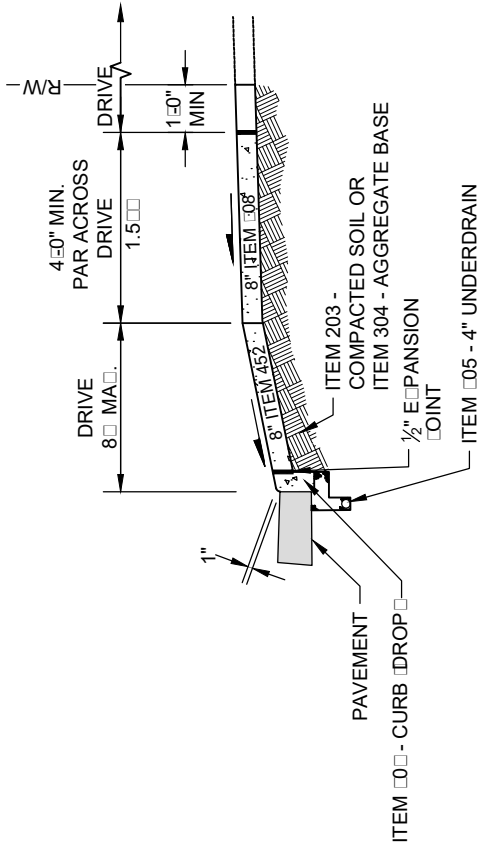
THIS STANDARD DRAWING IS FOR DRIVES ON LOCAL OR COLLECTOR STREETS WITH SPEEDS 35 MPH, UNLESS APPROVED OTHERWISE BY DEPARTMENT OF PUBLIC SERVICE.

CURB OR COMBINED CURB AND GUTTER SHALL BE TAKEN OUT AND REPLACED WITH CONCRETE, SEPARATED FROM THE DRIVE BY 1/2" PREMOLDED EXPANSION JOINT. WHEN LESS THAN 5 FT. OF A CURB SECTION REMAINS AFTER THE CURB CUT IS LOCATED, IT SHALL ALSO BE REMOVED AND REPLACED. CURB SHALL BE CONSTRUCTED IN MINIMUM 5 FT. SECTIONS AND MAXIMUM 10 FT. SECTIONS.

SIDEWALK WIDTH SHALL BE PER STANDARD DRAWING 2300. SIDEWALK THICKNESS SHALL BE 8" CONCRETE TO ONE FULL PANEL MIN. 5 FT. BEYOND THE EDGE OF THE FULL WIDTH SECTION OF THE DRIVE.

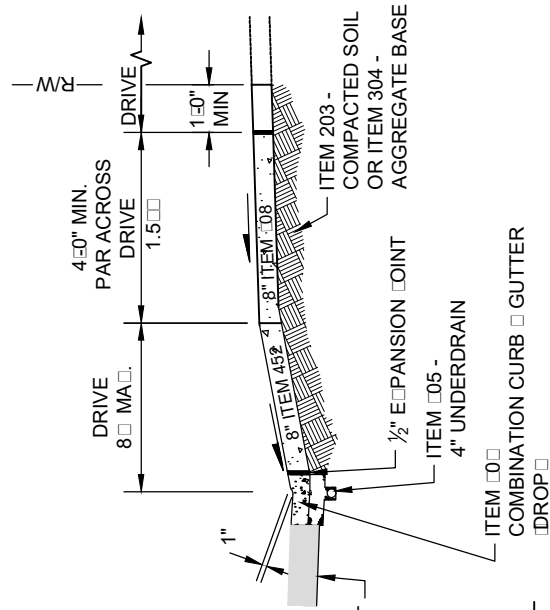
PAR PEDESTRIAN ACCESS ROUTE. SET PAR THROUGH APPROACH AT SIDEWALK GRADE TO AVOID RAMP OR TRANSITION. IF NOT POSSIBLE, THEN MINIMIZE TRANSITION FROM SIDEWALK TO APPROACH.

WHEN CURB OR CURB OR CURB AND GUTTER ARE PRESENT ALL DRIVEWAYS SHALL BE ITEM 452 CONCRETE PAVEMENT



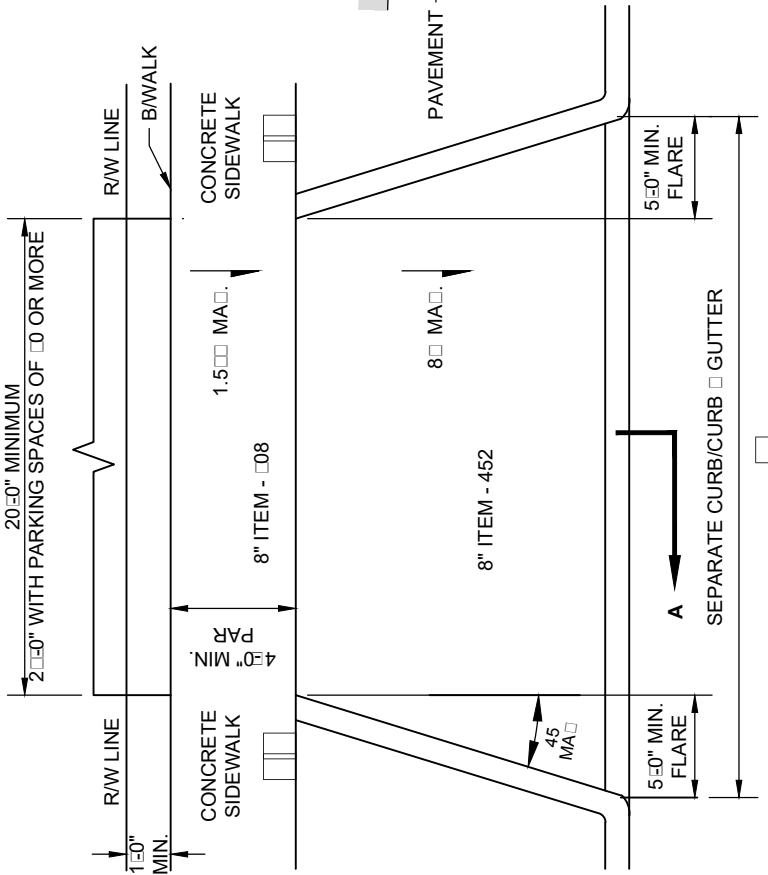
TRAFFIC

ITEM 05 - 4" UNDERDRAIN



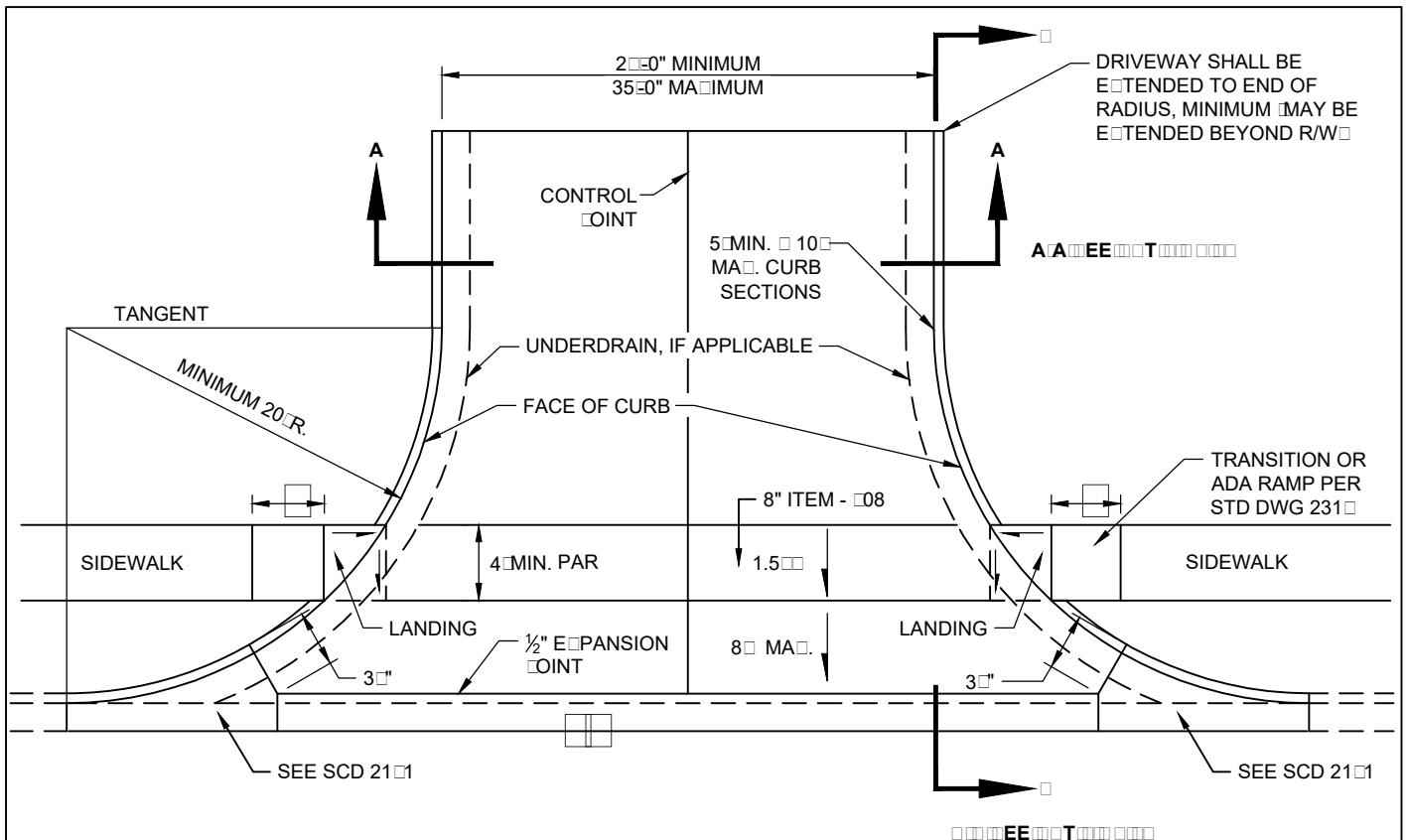
TRAFFIC

ITEM 05 - 4" UNDERDRAIN



CURBED ROADWAY WITH FLARES, TYPE A

<b>DRIVEWAY, NON-RESIDENTIAL</b>	
CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	
CITY ENGINEER	<b>STD DWG</b> <b>2202</b> 12/31/18
	SHT 1 OF 14



8" CONCRETE SIDEWALK FOR 1 FULL PANEL MIN. 5 FT. BEYOND EDGE OF DRIVE.

MAINTAIN 4" PIPE UNDERDRAIN. CURB OR COMBINED CURB AND GUTTER SHALL BE TAKEN OUT AND REPLACED WITH CONCRETE, SEPARATED FROM THE DRIVE BY 1/2" PREMOLDED EXPANSION JOINT. WHEN LESS THAN 5 FT. OF A CURB SECTION REMAINS AFTER THE CURB CUT IS LOCATED, IT SHALL ALSO BE REMOVED AND REPLACED. CURB/GUTTER SHALL BE CONSTRUCTED IN MINIMUM 5 FT. SECTIONS AND MAXIMUM 10 FT. SECTIONS.

PAR = PEDESTRIAN ACCESS ROUTE. SET PAR THROUGH APPROACH AT SIDEWALK GRADE TO AVOID RAMP OR TRANSITION. IF NOT POSSIBLE, THEN MINIMIZE TRANSITION FROM SIDEWALK TO APPROACH.

NO DOWELS REQUIRED ON DRIVES.

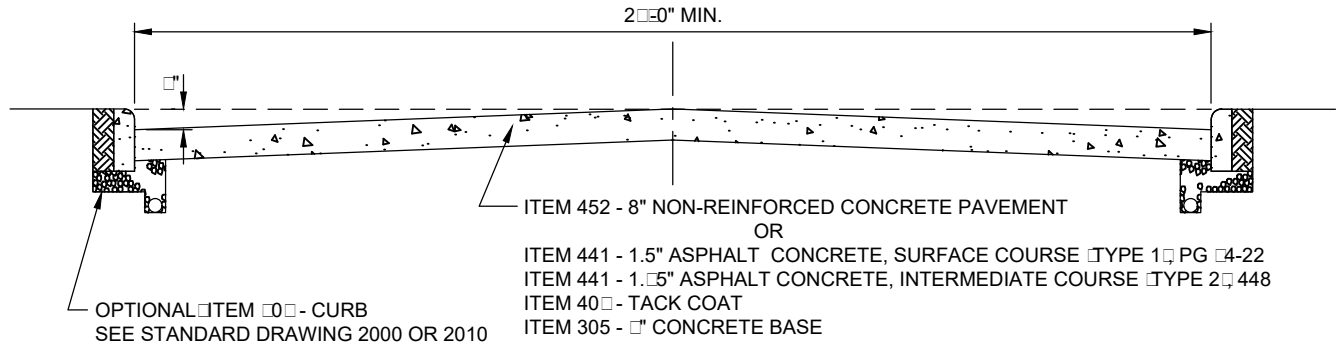
WHEN A CURB OR CURB AND GUTTER ARE PRESENT ALL DRIVEWAYS SHALL BE ITEM 452 CONCRETE PAVEMENT

### CURBED ROADWAY WITH RADIUS

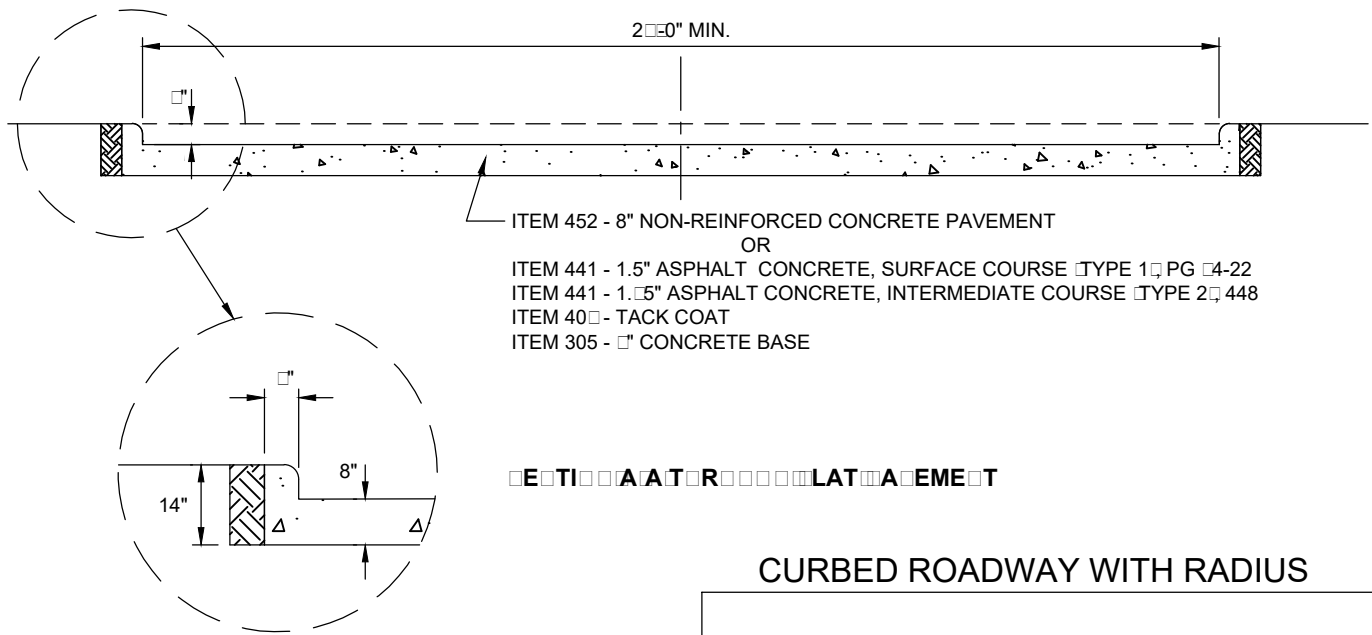
## DRIVEWAY, NON-RESIDENTIAL

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC SERVICE  
 DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
**2202**  
 12/31/18  
 SHT 5 OF 14



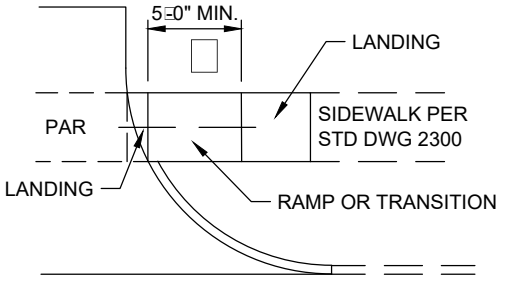
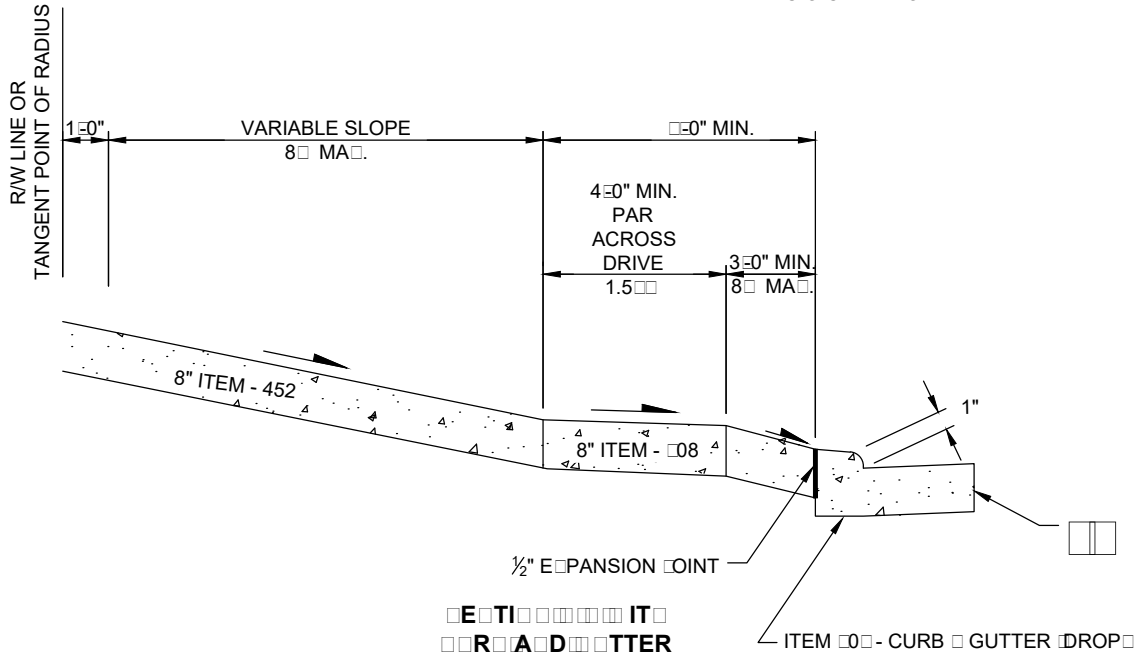
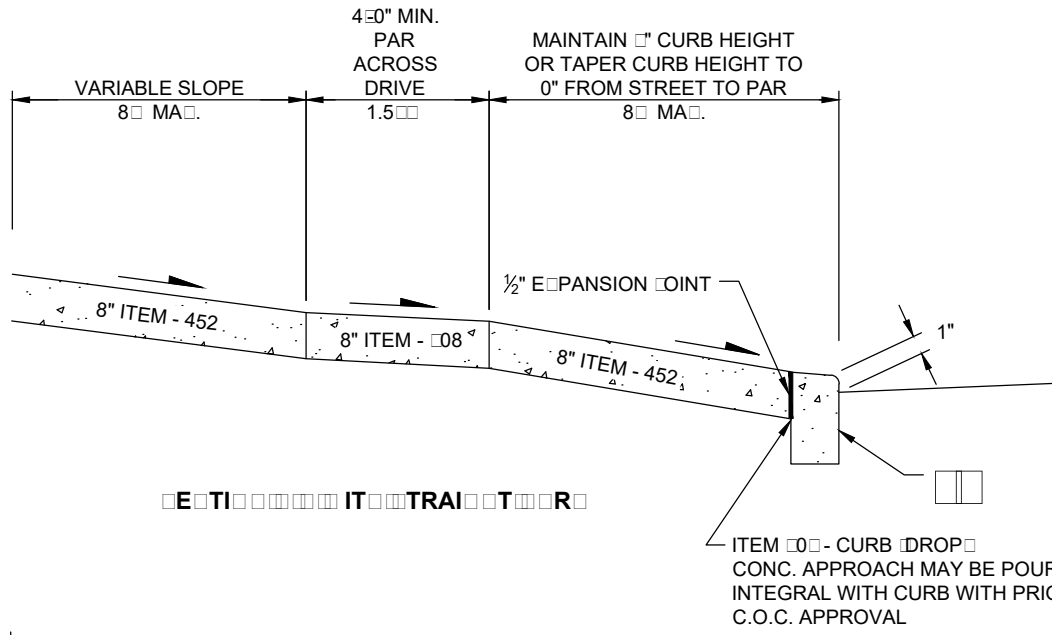
SECTION A-A THROUGH DRIVEWAY



**CURBED ROADWAY WITH RADIUS**  
**DRIVEWAY, NON-RESIDENTIAL**

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>2202</b>
	12/31/18
	SHT 1 OF 14





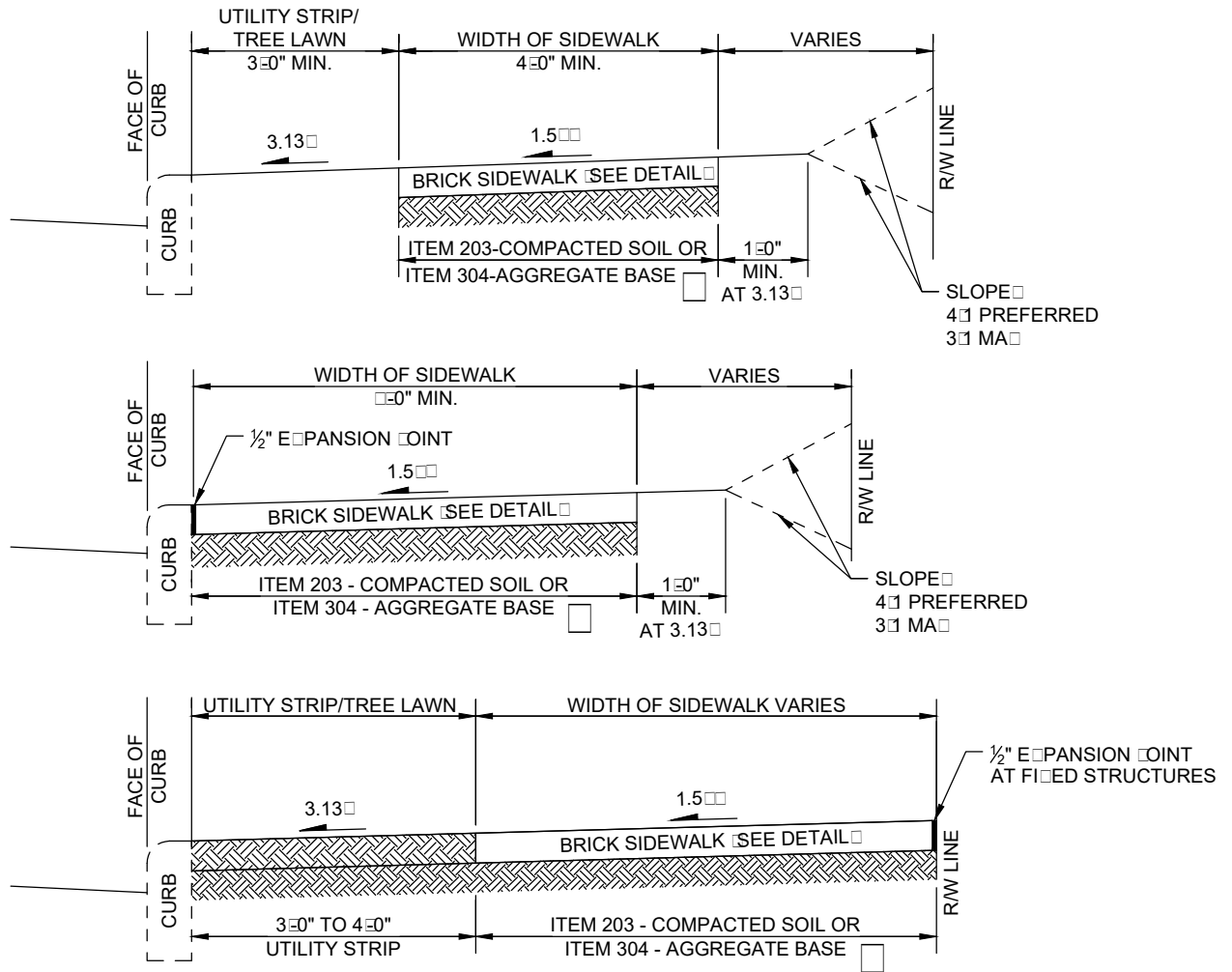
PAR = PEDESTRIAN ACCESS ROUTE. SET PAR THROUGH APPROACH AT SIDEWALK GRADE TO AVOID RAMP OR TRANSITION. IF NOT POSSIBLE, THEN MINIMIZE TRANSITION FROM SIDEWALK TO APPROACH.

- 8" ITEM - 08
- STRAIGHT CURB OR CONCRETE CURB & GUTTER.

**CURBED ROADWAY WITH RADIUS**

**DRIVEWAY, NON-RESIDENTIAL**

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>2202</b>
	12/31/18
	SHT 04 OF 14



WHERE NEW WALK ABUTS ADJACENT WALK, SAWCUT EXISTING WALK TO NEAREST JOINT AND INSTALL EXPANSION JOINT.

EXPANSION JOINT LOCATIONS AND SPACING PER ITEM 08.03.

WATER AND UTILITY BODIES IN THE SIDEWALK AREA SHALL BE ADJUSTED FLUSH WITH FINAL SURFACE.

ROOF DRAINS SHALL BE EXTENDED UNDER THE SIDEWALK AND THROUGH THE CURB. SEE STD DWG 2320.

WHEN A SIDEWALK IS CONSTRUCTED FOR THE ENTIRE WIDTH FROM THE CURB TO THE R/W LINE, THE WALK SHALL BE CONSTRUCTED PART WIDTH AT A TIME, ALLOWING FOR SUFFICIENT UNOBSTRUCTED AREA 48" WIDE FOR SAFE MOVEMENT OF PEDESTRIAN TRAFFIC, OR AS APPROVED BY ENGINEER.

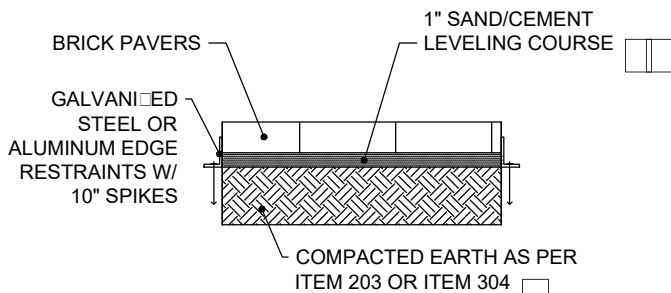
ITEM NUMBERS REFER TO THE CITY OF COLUMBUS CMSC, CURRENT EDITION. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THESE SPECIFICATIONS.

5% AGGREGATE MAY BE USED FOR REPLACEMENT WORK.

THE SAND TO CEMENT RATIO IS 5 PARTS SAND TO ONE PART CEMENT.

## RESIDENTIAL

# BRICK SIDEWALK



**DETAIL**

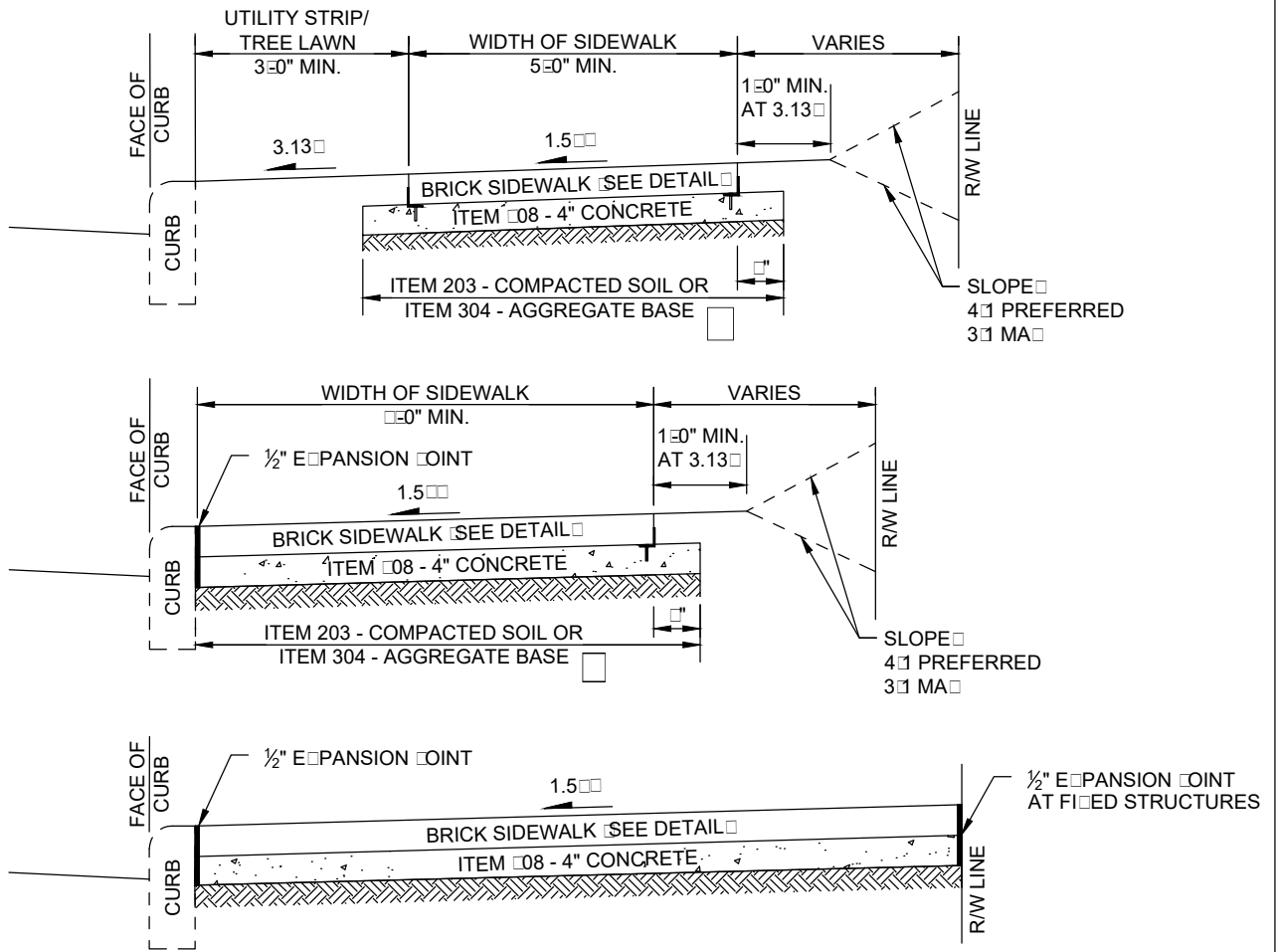
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
**2301**

CITY ENGINEER

04/30/18

SHT 1 OF 3



WHERE SIDEWALKS ABUT DRIVEWAYS OR ALLEY APPROACHES, THE CONCRETE THICKNESS OF THE WALK SHALL EQUAL THE THICKNESS OF THE APPROACH MINIMUM FOR A DISTANCE OF ONE FULL PANEL OR MINIMUM 5 FEET. SEE STANDARD DRAWING OF THE APPLICABLE DRIVEWAY OR ALLEY.

WHERE NEW WALK ABUTS ADJOINING WALK, SAWCUT EXISTING WALK TO NEAREST JOINT AND INSTALL EXPANSION JOINT.

EXPANSION JOINT LOCATIONS AND SPACING PER ITEM 08.03.

WATER AND UTILITY BOUES IN THE SIDEWALK AREA SHALL BE ADJUSTED FLUSH WITH FINAL SURFACE.

ROOF DRAINS SHALL BE EXTENDED UNDER THE SIDEWALK AND THROUGH THE CURB. SEE STD DWG 2320.

WHEN A SIDEWALK IS CONSTRUCTED FOR THE ENTIRE WIDTH FROM THE CURB TO THE R/W LINE, THE WALK SHALL BE CONSTRUCTED PART WIDTH AT A TIME, ALLOWING FOR SUFFICIENT UNOBSTRUCTED AREA 48" WIDE FOR SAFE MOVEMENT OF PEDESTRIAN TRAFFIC, OR AS APPROVED BY ENGINEER.

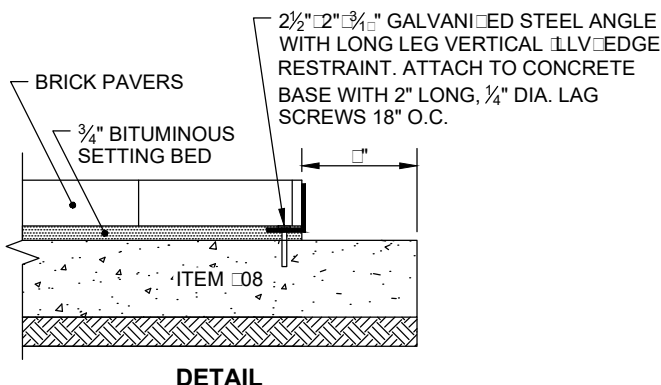
ONE INCH CONTRACTION JOINTS SHALL BE SAWS IN THE CONCRETE EVERY 10 FEET.

ITEM NUMBERS REFER TO THE CITY OF COLUMBUS CMSC, CURRENT EDITION. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THESE SPECIFICATIONS.

5 AGGREGATE MAY BE USED FOR REPLACEMENT WORK.

## NON-RESIDENTIAL

# BRICK SIDEWALK



CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG  
**2301**

04/30/18

SHT 2 OF 3

ITEM SPECIAL - BRICK PAVERS INCLUDING CONCRETE BASE

SEE SUPPLEMENTAL SPECIFICATION SS-1524 ROADWAY PAVERS; FOLLOW ALL APPLICATION STANDARDS, SUBMITTAL REQUIREMENTS, MATERIALS, CONSTRUCTION REQUIREMENTS, QUALITY ASSURANCE AND CONTROL, METHOD OF MEASUREMENT, BASIS OF PAYMENT AND WARRANTY REQUIREMENTS.

MANUFACTURERS AND MATERIALS SHALL BE AS PER THE QUALIFIED PRODUCTS LIST AND APPROVED MANUFACTURERS / SUPPLIERS LIST.

**BRICK  
SIDEWALK**

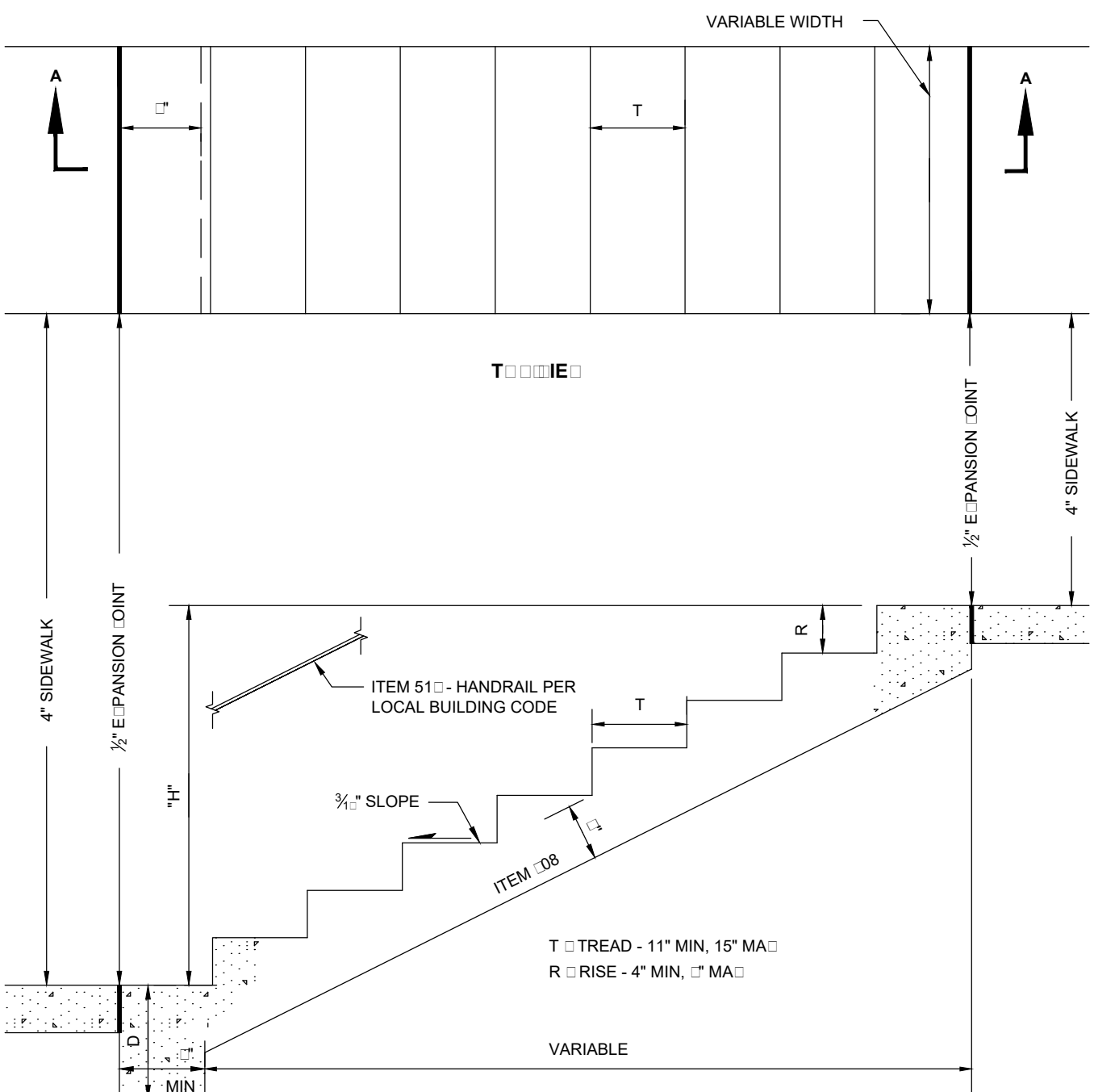
CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

**2301**

04/30/18

SHT 3 OF 3



T ■■■■ I E ■

T ■ TREAD - 11" MIN, 15" MA ■  
 R ■ RISE - 4" MIN, ■ MA ■

■ E ■ T I ■ ■ A ■ A  
 NO SCALE

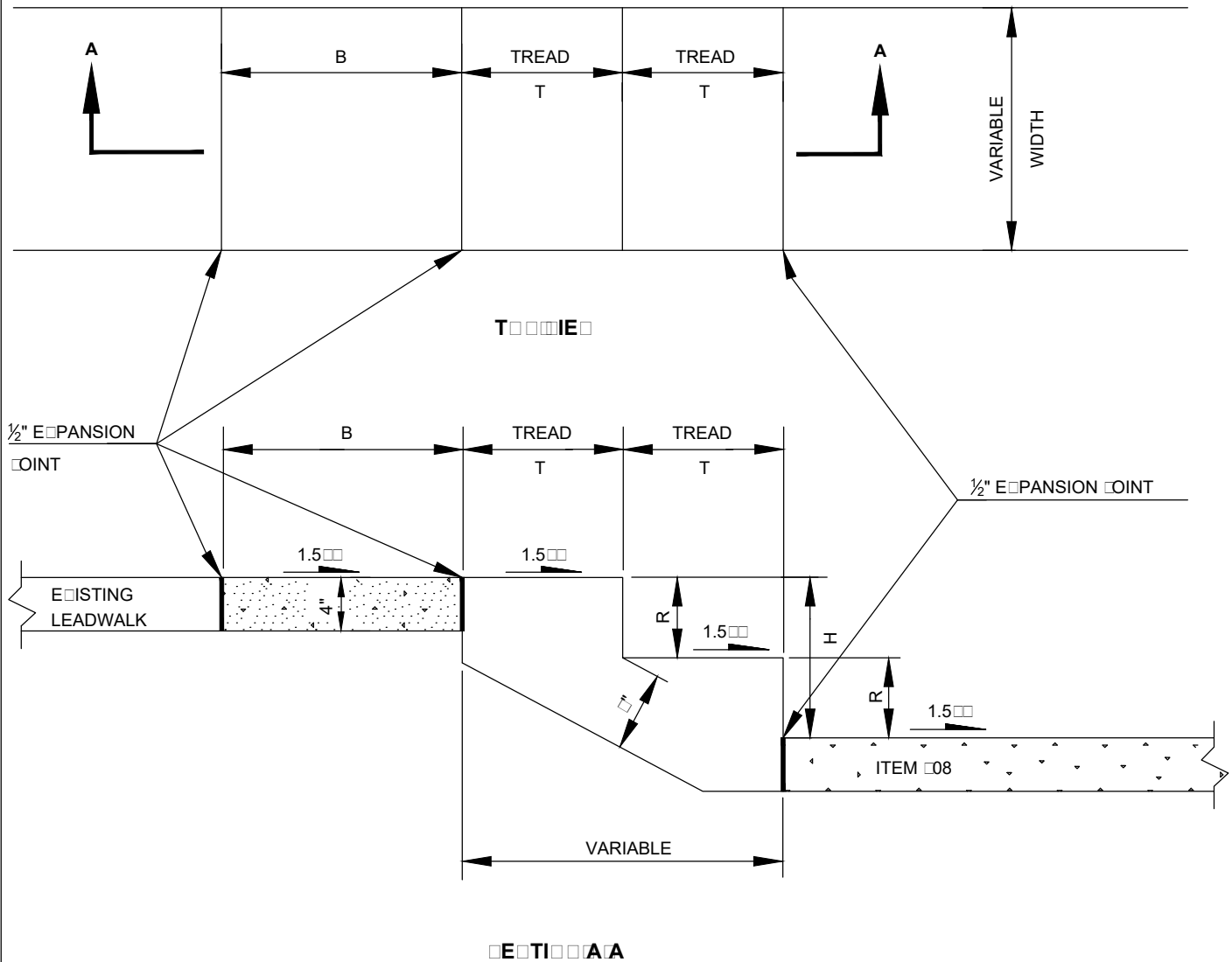
FOR "H" ■ 24" AND UNDER  
 SEE SHEET 2 OR 3

NO. OF RISERS	"D"
4	8"
5	10"
■	10"
■	12"
8	12"

STAIR TREADS AND RISERS SHALL BE OF EQUAL SIZE AND SHAPE. TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTHS SHALL NOT EXCEED 3/8 INCHES.

**CONCRETE STEPS**

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>2328</b>
 CITY ENGINEER	4/30/2018 SHT 1 OF 3



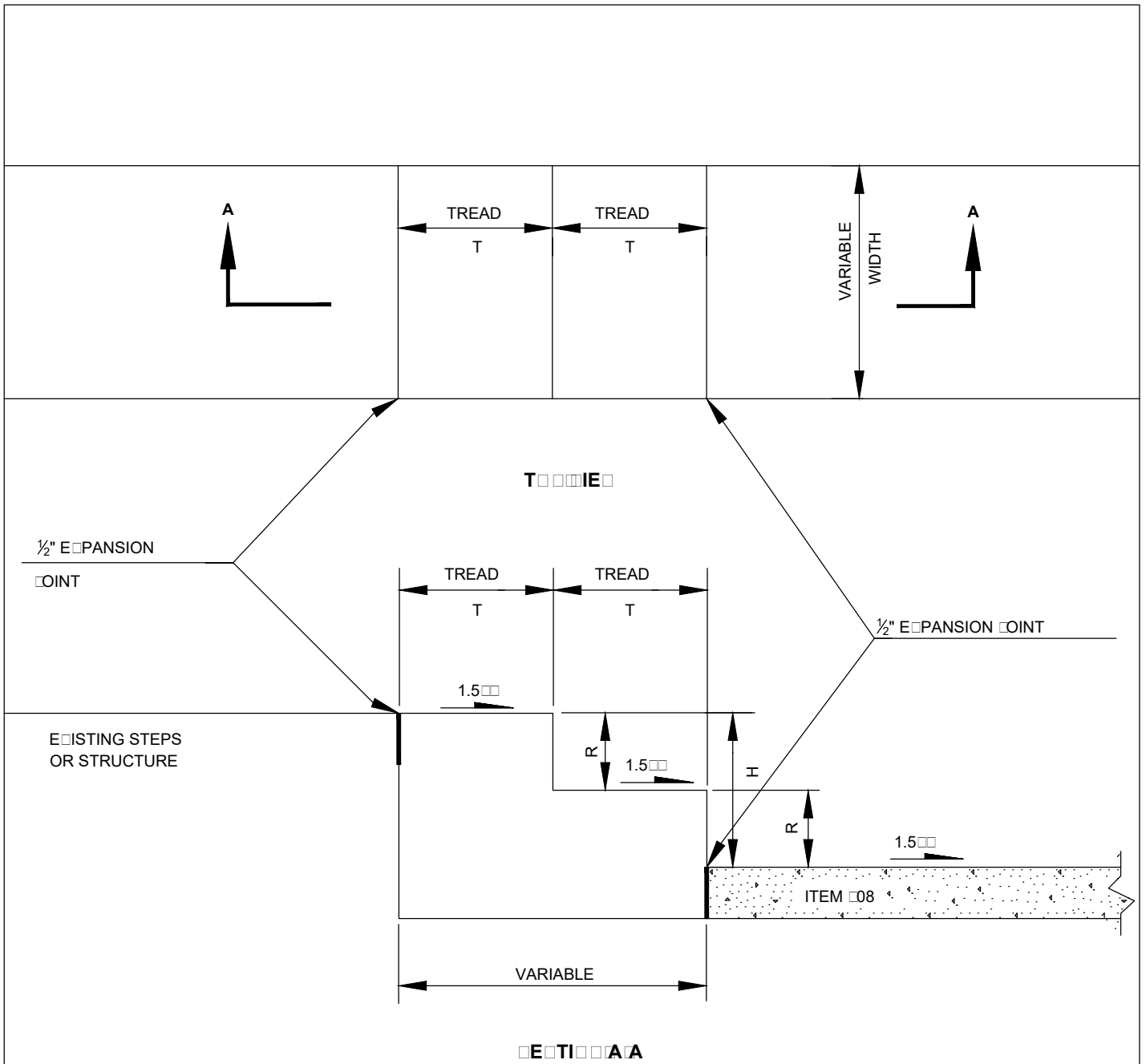
T = TREAD - 11" MIN, 15" MAX

R = RISER - 4" MIN, 8" MAX

IF "H" IS GREATER THAN 24", SEE SHT. 1 OF 3

STAIR TREADS AND RISERS SHALL BE OF EQUAL SIZE AND SHAPE. TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTHS SHALL NOT EXCEED 3/8 INCHES.

<h2 style="margin: 0;">CONCRETE STEPS</h2>	
CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>2328</b> 4/30/2018 SHT 2 OF 3



T = TREAD - 11" MIN, 15" MAX

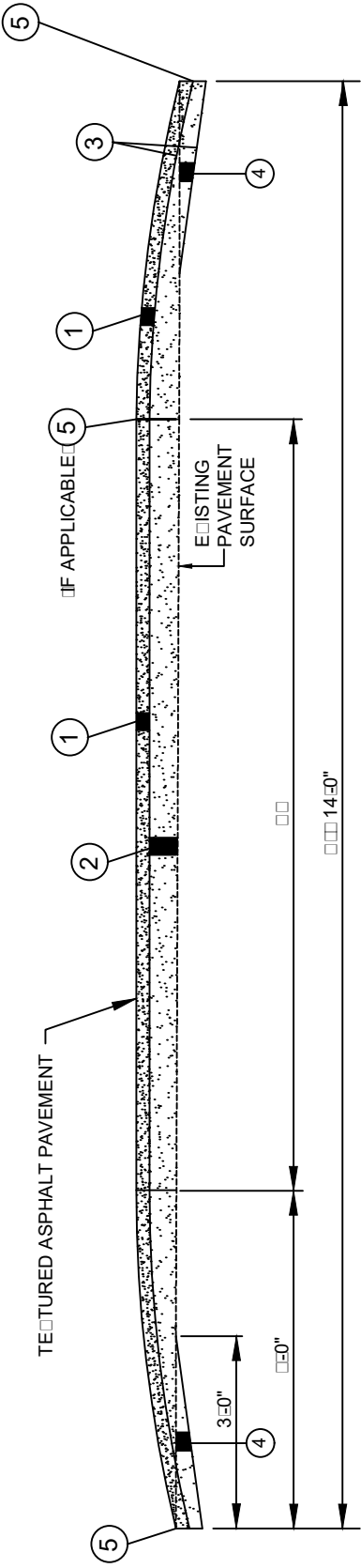
R = RISER - 4" MIN, 8" MAX

IF "H" IS GREATER THAN 24", SEE SHT. 1 OF 3

THIS STANDARD DRAWING SHALL BE USED WHEN CONSTRUCTING A SMALL PORCH STOOP OR WHEN MEETING EXISTING STEPS.

STAIR TREADS AND RISERS SHALL BE OF EQUAL SIZE AND SHAPE. TOLERANCE BETWEEN THE LARGEST AND SMALLEST RISER HEIGHT OR BETWEEN THE LARGEST AND SMALLEST TREAD DEPTHS SHALL NOT EXCEED 3/8 INCHES.

<h2>CONCRETE STEPS</h2>	
CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC SERVICE DIVISION OF DESIGN AND CONSTRUCTION	<b>STD DWG</b> <b>2328</b> 4/30/2018 SHT 3 OF 3

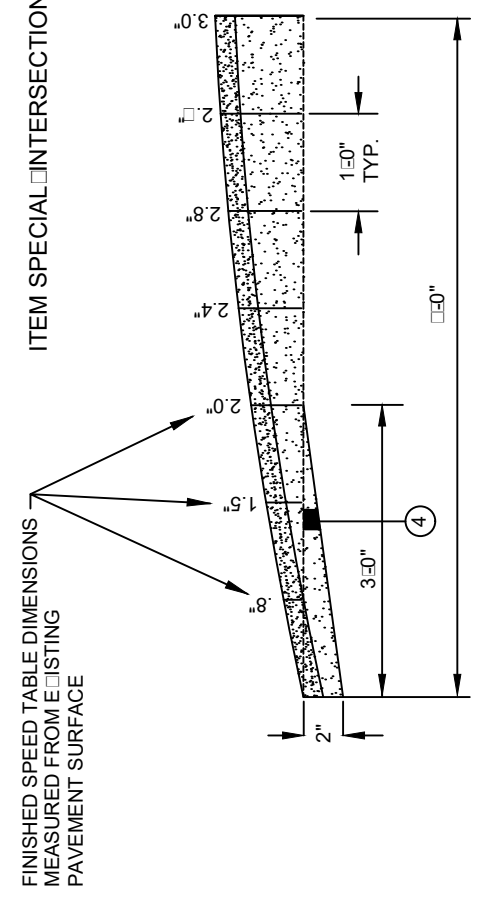


- ① ITEM 441 - 1 1/2" ASPHALT CONCRETE, SURFACE COURSE  
TYPE 1 PG 4-22
- ② ITEM 441 - VAR. ASPHALT CONCRETE, INTERMEDIATE COURSE TYPE 2 PG 4-22
- ③ ITEM 40 - TACK COAT
- ④ ASPHALT REMOVED
- ⑤ ITEM 423 - CRACK SEALING, TYPE I

THE TEMPERATURE FOR ITEM 441 - ASPHALT CONCRETE, INTERMEDIATE COURSE SHALL BE 150 F. FOR ITEM 441 - ASPHALT CONCRETE, SURFACE COURSE CAN BE PLACED.

VARIABLES ACCORDING TO STREET WIDTH.

ITEM SPECIAL INTERSECTION SPEED TABLE EACH



CROSS - SECTION

INTERSECTION SPEED TABLE

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

STD DWG

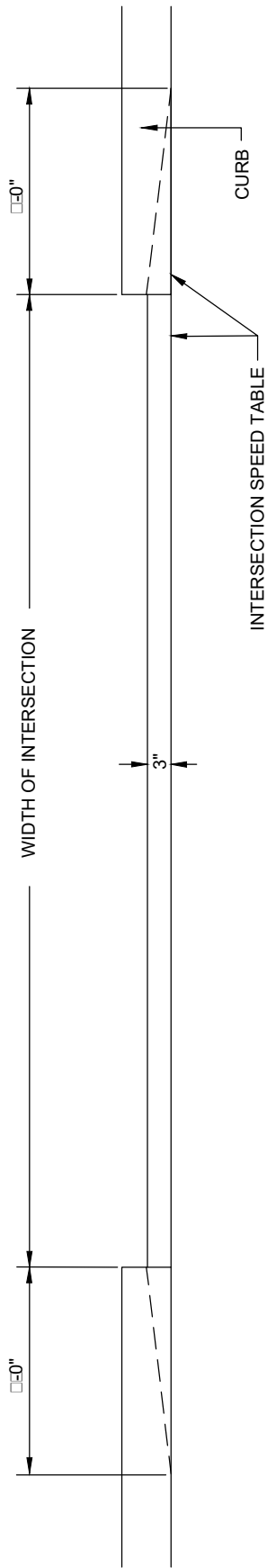
233

CITY ENGINEER

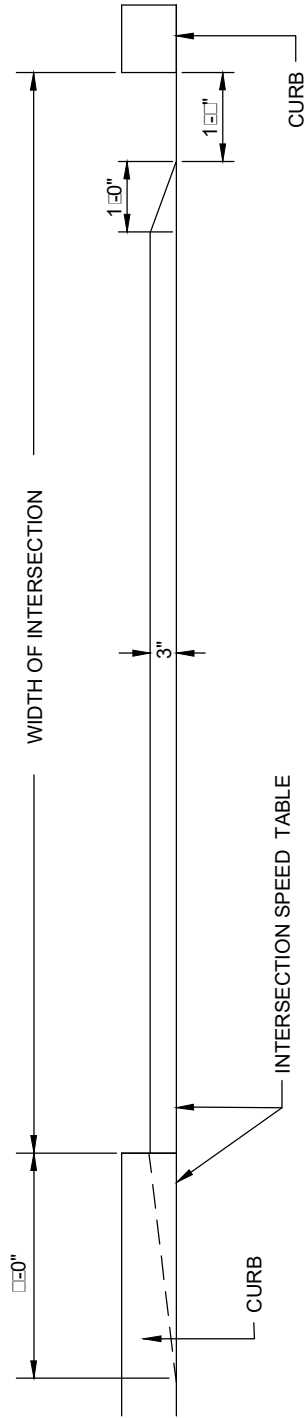
4/30/2018

SHT 1 OF 2





TRIPLE INTERSECTION



ROADWAY CROSS - SECTION

INTERSECTION  
SPEED TABLE

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC SERVICE  
DIVISION OF DESIGN AND CONSTRUCTION

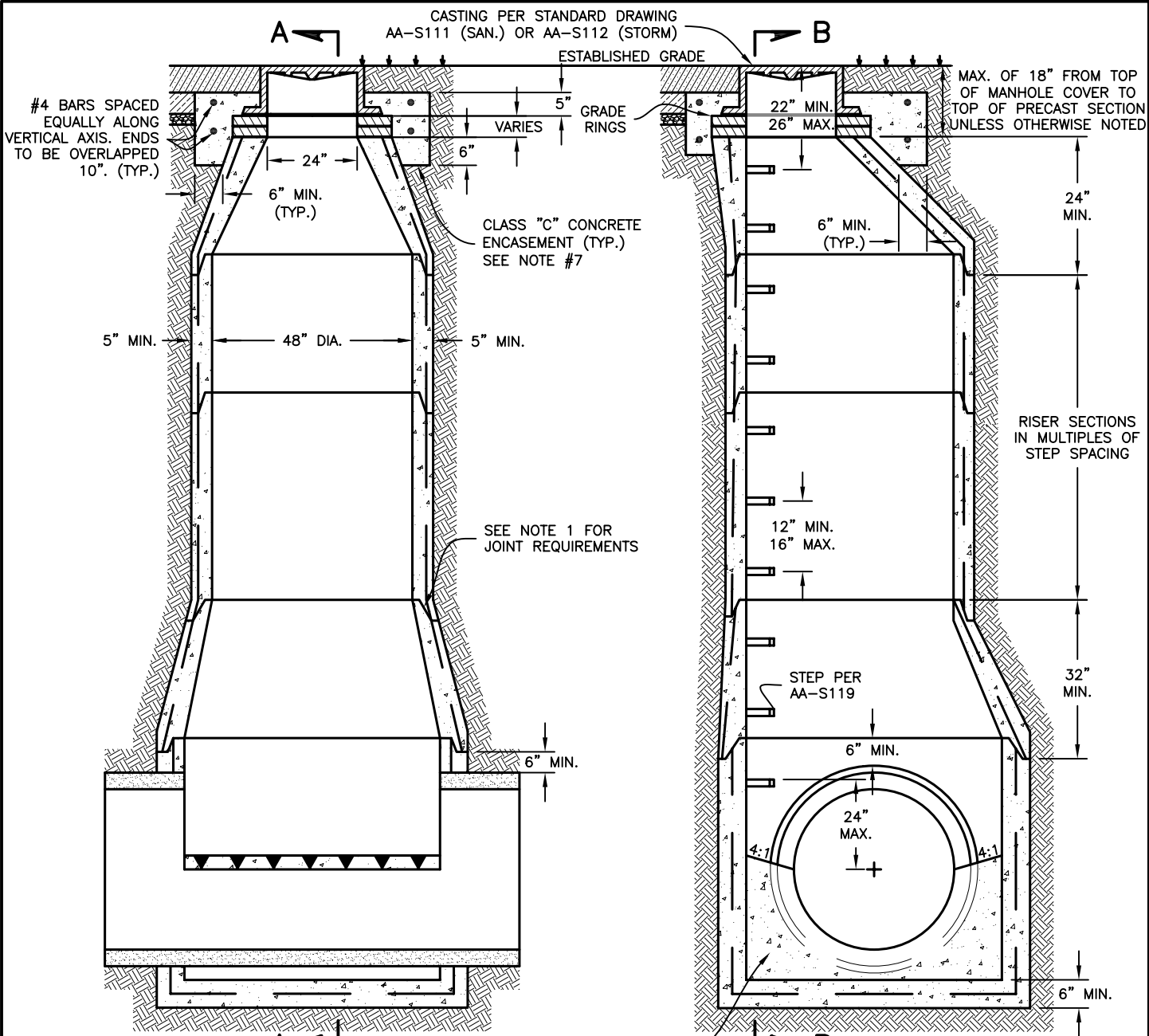
STD DWG

233

4/30/2018

SHT 2 OF 2

TRIPLE INTERSECTION



SECTION B-B

SECTION A-A

NOTES:

1. JOINTS AND CONNECTIONS SHALL BE PER 604.06.
2. PRECAST MANHOLES SHALL BE IN ACCORDANCE WITH ASTM C-478.
3. PRECAST WALLS SHALL HAVE A MIN. THICKNESS OF 5" AND BE SUFFICIENTLY REINFORCED TO PERMIT SHIPPING AND HANDLING WITHOUT DAMAGE.
4. FINISH MANHOLE CHANNEL ACCORDING TO STANDARD DRAWING AA-S117.
5. SEE TABLE FOR MANHOLE BASE DIAMETER.
6. MANHOLES MUST BE SET ON FOUNDATION OF CRUSHED #57 LIMESTONE, 6" MIN. THICKNESS.
7. ONLY SANITARY MANHOLES IN IMPERVIOUS AREAS SHALL REQUIRE A CONCRETE COLLAR, UNLESS OTHERWISE SPECIFIED. SANITARY MANHOLES LOCATED WITHIN PERVIOUS AREAS SHALL REQUIRE A FLEXIBLE CHIMNEY SEAL.

MANHOLE BASE I.D. (INCHES)	MAXIMUM PIPE O.D.	
	STRAIGHT PIPE (INCHES)	RIGHT ANGLE (INCHES)
48	31	25
60	42	32
72	51	38
84	-	44
96	-	50

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF SEWERAGE & DRAINAGE

TYPE "C" MANHOLE

STANDARD DRAWING  
AA-S102

REVISED 12/6/13

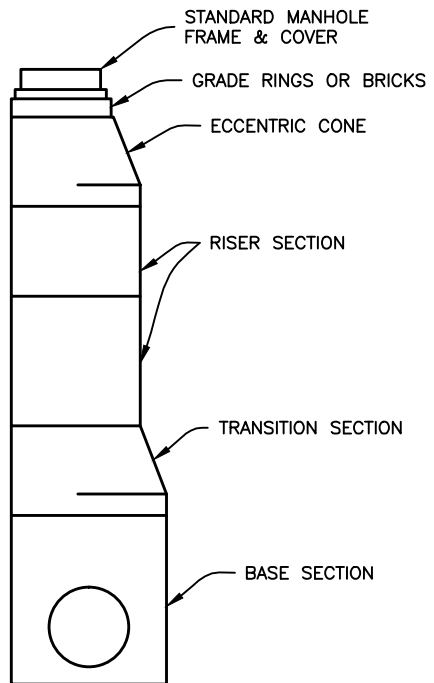
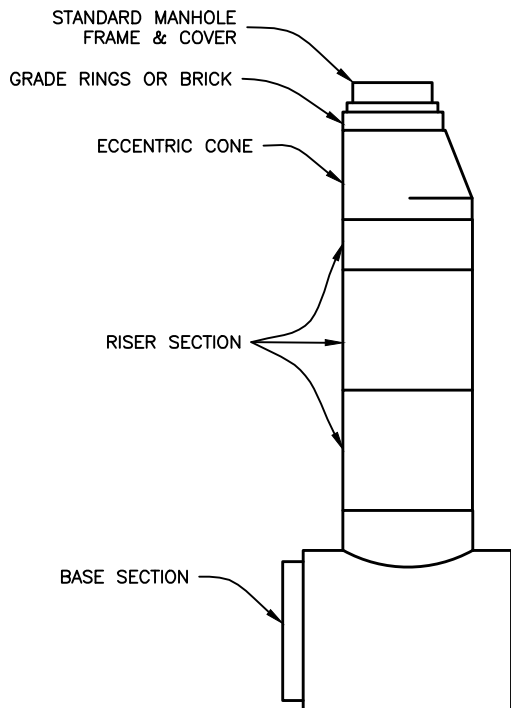
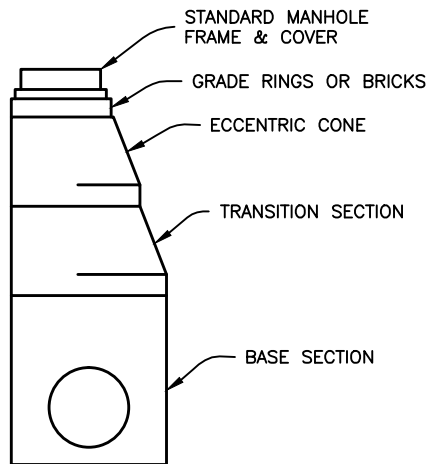
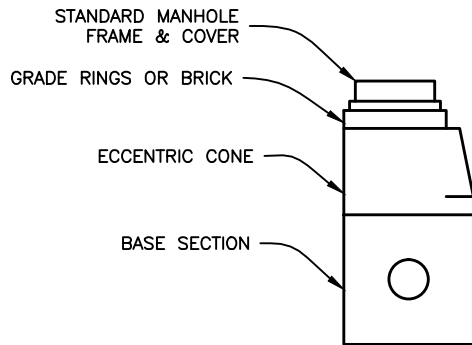
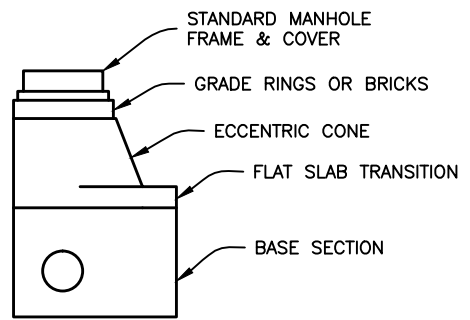
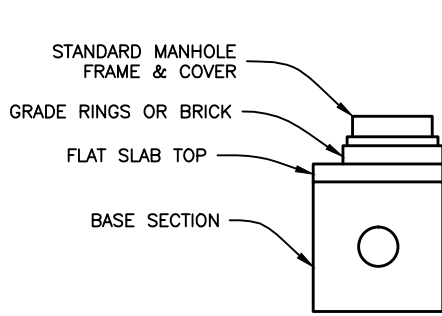
SSS MANAGER

*John J. Newson*

PAGE

1

1



CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF SEWERAGE & DRAINAGE

TYPICAL ASSEMBLY  
 COMBINATIONS  
 FOR  
 PRECAST MANHOLES

STANDARD DRAWING  
 AA-S106

REVISED 7/9/12

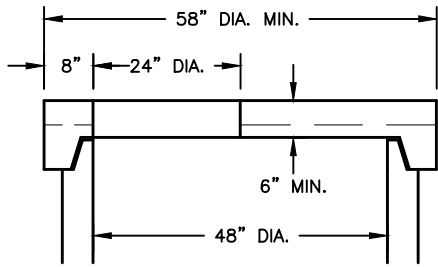
SSSES MANAGER

*John H. Newsome*

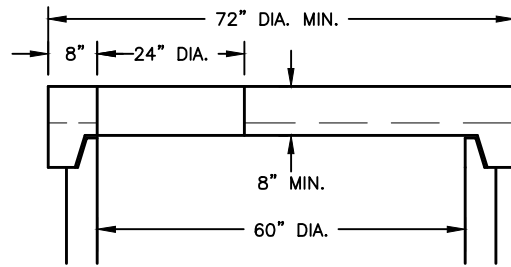
PAGE

1

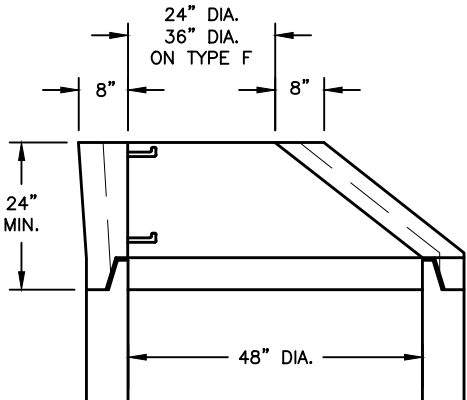
1



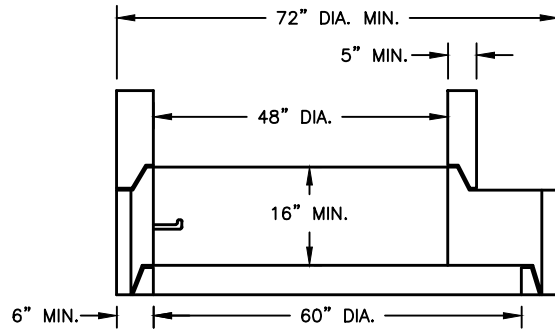
FLAT SLAB TOP  
(48" RISERS)



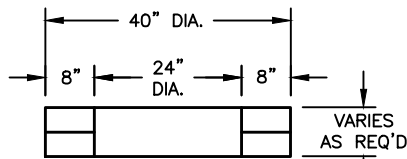
FLAT SLAB TOP  
(60" RISERS)



ECCENTRIC CONE TOP  
(48" RISERS)



FLAT SLAB TRANSITION  
(60" TO 48")



STANDARD GRADE RING

NOTE  
ALL PRE-CAST MANHOLE SECTIONS SHALL BE IN ACCORDANCE WITH ASTM C418.

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF SEWERAGE & DRAINAGE

*John J. Newsome*

SSES MANAGER

MISCELLANEOUS ITEMS  
PRECAST MANHOLES

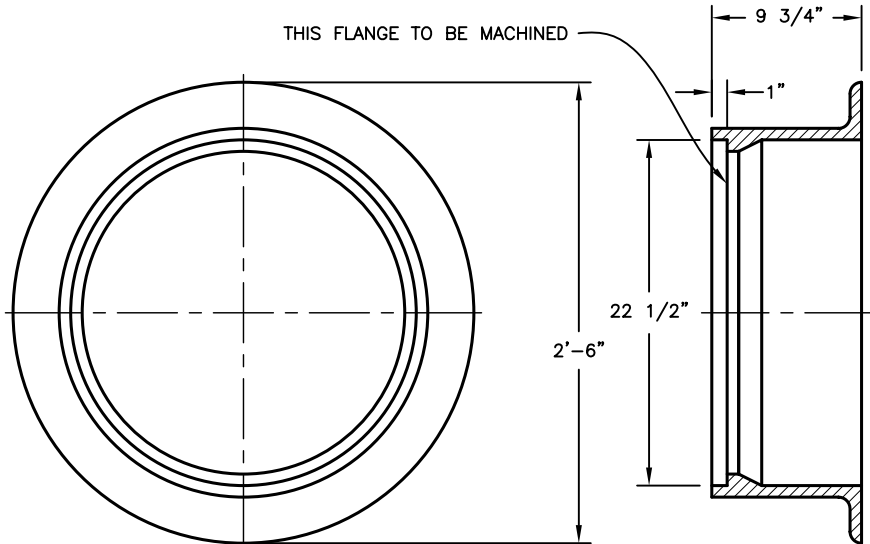
STANDARD DRAWING  
AA-S107

REVISED 7/9/12

PAGE

1

1



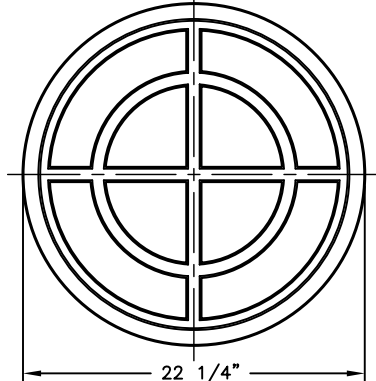
PLAN

SECTION

GROUND RIM  
APPROX. WEIGHT = 138LBS.

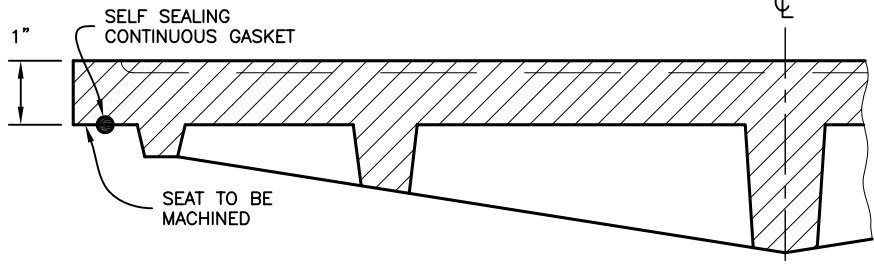


TOP

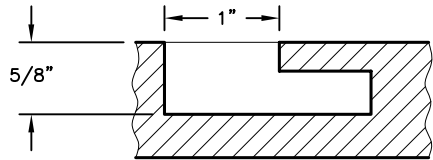


BOTTOM  
LID

APPROX. WEIGHT = 126 LBS.



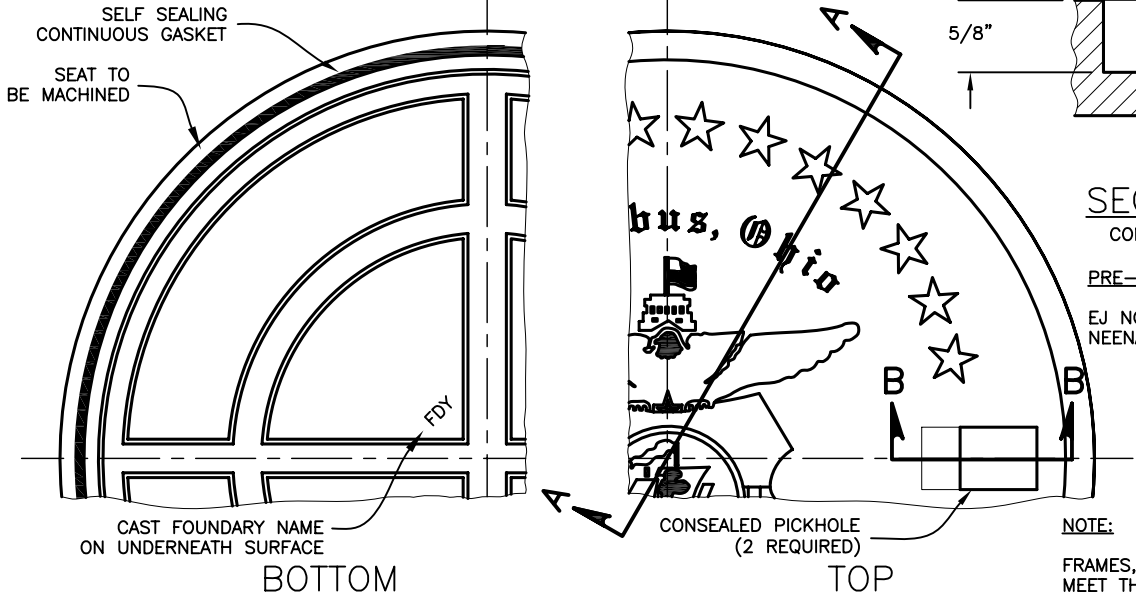
SECTION A-A



SECTION B-B  
CONCEALED PICKHOLE

PRE-APPROVED CASTINGS:  
EJ NO. - 1660A3GS, 1661Z1  
NEENAH NO. - 1762 WITH T-SEAL

NOTE:  
FRAMES, GRATES, AND COVERS SHALL  
MEET THE REQUIREMENTS OF 604.02  
AND AASHTO M306



BOTTOM

TOP

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF SEWERAGE & DRAINAGE

STANDARD DIMENSIONS  
FOR MANHOLE FRAME  
& COVER CASTING  
(SANITARY SEWERS)

STANDARD DRAWING  
AA-S111

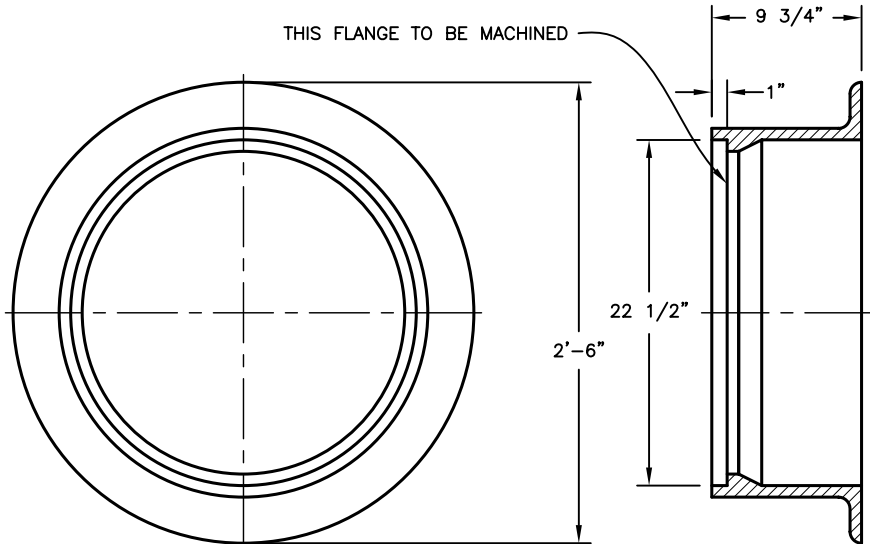
REVISED 12/6/13

SSES MANAGER

*John J. Newson*

PAGE

1 / 1



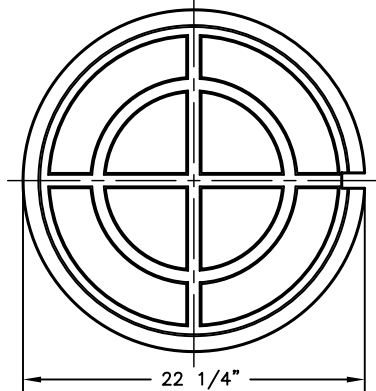
PLAN

SECTION

GROUND RIM  
APPROX. WEIGHT = 138LBS.

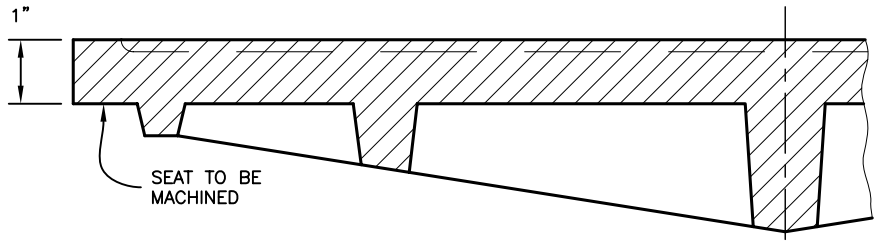


TOP



BOTTOM  
LID

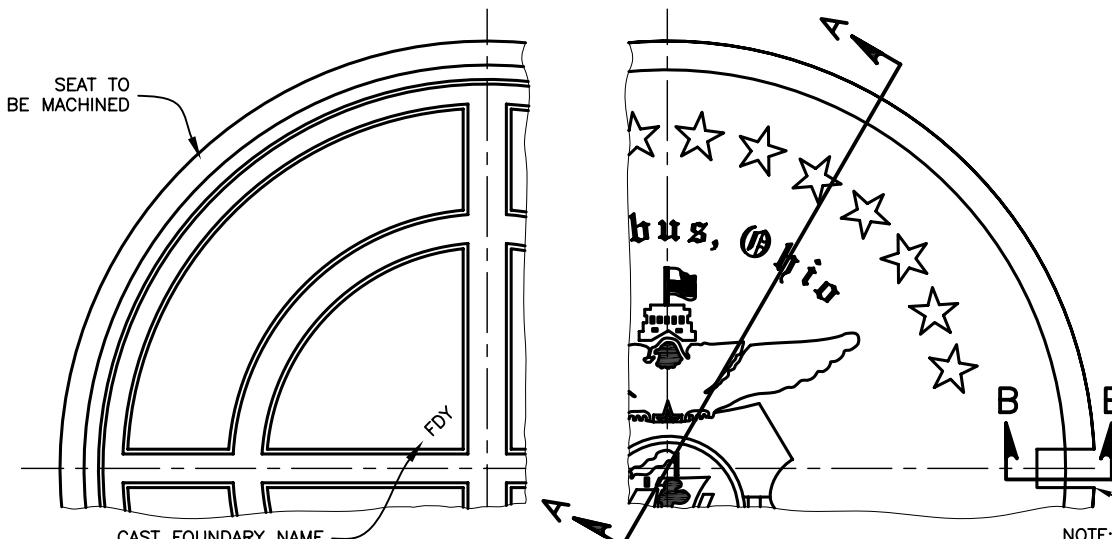
APPROX. WEIGHT = 126 LBS.



SECTION A-A

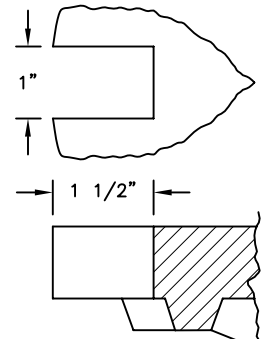
PRE-APPROVED CASTINGS:

EJ NO. - 1660A3, 1661Z1  
NEENAH NO. - 1762



BOTTOM

TOP



SECTION B-B  
PICKHOLE

NOTE:

FRAMES, GRATES, AND COVERS SHALL MEET THE REQUIREMENTS OF 604.02 AND AASHTO M306

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF SEWERAGE & DRAINAGE

*John J. Newsome*

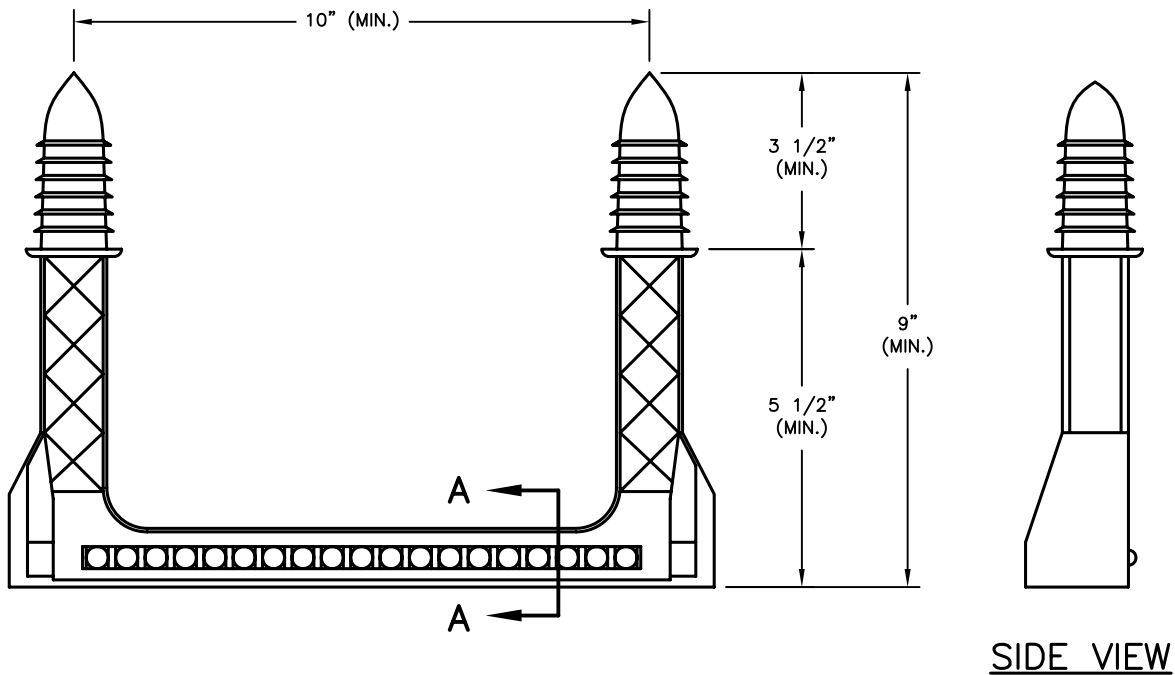
SSES MANAGER

STANDARD DIMENSIONS  
FOR MANHOLE FRAME  
& COVER CASTING  
(STORM SEWERS)

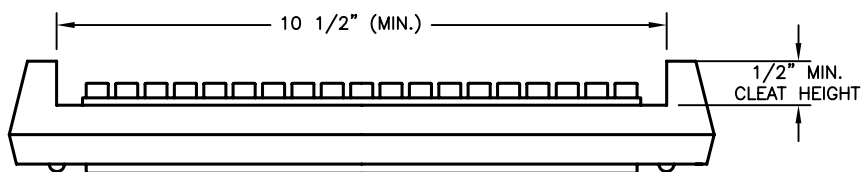
STANDARD DRAWING  
AA-S112

REVISED 12/6/13

PAGE 1



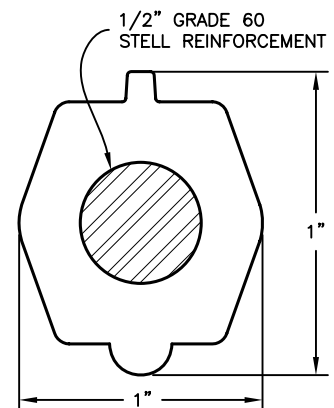
TOP VIEW



FRONT VIEW

NOTES:

1. STEPS SHALL MEET THE REQUIREMENTS OF ASTM C478, AND SHALL BE INSTALLED WITH A UNIFORM VERTICAL SPACING OF 12" TO 16"
2. STEPS INSTALLED IN EXISTING STRUCTURES SHALL BE SET IN A QUICK SETTING NON-SHRINK EPOXY.
3. STEPS SHALL CONFORM TO MATERIAL REQUIREMENTS OF CMS 711.31. ALL STEPS SHALL HAVE A DEPRESSED TREAD OR 1/2" MINIMUM CLEAT HEIGHT AT THE ENDS.
4. THE ENGINEER MAY REQUIRE THE CONTRACTOR TO TEST LOAD A MAXIMUM OF ONE STEP PER STRUCTURE PER ASTM C478. IF THE SELECTED STEP FAILS THE ASTM TEST, THE REMAINING STEPS IN THAT STRUCTURE SHALL ALSO BE TESTED. ALL STEPS NOT PASSING THE ASTM TEST SHALL BE REMOVED. ALL NEW STEPS SHALL BE TESTED PER ASTM C478. THE COST OF TESTING SHALL BE INCLUDED IN THE UNIT PRICE BID FOR SAID STRUCTURE.



SECTION A-A

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF SEWERAGE & DRAINAGE

MANHOLE STEP

STANDARD DRAWING  
 AA-S119

REVISED 8/8/14

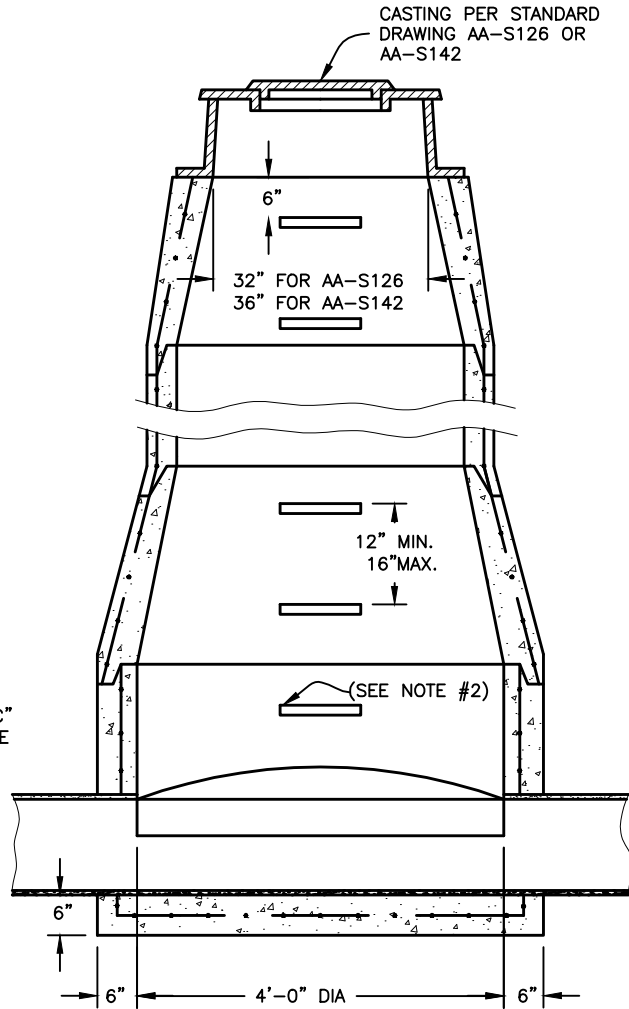
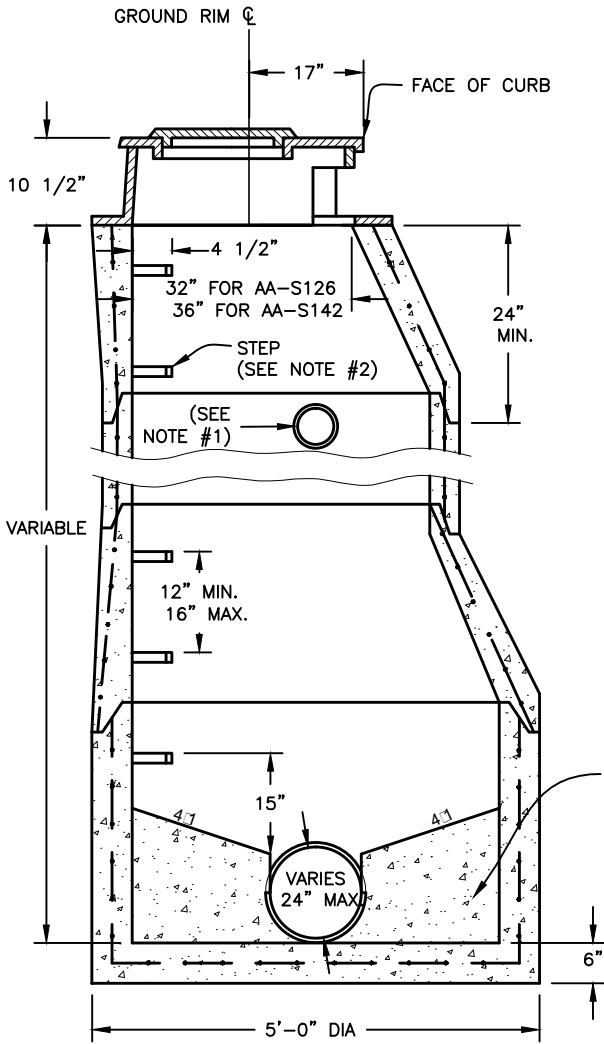
SSES MANAGER

*John J. Newson*

PAGE

1

1



CLASS "C" CONCRETE

**NOTES:**

1. PLACE STANDARD 4" CURB DRAIN STUBS 30" BELOW THE TOP OF THE CURB OR AS DIRECTED.
2. INSTALL STANDARD STEPS PER AA-S119.
3. PRE-CAST WALLS SHALL HAVE A 5" MIN. THICKNESS & BE SUFFICIENTLY REINFORCED TO PERMIT SHIPPING & HANDLING WITHOUT DAMAGE.
4. MANHOLE SHALL BE IN ACCORDANCE WITH ASTM C478.

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF SEWERAGE & DRAINAGE

*John J. Newsome*

SSES MANAGER

CURB INLET MANHOLE

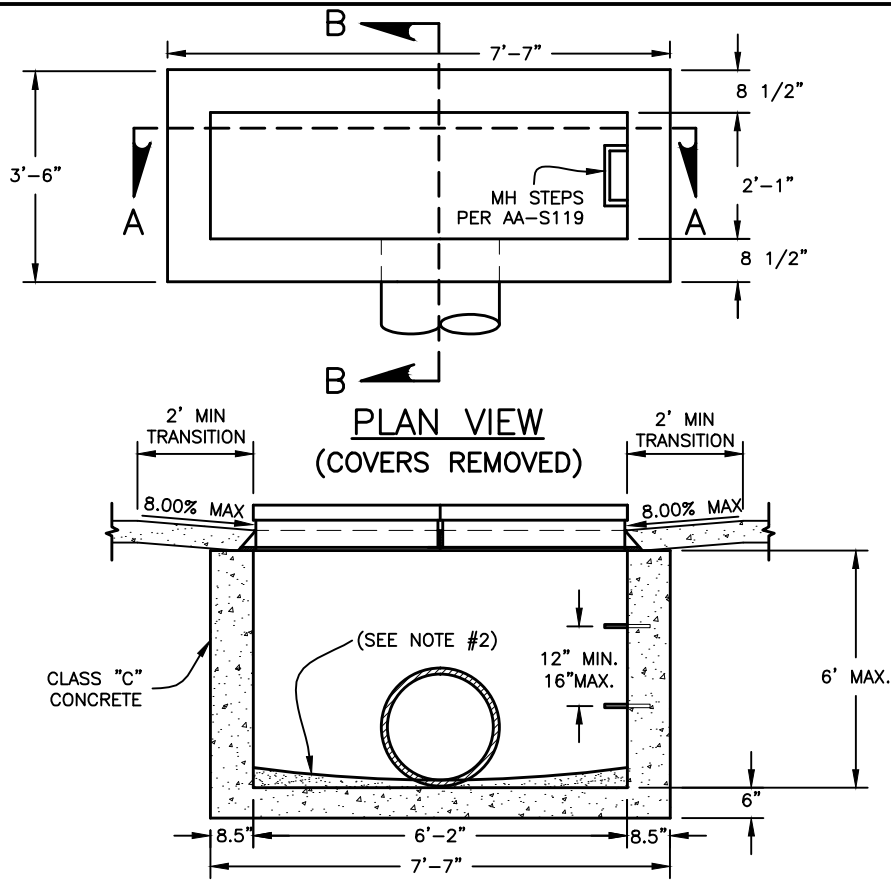
STANDARD DRAWING  
 AA-S121

REVISED 7/9/12

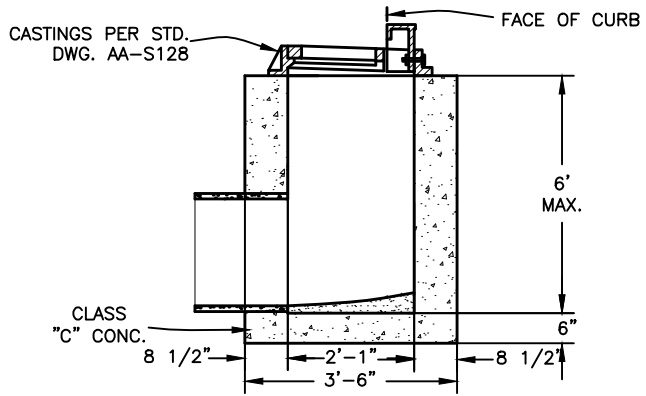
PAGE

1  
 1





**SECTION A-A**

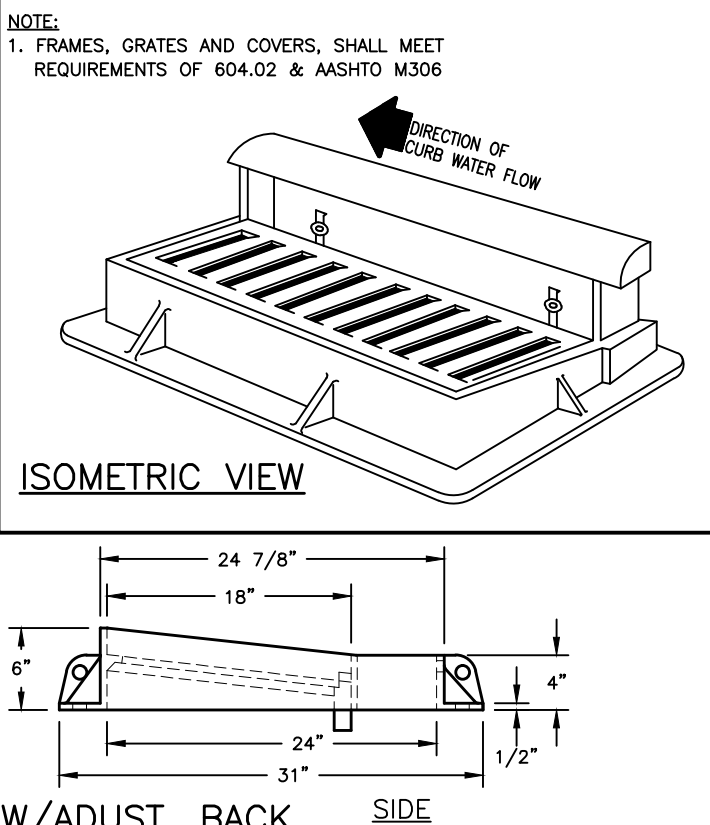
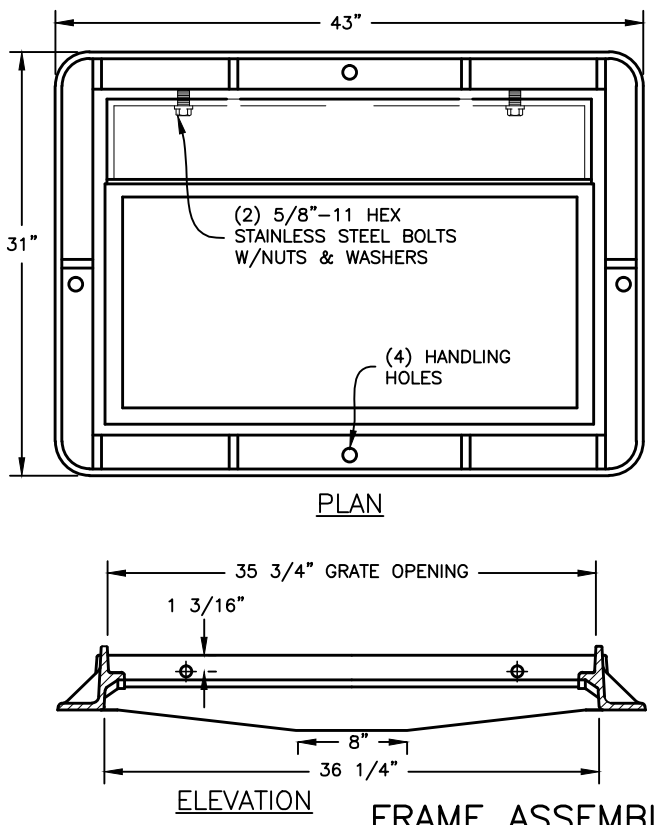
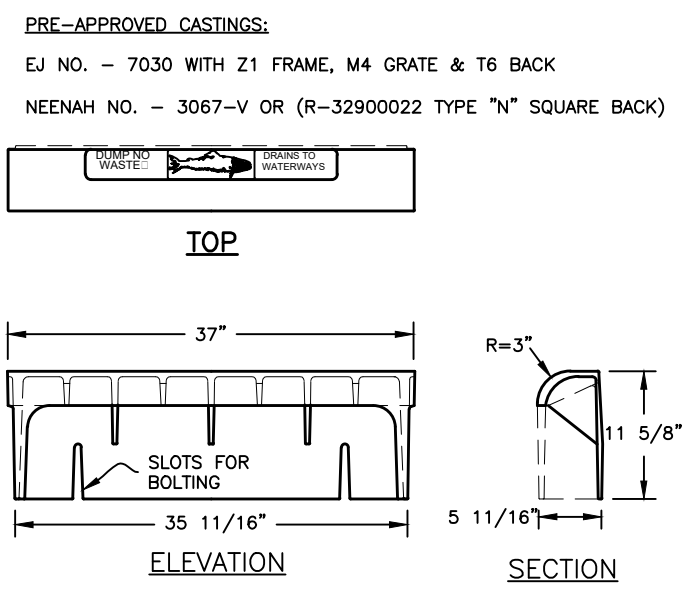
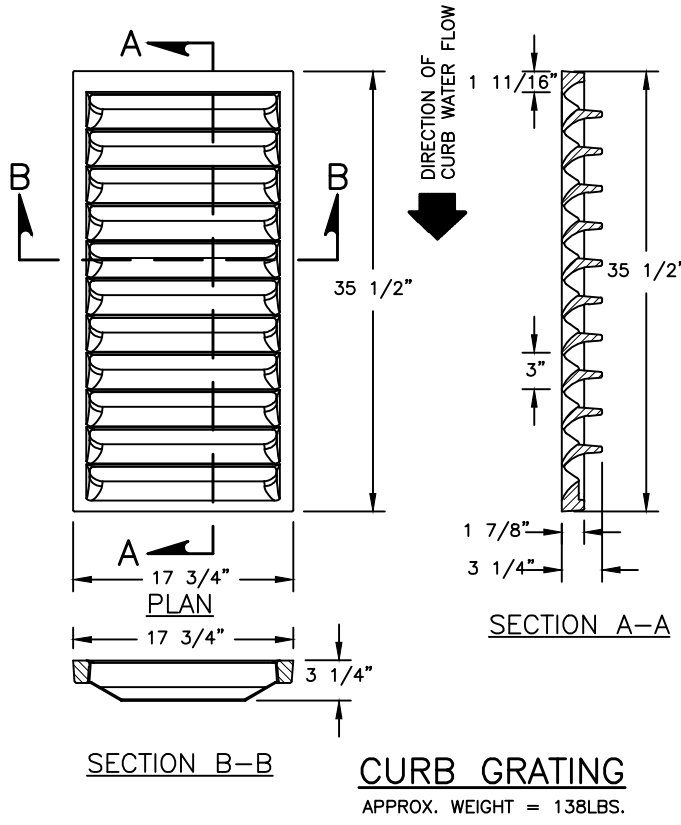


**SECTION B-B**

**NOTES:**

1. PRECAST UNITS SHALL BE IN ACCORDANCE WITH ASTM C913, HAVE A MIN. 6" THICKNESS, AND BE SUFFICIENTLY REINFORCED FOR SHIPPING AND HANDLING.
2. THE INLET BOTTOM SHALL BE SHAPED TO PROVIDE A MINIMUM SLOPE OF 2" TO OUTLET PIPE. THE CROSS SECTIONAL FORM AND LONGITUDINAL SLOPE SHALL BE ADAPTED TO LOCATION OF OUTLET PIPE AS DIRECTED.
3. OUTLET PIPE MAY BE LOCATED IN FRONT OR BACK AND SHALL BE DIRECTED TOWARDS CENTER OF INLET.
4. THE EXISTING GUTTER WITHIN THE AREA AROUND INLET WHERE CUT OUT, SHALL BE REPLACED WITH CLASS "C" CONC. OR ASPHALT CONC. PAVING AS ORDERED.
5. BACKFILLING WITHIN PROPOSED PAVED AREAS SHALL BE IN ACCORDANCE WITH ITEM 912.
6. STRUCTURES SHALL BE CAST IN PLACE CONCRETE, CLASS "C", OR PRECAST CONCRETE.
7. PLACE 4" CURB DRAIN STUBS 30" BELOW TOP OF CURB OR AS DIRECTED.
8. MAXIMUM PIPE DIAMETERS ARE 18" INTO SIDE WALLS AND 48" INTO FRONT OR BACKWALLS.

CITY OF COLUMBUS, OHIO DEPARTMENT OF PUBLIC UTILITIES DIVISION OF SEWERAGE & DRAINAGE	<b>DOUBLE CURB AND GUTTER INLET</b>	STANDARD DRAWING <b>AA-S125B</b>
SSES MANAGER		REVISED 8/8/14
		PAGE 1 / 1



CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF SEWERAGE & DRAINAGE

*John J. Newsome*

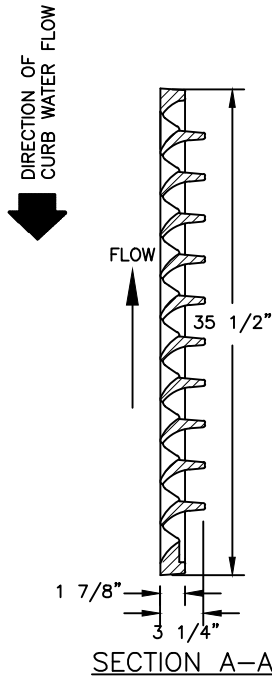
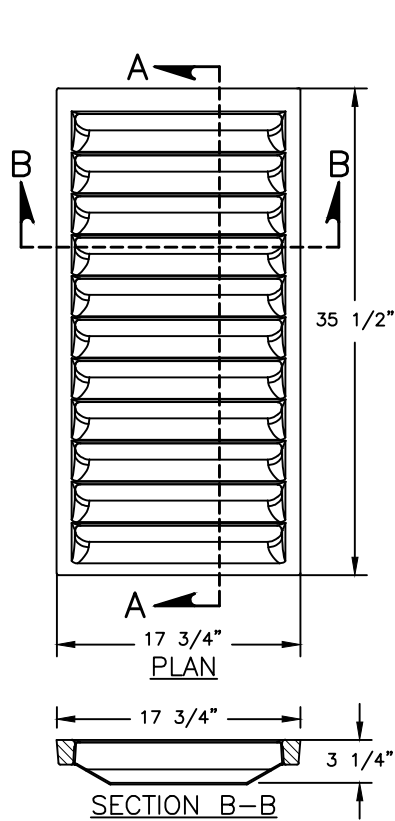
SSS MANAGER

CAST IRON FRAME  
 AND GRATE FOR CURB  
 & GUTTER INLET  
 (HEAVY DUTY)

STANDARD DRAWING  
 AA-S128

REVISED 8/8/14

PAGE 1 / 2



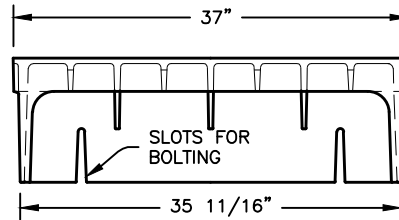
**PRE-APPROVED CASTINGS:**

EJ NO. - 7031, 7032 WITH Z1 FRAME, M4 GRATE & T6 BACK

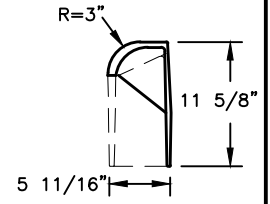
NEENAH NO. - 3295-2 WITH TYPE V GRATE OR (R-32900022 TYPE "N" SQUARE BACK)



**TOP**



**ELEVATION**



**SECTION**

**STANDARD CATCH BASIN  
ADJUSTABLE BACK**

APPROX. WEIGHT = 79LBS.

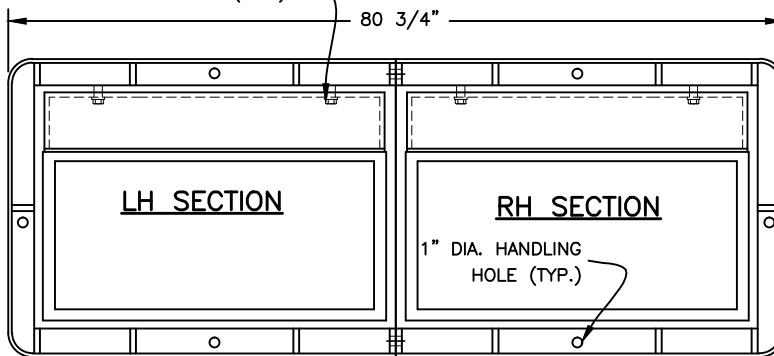
**NOTE:**

1. CURB ADJUSTMENT 6" TO 11".
2. FOR GRANITE OR OTHER SQUARE CURB SECTIONS A SQUARE BACK CASTING WITH AN ENVIRONMENTAL NOTICE OR MOUNT PLATE SHALL BE USED.

**CURB GRATING**

APPROX. WEIGHT = 138LBS.

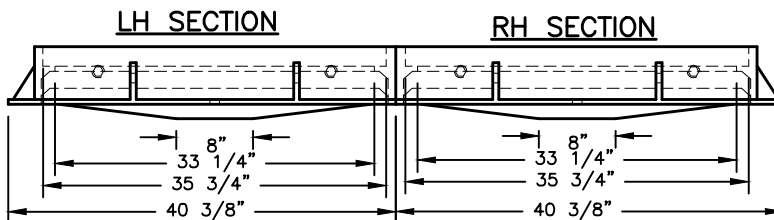
5/8"-HEX STAINLESS STEEL WITH NUTS & WASHERS (TYP.)



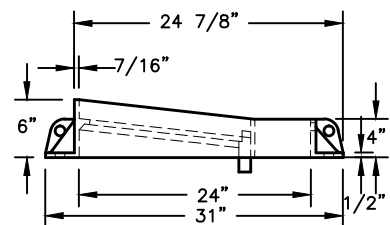
**PLAN**

**NOTES:**

1. FRAMES, GRATES & COVERS, SHALL MEET REQUIREMENTS OF 604.02 & AASHTO M306.
2. SEE SHEETS AA-S125A, B, AND C FOR MULTIPLE CATCH BASIN CONFIGURATIONS.
3. LEFT, RIGHT, & CENTER FRAME SECTIONS PROVIDED BY MANUFACTURER.



**ELEVATION  
DOUBLE SECTION**



**SIDE**

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF SEWERAGE & DRAINAGE

*John J. Newsome*

SSES MANAGER

CAST IRON FRAME  
AND GRATE FOR CURB  
& GUTTER INLET  
(HEAVY DUTY)

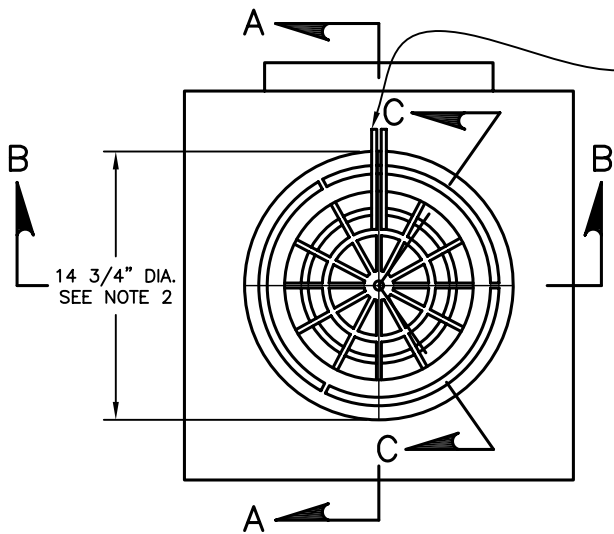
STANDARD DRAWING  
AA-S128

REVISED 8/8/14

PAGE

2

2

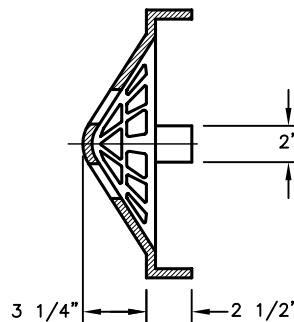


3/8" DIA. STAINLESS STEEL ANCHOR ROD 24" LONG BENT AROUND GRATE AS SHOWN & ANCHORED INTO THE CONCRETE CASING

14 3/4" DIA. SEE NOTE 2

PRE-APPROVED CASTINGS:

EJ NO. - 6495  
NEENAH NO. - 4351-B



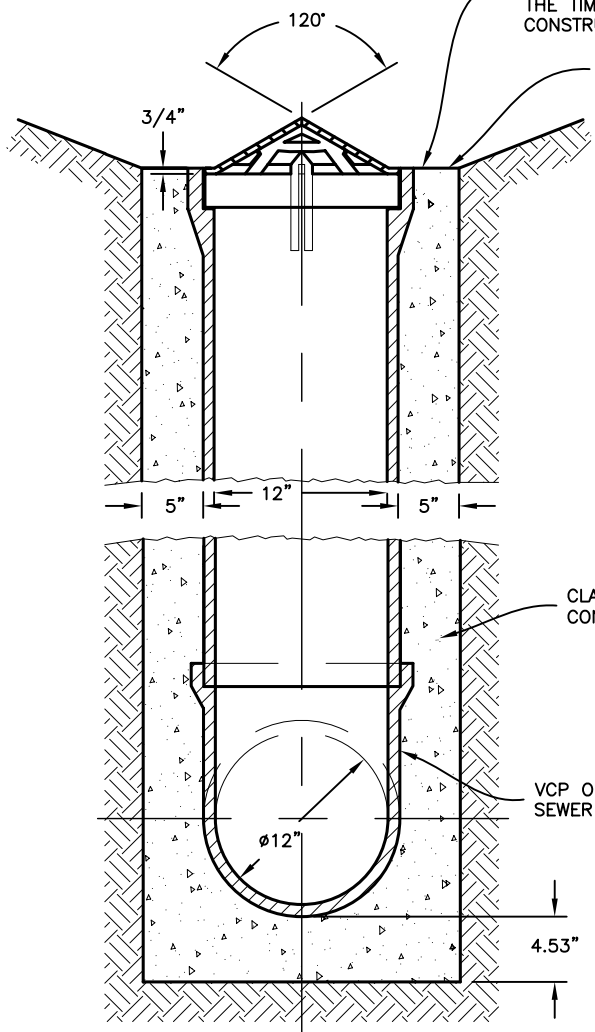
**SECTION C-C**

ELEVATION OF TOP OF DITCH INLET TO BE DETERMINED AT THE TIME OF CONSTRUCTION

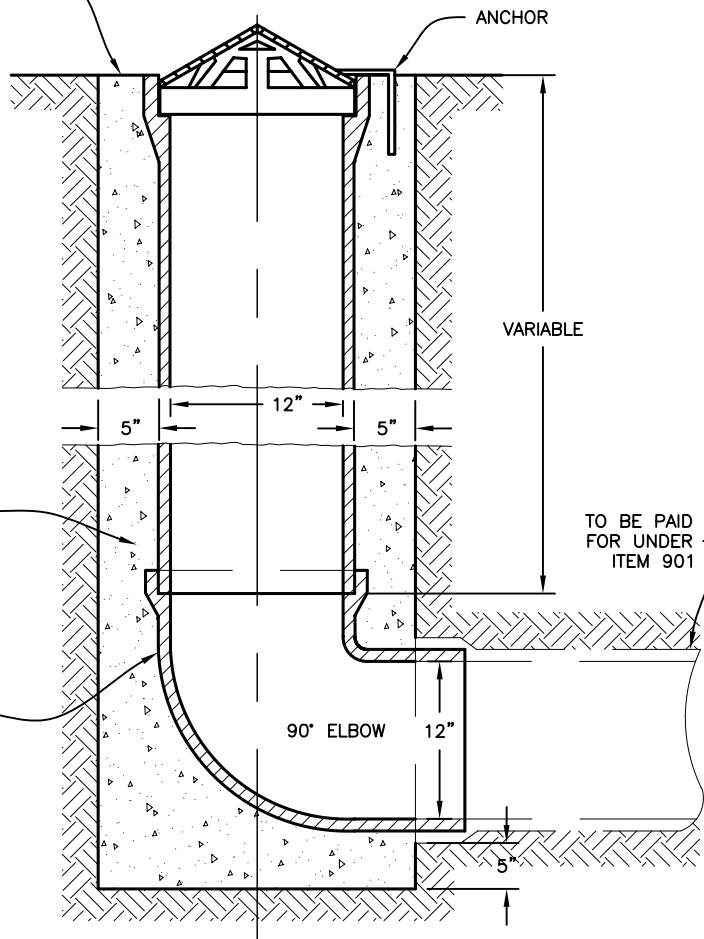
BOTTOM OF SIDE DITCH

**NOTES:**

- FRAMES, GRATES, AND COVERS SHALL MEET REQUIREMENTS OF 604.02.
- DIMENSION MAY VARY TO FIT BELL END OF PIPE. WEIGHT: 22± LBS.



**SECTION B-B**



**SECTION A-A**

CITY OF COLUMBUS, OHIO  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF SEWERAGE & DRAINAGE

CATCH BASIN  
12" DIAMETER

STANDARD DRAWING  
AA-S130

REVISED 12/6/13

SSS MANAGER

*John J. Newson*

PAGE

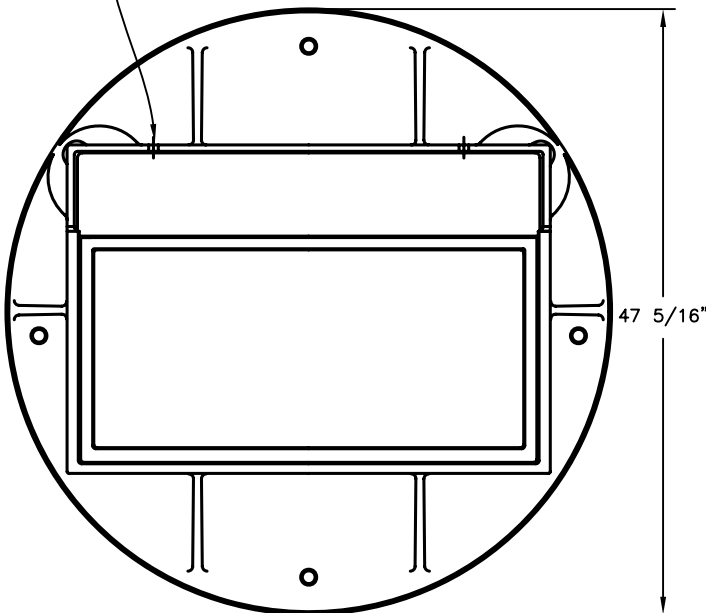
1

1

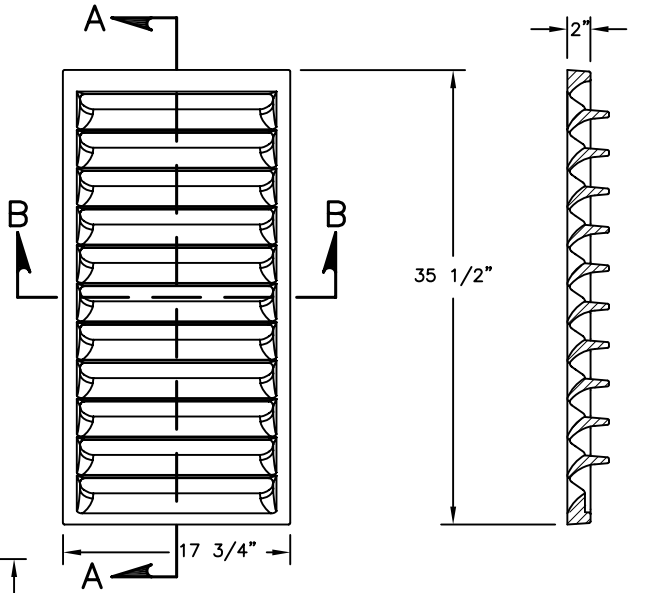
NOTE:

1. FRAMES, GRATES AND COVERS, SHALL MEET REQUIREMENTS OF 604.02 & AASHTO M306
2. CURB ADJUSTABLE FROM 3 1/4" TO 9".

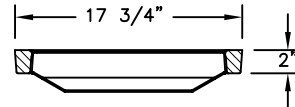
(2) 5/8"-11 HEX STAINLESS STEEL BOLTS W/NUTS AND WASHERS



PLAN



SECTION A-A

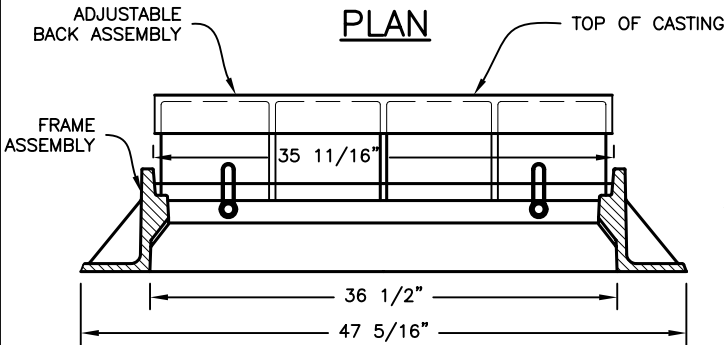


SECTION B-B

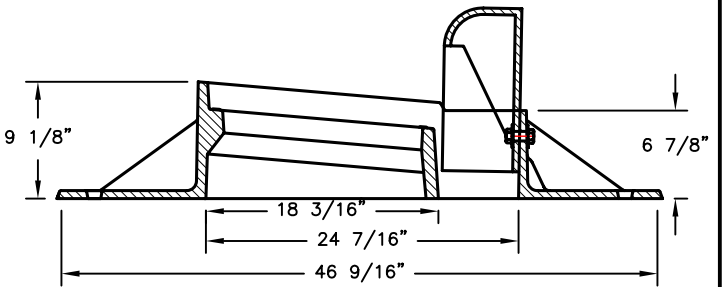
CURB GRATING

PRE-APPROVED CASTINGS:

EJ NO. - 7360Z WITH 7030M4 GRATE & 7030T6 BACK  
 NEENAH NO. - 3246-F WITH TYPE V GRATE



ELEVATION



FRAME ASSEMBLY  
 W/ADJUST. BACK

SECTION

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF SEWERAGE & DRAINAGE

CURB & GUTTER INLET  
 FOR CURB INLET  
 MANHOLES

STANDARD DRAWING  
 AA-S142

REVISED 12/6/13

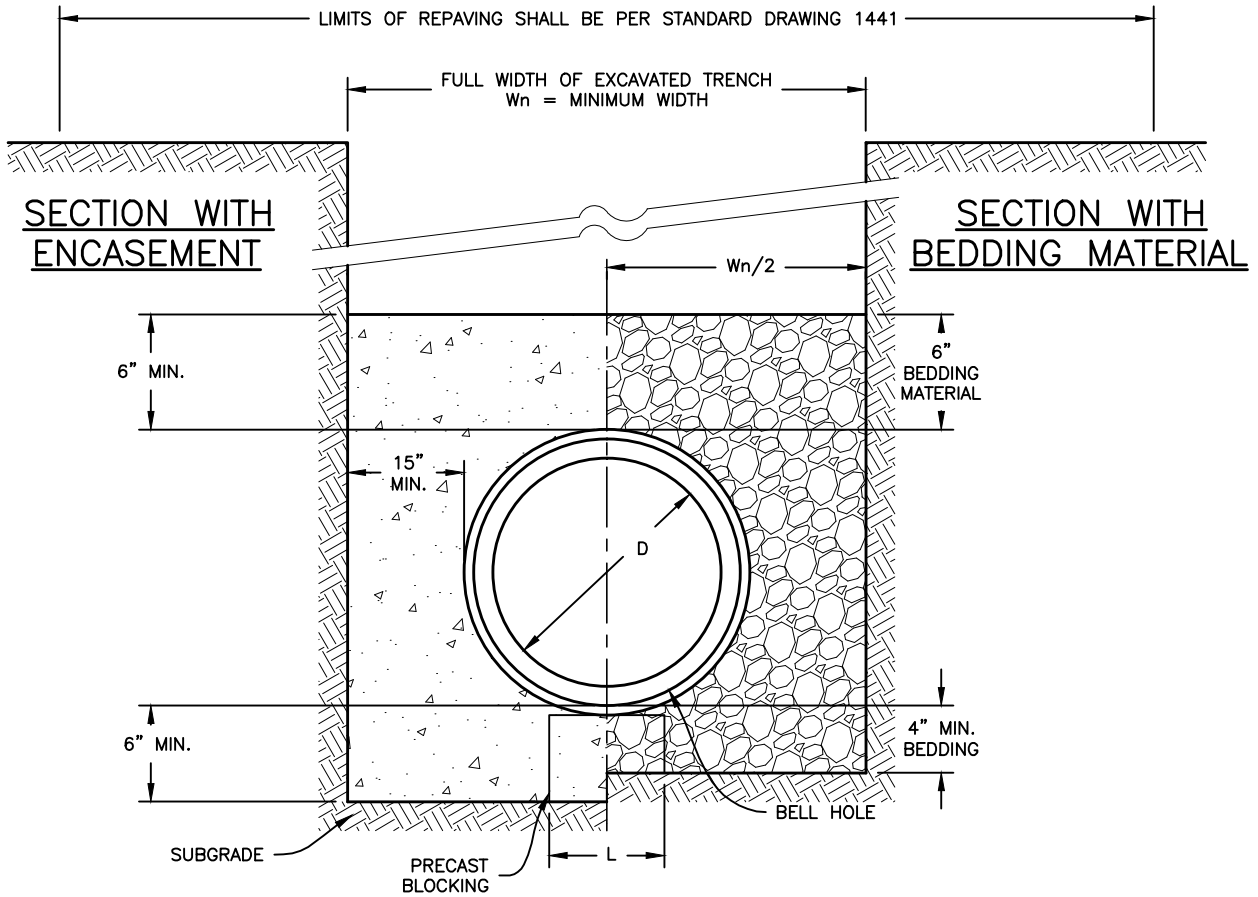
PAGE

1

1

SSES MANAGER

*John J. Newson*



DIA	Wn	L
6"	30"	12"
8"	30"	12"
10"	30"	12"
12"	32"	12"
15"	36"	12"
18"	40"	12"
21"	44"	12"
24"	48"	12"
27"	52"	12"
30"	56"	15"
36"	64"	18"
42"	72"	21"
48"	80"	24"
60"	96"	30"

**NOTES:**

1. SECTIONS SYMETRICAL ABOUT  $\text{C}$ .
2. PIPE DIMENSIONS ON CHART ARE MINIMUM AND EXPRESSED IN INCHES.
3. FOR SANITARY SEWER CONSTRUCTION TRENCH DAMS ARE REQUIRED AS SPECIFIED UNDER 901.11.
4. PROVIDE EMBEDMENT IN ACCORDANCE WITH THE RECOMMENDATIONS OF ASTM D2321, 7.5.
5. ENCASEMENT TO BE CLASS "A" CONCRETE, ITEM 905.
6. THE PIPE SHALL BE SUPPORTED BY 12" CONCRETE BLOCKING WHEN CONCRETE ENCASEMENT IS REQUIRED.
7. BLOCKING SHALL HAVE THE LENGTH SHOWN IN THE CHART OR OF SUFFICIENT LENGTH SO THAT THE PIPE LOAD ON THE SUBGRADE SHALL NOT EXCEED 3,000 LBS/SF. SEE CHART FOR MINIMUM BLOCKING LENGTHS.

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF SEWERAGE & DRAINAGE

*John J. Newson*

SSSES MANAGER

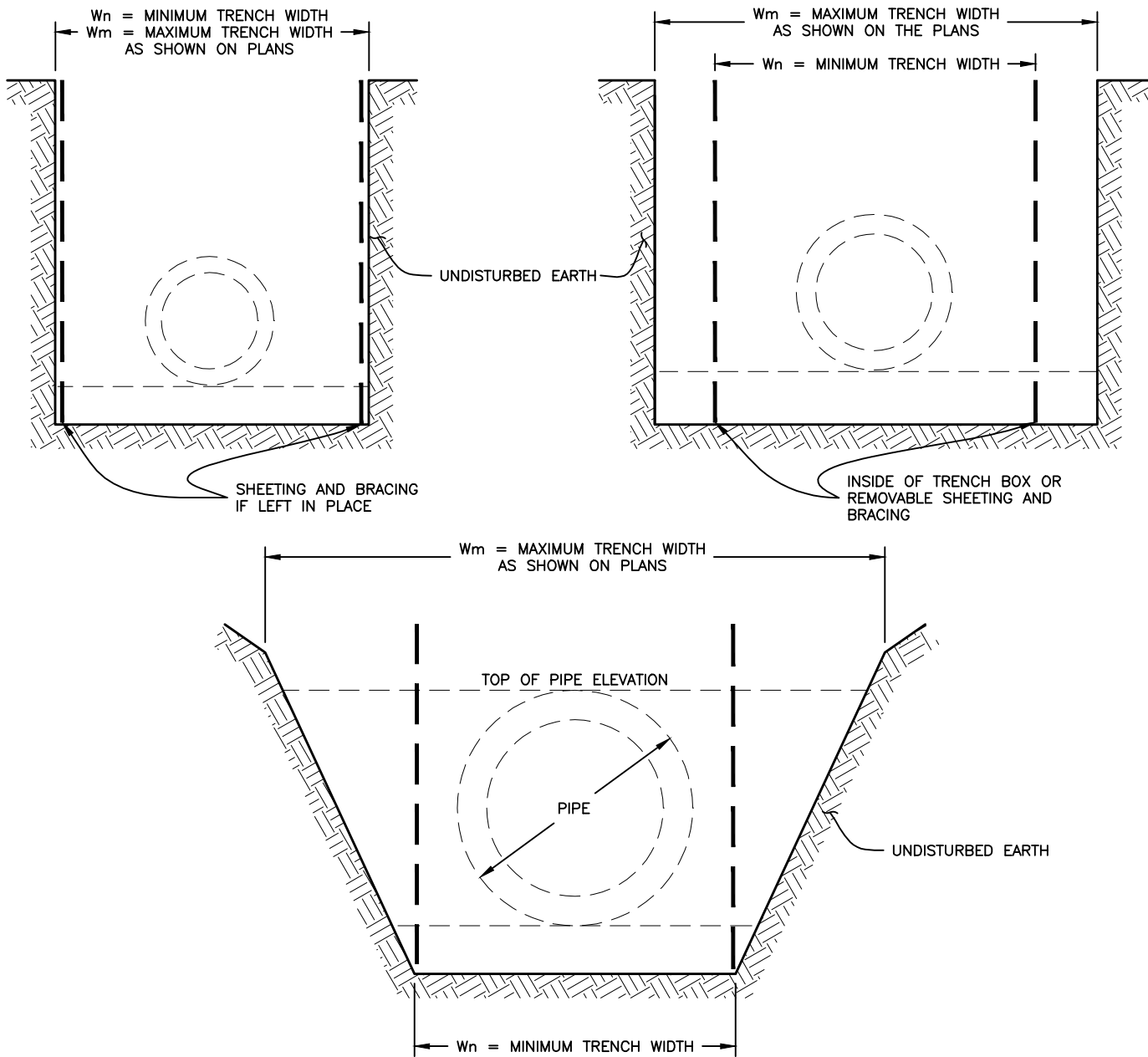
TYPE I BEDDING FOR  
 FLEXIBLE SEWER PIPE  
 6" TO 60" DIAMETER

STANDARD DRAWING  
 AA-S149

REVISED 10/15/14

PAGE

1 / 1



**NOTES:**

1. QUANTITIES AS SHOWN ON THE STANDARD DRAWINGS ARE BASED ON THE MINIMUM WIDTH OF TRENCH ( $W_n$ ). IF ANY ALTERNATIVE TRENCH IS USED THE CONTRACTOR WILL BE REQUIRED TO EXTEND THE BEDDING, BACKING OR ENCASEMENT MATERIAL ACROSS THE ENTIRE EXCAVATED TRENCH AT THE DEPTH SPECIFIED. THE COST OF THE INCREASED MATERIAL SHALL BE INCLUDED IN THE PRICE BID FOR ITEM 901.
2. THE MAXIMUM WIDTH OF THE TRENCH ( $W_m$ ) AS SHOWN ON PLANS, AT TOP OF PIPE, WILL BE STRICTLY ENFORCED AND WILL APPLY TO ANY TYPE OF TRENCH CONSTRUCTION TECHNIQUE USED.
3. IF NO MAXIMUM WIDTH OF TRENCH ( $W_m$ ) IS SHOWN ON PLANS, THE BACKFILL LOAD ON THE PIPE IS AT A MAXIMUM AND WILL REMAIN CONSTANT REGARDLESS OF ANY INCREASE IN THE WIDTH OF THE TRENCH.

CITY OF COLUMBUS, OHIO  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF SEWERAGE & DRAINAGE

*John J. Newsome*

SSES MANAGER

TRENCH INSTALLATION  
 WITH MAXIMUM WIDTH  
 SPECIFIED

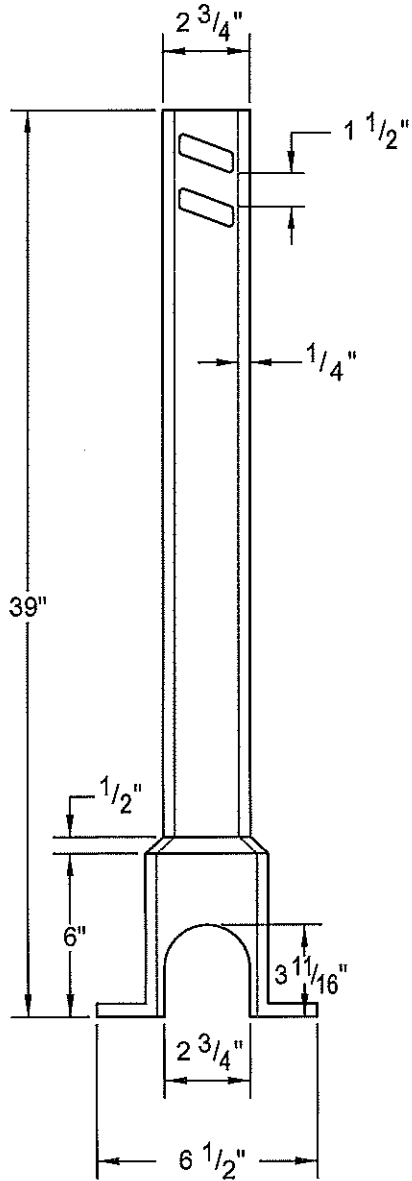
STANDARD DRAWING  
 AA-S150

REVISED 7/9/12

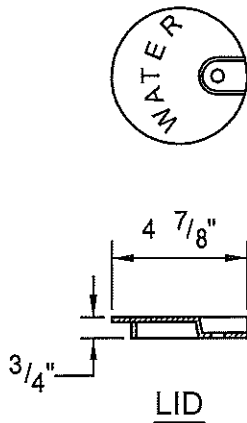
PAGE

1

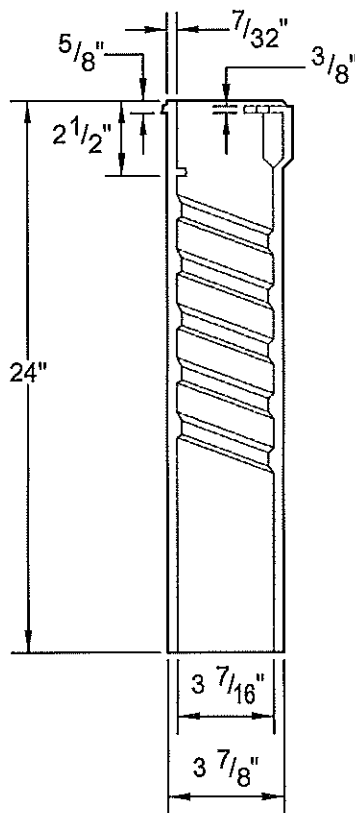
1



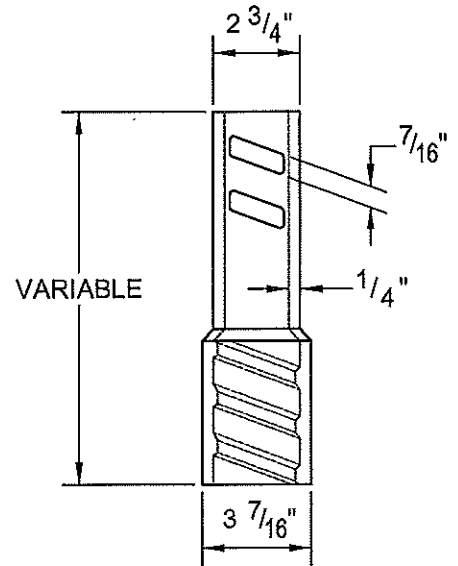
**BOTTOM**  
(22 Pounds)



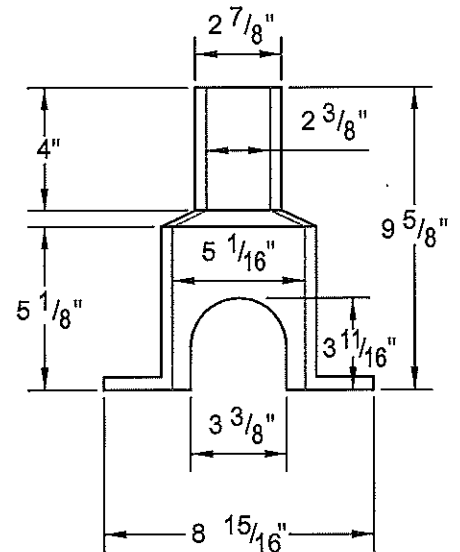
**LID**



**TOP**  
(19 Pounds)



**EXTENSION**  
(9" - 7 Pounds)  
(16" - 12 Pounds)  
(28" - 17 Pounds)  
(30" - 19 Pounds)



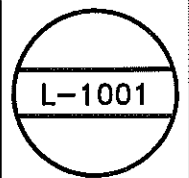
**ENLARGED BASE**  
(8 Pounds)

L-1001.Dwg Revision Date: 1/2/13

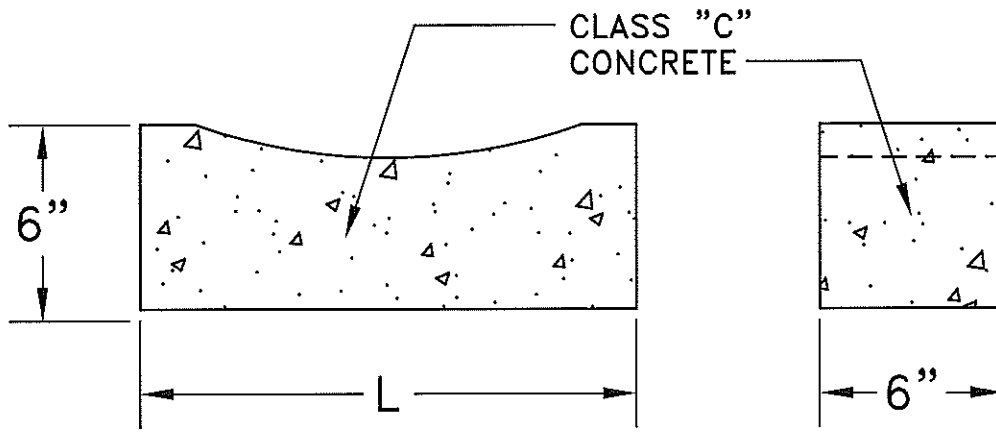
CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*RC Westerfield* 5-14-13  
ADMINISTRATOR DATE

STANDARD DETAIL  
TYPICAL CURB BOX







GATE VALVES

BUTTERFLY VALVES

SIZE OF VALVE	L	VOLUME CU-FT
3"	15"	0.31
4"	16"	0.33
6"	17"	0.36
8"	20"	0.42
12"	24"	0.50
16"	30"	0.63
20"	36"	0.75
24"	42"	0.88
30"	48"	1.00
36"	54"	1.13
42"	60"	1.25
48"	66"	1.38

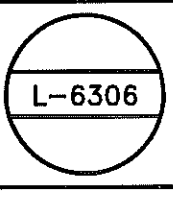
NOTE:  
FOR VALVES LARGER THAN 48" THE SUPPORT SHALL BE DESIGNED BY A STRUCTURAL ENGINEER.

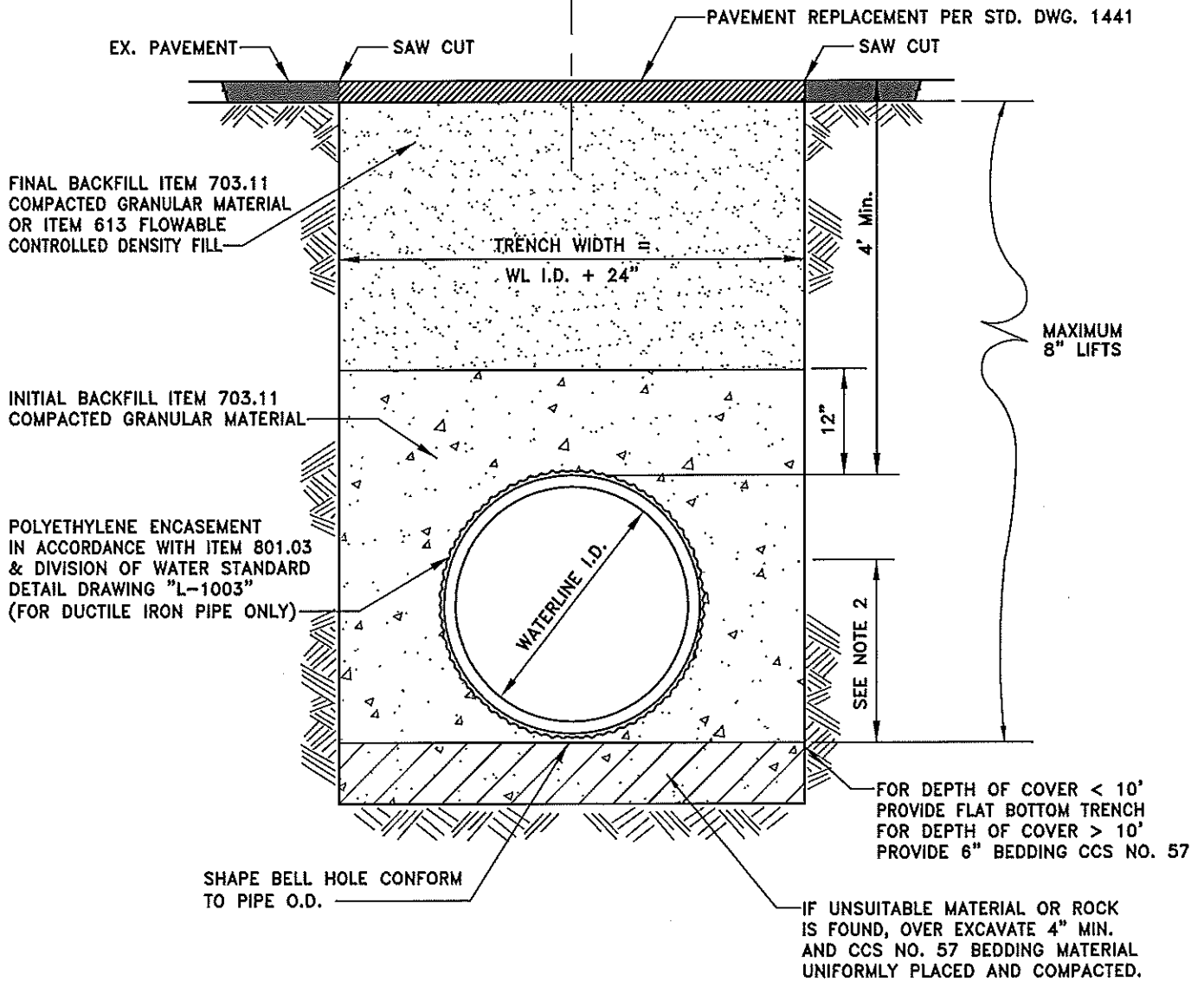
L-6306.Dwg Revision Date: 1/2/13

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*R.C. Waterfield* 5-14-13  
ADMINISTRATOR DATE

STANDARD DETAIL  
CONCRETE VALVE SUPPORTS





**NOTES:**

1. REFER TO OSHA REQUIREMENTS FOR MAXIMUM ALLOWABLE TRENCH SLOPES.
2. THIS PORTION OF PIPE EMBEDMENT ZONE MUST BE RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD.
3. PROVIDE FILTER FABRIC WHEN VERY FINE OR UNSTABLE MATERIAL IS ENCOUNTERED.
4. BACKFILL SHALL BE COMPACTED PER THE REQUIREMENTS OF ITEM 801.12.

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

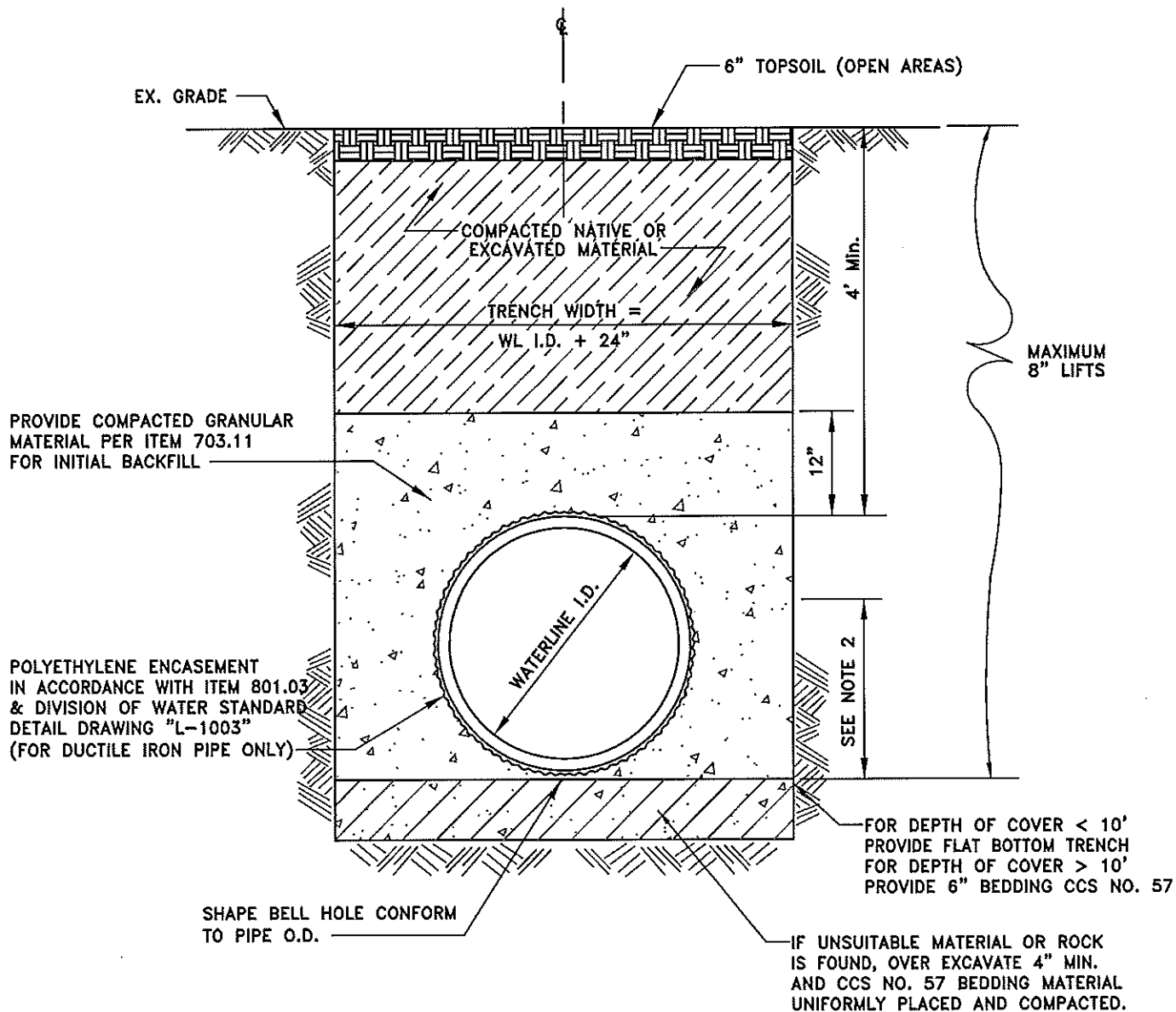
APPROVED:

*R.C. Westfield*  
ADMINISTRATOR

5-14-13  
DATE

STANDARD DETAIL  
**TYPICAL TRENCH**  
EXCAVATION & BACKFILL UNDER  
INFLUENCE OF PAVEMENT  
(FOR 16" DIAMETER WATER MAIN AND SMALLER)

L-6309A



**NOTES:**

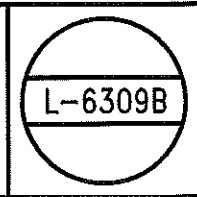
1. REFER TO OSHA REQUIREMENTS FOR MAXIMUM ALLOWABLE TRENCH SLOPES.
2. THIS PORTION OF PIPE EMBEDMENT ZONE MUST BE RECOMPACTED TO PROPER DENSITIES AFTER MOVING SUPPORT SYSTEM FORWARD.
3. PROVIDE FILTER FABRIC WHEN VERY FINE OR UNSTABLE MATERIAL IS ENCOUNTERED.
4. BACKFILL SHALL BE COMPACTED PER THE REQUIREMENTS OF ITEM 801.12.

L-6309B Revision Date: 3/4/13

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*R.C. Westerfield* 5-14-13  
ADMINISTRATOR DATE

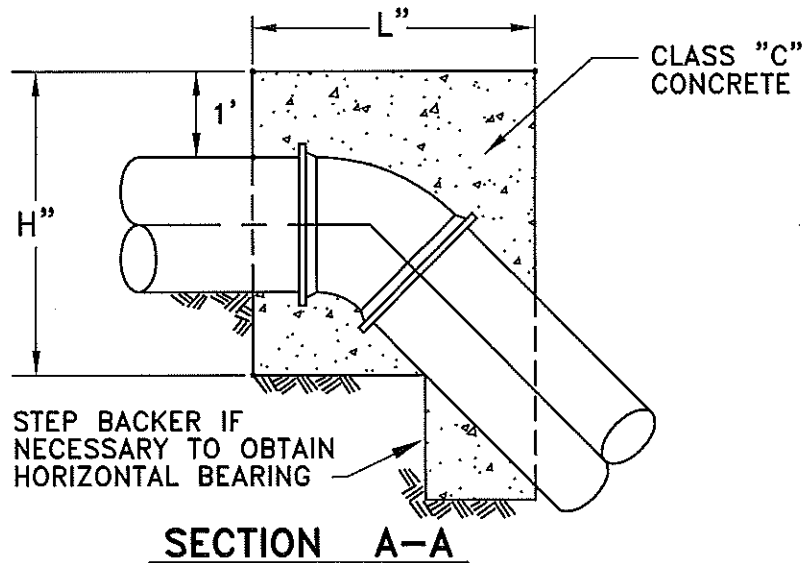
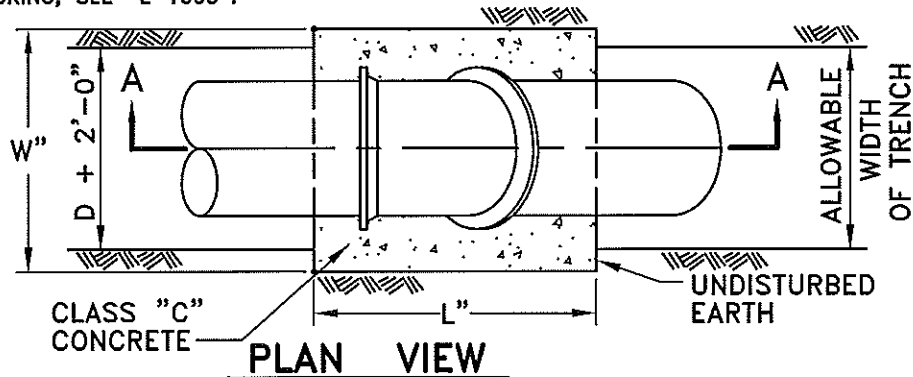
STANDARD DETAIL  
**TYPICAL TRENCH**  
EXCAVATION & BACKFILL OUTSIDE  
INFLUENCE OF PAVEMENT  
(FOR 16" DIAMETER WATER MAIN AND SMALLER)



PIPE SIZE	11.25°				22.5°				45°			
	L"	W"	H"	Vol.	L"	W"	H"	Vol.	L"	W"	H"	Vol.
3"	12	18	12	1.5	13	25	16	3.0	18	30	19	5.9
4"	12	24	16	2.6	16	30	18	5.0	22	36	24	11.0
6"	12	48	18	6.0	15	43	36	13.4	30	55	24	22.9
8"	12	63	24	10.5	18	57	34	20.2	36	57	33	39.2
12"	20	54	36	22.6	37	62	37	49.0	48	62	51	87.9
16"	31	65	38	44.3	60	65	39	88.1	65	65	65	159.2

**NOTES:**

- VOLUMES GIVEN IN CUBIC FEET.
- BACKER TO BE CENTERED HORIZONTALLY ON BEND.
- STEEL WILL BE USED AS REQUIRED BY THE ENGINEER.
- ALL NEW PIPE 20" & LARGER SHALL BE RESTRAINED JOINT PER CCMS ITEM 801 UNLESS OTHERWISE PER PLAN OR AS DIRECTED BY THE ENGINEER.
- EXISTING WATER LINES 20" AND GREATER MUST HAVE PRIOR APPROVAL FROM DOW TO LOWER UNDER A PROPOSED UTILITY. APPROVAL WILL ONLY BE GIVEN UNDER SPECIAL CIRCUMSTANCES AND CONTINGENT UPON THE CONTRACTOR SUBMITTING A DESIGNED DRAWING, STAMPED BY A PROFESSIONAL ENGINEER, DETAILING HOW THE LOWERED WATER MAIN WILL BE RESTRAINED TO THE EXISTING WATER MAIN.
- WHERE POLYETHYLENE ENCASEMENT IS REQUIRED, ALL GLANDS & BOLTS SHALL BE WRAPPED PRIOR TO PLACEMENT OF CONCRETE BLOCKING, SEE "L-1003".

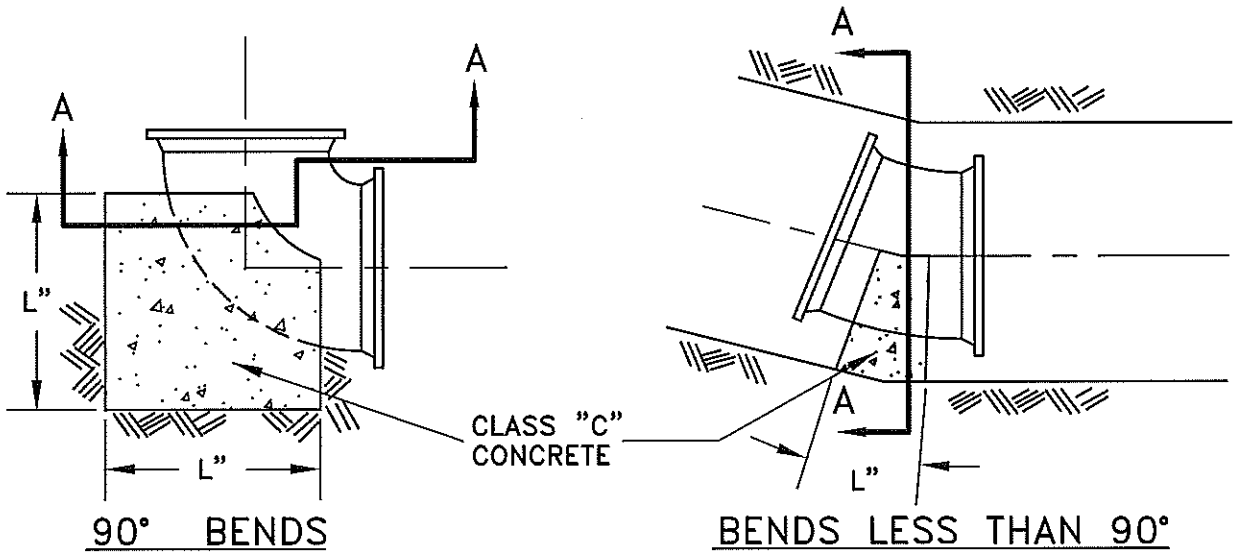


L-6310.Dwg Revision Date: 1/2/13

CITY OF COLUMBUS DEPARTMENT OF PUBLIC UTILITIES DIVISION OF WATER	STANDARD DETAIL <b>BACKING FOR VERTICAL BENDS</b> (OVER BENDS ONLY)	
APPROVED: <i>R.C. Westerfield</i> ADMINISTRATOR	5-14-13 DATE	

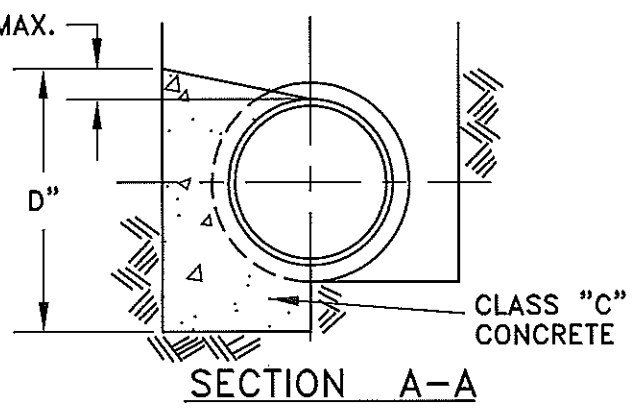
SIZE OF PIPE	DEGREE OF BEND											
	11.25°			22.50°			45°			90° (HORZ. ONLY)		
	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.
3"	4	3	0.1	6	4	0.2	10	4	0.3	10	4	0.3
4"	5	4	0.2	9	5	0.4	14	5	0.6	14	5	0.6
6"	8	6	0.5	12	7	0.7	20	8	1.4	18	9	1.7
8"	9	8	0.7	16	9	1.4	24	12	2.7	25	11	4.0
12"	14	12	1.8	24	14	3.6	36	18	6.8	32	18	10.7
16"	18	16	3.4	32	18	6.7	36	32	13.4	41	26	25.6

STEEL WILL BE USED AS REQUIRED BY ENGINEER



**NOTES:**

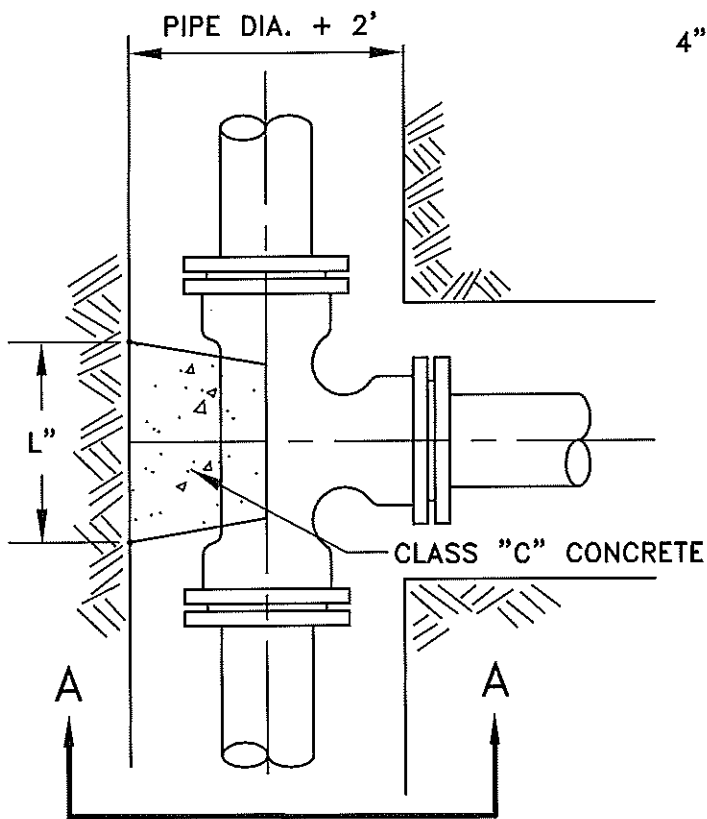
1. BACKER DESIGNED FOR 3000 PSF SOIL BEARING.
2. CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH.
3. ALL NEW PIPE 20" & LARGER SHALL BE RESTRAINED JOINT PER CCMS ITEM 801 UNLESS OTHERWISE INDICATED PER PLAN OR AS DIRECTED BY THE ENGINEER.
4. EXISTING WATER LINES 20" AND GREATER MUST HAVE PRIOR APPROVAL FROM DOW TO LOWER UNDER A PROPOSED UTILITY. APPROVAL WILL ONLY BE GIVEN UNDER SPECIAL CIRCUMSTANCES AND CONTINGENT UPON THE CONTRACTOR SUBMITTING A DESIGNED DRAWING, STAMPED BY A PROFESSIONAL ENGINEER, DETAILING HOW THE LOWERED WATER MAIN WILL BE RESTRAINED TO THE EXISTING WATER MAIN.
5. PROVIDE CLEARANCE FOR REMOVAL OF BOLTS.



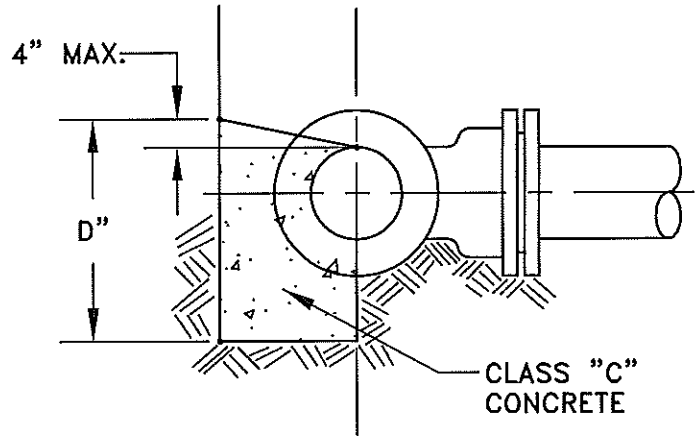
L-6311.Dwg Revision Date: 1/11/13

CITY OF COLUMBUS DEPARTMENT OF PUBLIC UTILITIES DIVISION OF WATER	<b>STANDARD DETAIL</b> <b>BACKING FOR BENDS</b> HORIZONTAL AND VERTICAL SAG	
APPROVED: <i>RC Westerfield</i> ADMINISTRATOR	5-14-13 DATE	

R U N	BRANCH																							
	3"			4"			6"			8"			12"			16"			20"			24"		
	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.	L"	D"	Vc.f.
3"	12	5	0.5																					
4"	10	6	0.5	11	8	0.8																		
6"	9	7	0.5	11	8	0.8	18	12	1.9															
8"	8	8	0.5	10	9	0.7	18	12	1.9	23	16	3.5												
12"	6	12	0.6	8	12	0.8	18	12	1.9	23	16	3.5	38	22	8.7									
16"							14	16	2.0	20	18	3.3	36	23	8.7	49	30	13.6						
20"							11	20	1.9	18	20	3.3	35	24	8.7	46	32	13.6	60	38	26.5			
24"							9	24	1.9	15	24	3.3	30	28	8.7	42	36	14.0	54	42	26.3	68	48	45.4
STEEL WILL BE USED AS REQUIRED BY THE ENGINEER																								



PLAN VIEW



SECTION A-A

NOTES:

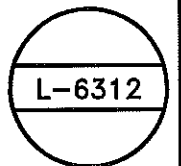
1. BACKER DESIGNED FOR 3000 PSF SOIL BEARING.
2. CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH.
3. PROVIDE CLEARANCE FOR REMOVAL OF BOLTS.

L-6312.Dwg Revision Date: 1/2/13

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*R.C. Westerfield* 5-14-13  
ADMINISTRATOR DATE

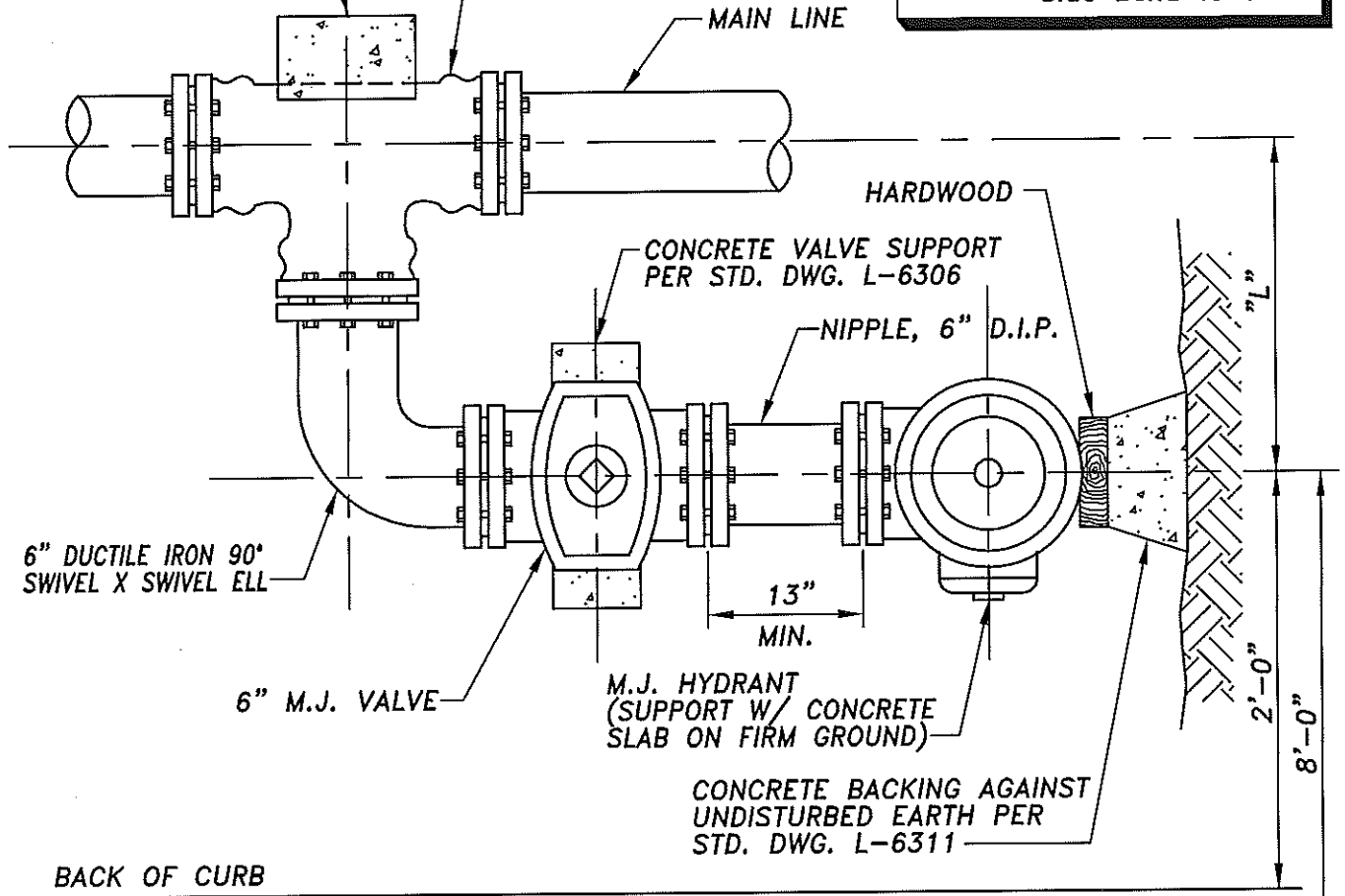
STANDARD DETAIL  
BACKING FOR TEES



CONCRETE BACKER PER  
STD. DWG. L-6312

DUCTILE IRON  
MECHANICAL JOINT TEE

TYPE "B": Long Side Bend  
to Tee.  
TYPE "B" MODIFIED: Short  
Side Bend to Tee.



BACK OF CURB

EDGE OF PAVEMENT OR EDGE OF PAVED BERM

MAIN LINE	DIMENSION "L"	
	TYPE "B"	TYPE "B" MOD.
6"	24"	19"
8"	25"	20"
12"	28"	23"
16"	31"	26"
20"	33"	28"
24"	36"	31"
30"	39"	34"

**NOTES:**

1. FIRE HYDRANT SHALL HAVE A MAXIMUM BURY OF 7'-0". MODIFICATION OF THE HYDRANT LEAD TO MEET THIS REQUIREMENT SHALL BE IN THAT SECTION FROM THE VALVE TO THE HYDRANT AS PER STANDARD DETAIL L-7601.
2. FIRE HYDRANTS SHALL BE SET A MINIMUM OF 6' FROM ALL DRIVEWAY OPENINGS.
3. TEE USED TO CONNECT HYDRANT LEAD TO WATER MAIN IS INCLUDED IN COST OF ITEM 809, FIRE HYDRANT.

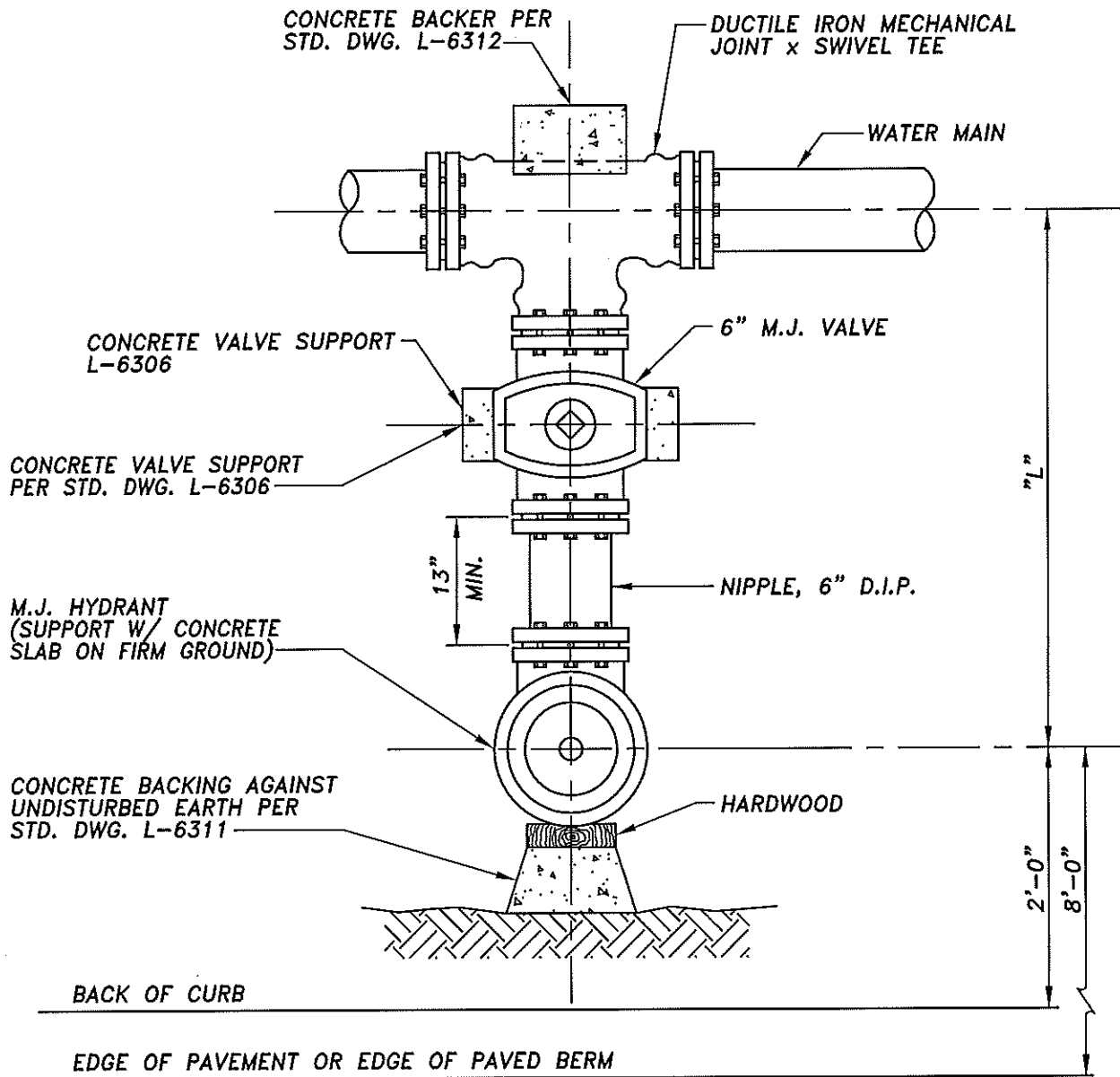
CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*R.C. Westphal*  
ADMINISTRATOR  
5-15-13  
DATE

STANDARD DETAIL  
TYPICAL HYDRANT SETTING  
TYPE "B" AND "B" MODIFIED  
FOR  
MECHANICAL JOINT TEES



L-6409 A.Dwg Revision Date: 1/2/13



MAIN LINE	DIMENSION "L"
	TYPE "A"
6"	39"
8"	40"
12"	43"
16"	46"
20"	58"
24"	61"
30"	64"

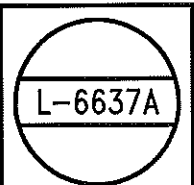
**NOTES:**

1. FIRE HYDRANT SHALL HAVE A MAXIMUM BURY OF 7'-0". MODIFICATION OF THE HYDRANT LEAD TO MEET THIS REQUIREMENT SHALL BE IN THAT SECTION FROM THE VALVE TO THE HYDRANT AS PER STANDARD DETAIL L-7601.
2. FIRE HYDRANTS SHALL BE SET A MINIMUM OF 6' FROM ALL DRIVEWAY OPENINGS.
3. TEE USED TO CONNECT HYDRANT LEAD TO WATER MAIN IS INCLUDED IN COST OF ITEM 809, FIRE HYDRANT.

CITY OF COLUMBUS  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF WATER

APPROVED:  
*R.C. Wasterfield* 5-16-13  
 ADMINISTRATOR DATE

STANDARD DETAIL  
 TYPICAL TYPE "A" HYDRANT SETTING  
 FOR DUCTILE IRON  
 MECHANICAL JOINT x SWIVEL TEES





LENGTH OF PIPE	GALLONS PER HOUR												
	6" Pipe	8" Pipe	12" Pipe	16" Pipe	20" Pipe	24" Pipe	30" Pipe	36" Pipe	42" Pipe	48" Pipe	54" Pipe	60" Pipe	66" Pipe
50	0.02	0.03	0.05	0.07	0.08	0.10	0.12	0.15	0.17	0.20	0.22	0.25	0.27
100	0.05	0.07	0.10	0.13	0.17	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55
200	0.10	0.13	0.20	0.26	0.33	0.40	0.50	0.60	0.70	0.79	0.89	0.99	1.09
300	0.15	0.20	0.30	0.40	0.50	0.60	0.74	0.89	1.04	1.19	1.34	1.49	1.64
400	0.20	0.26	0.40	0.53	0.66	0.79	0.99	1.19	1.39	1.59	1.79	1.99	2.18
500	0.25	0.33	0.50	0.66	0.83	0.99	1.24	1.49	1.74	1.99	2.23	2.48	2.73
600	0.30	0.40	0.60	0.79	0.99	1.19	1.49	1.79	2.09	2.38	2.68	2.98	3.28
700	0.35	0.46	0.70	0.93	1.16	1.39	1.74	2.09	2.43	2.78	3.13	3.48	3.82
800	0.40	0.53	0.79	1.06	1.32	1.59	1.99	2.38	2.78	3.18	3.57	3.97	4.37
900	0.45	0.60	0.89	1.19	1.49	1.79	2.23	2.68	3.13	3.57	4.02	4.47	4.92
1000	0.50	0.66	0.99	1.32	1.66	1.99	2.48	2.98	3.48	3.97	4.47	4.97	5.46
2500	1.24	1.66	2.48	3.31	4.14	4.97	6.21	7.45	8.69	9.93	11.17	12.41	13.65
5000	2.48	3.31	4.97	6.62	8.28	9.93	12.41	14.90	17.38	19.86	22.34	24.83	27.31
7500	3.72	4.97	7.45	9.93	12.41	14.90	18.62	22.34	26.07	29.79	33.51	37.24	40.96
10000	4.97	6.62	9.93	13.24	16.55	19.86	24.83	29.79	34.76	39.72	44.69	49.65	54.62


FORMULA: 
$$L = \frac{SD\sqrt{P}}{148,000}$$

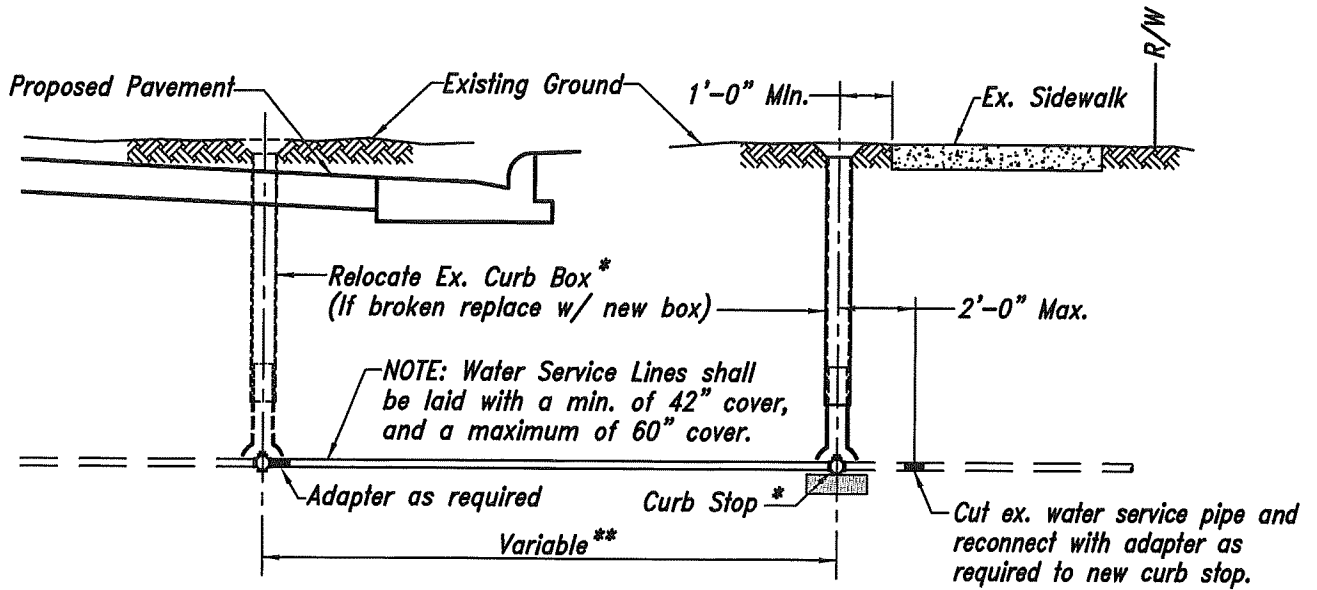
Where: L = Allowable Leakage (gal./hr.)  
 S = Length of pipe tested in feet.  
 D = Nominal pipe diameter in inches.  
 P = Test pressure (150 psi)

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal./hr./in. of nominal valve size will be allowed.

These calculations are based on "AWWA C-600-10" Specifications, Section 4, Hydrostatic Testing, Dated December 1, 2005.

L-6640.Dwg Revision Date: 3/5/13

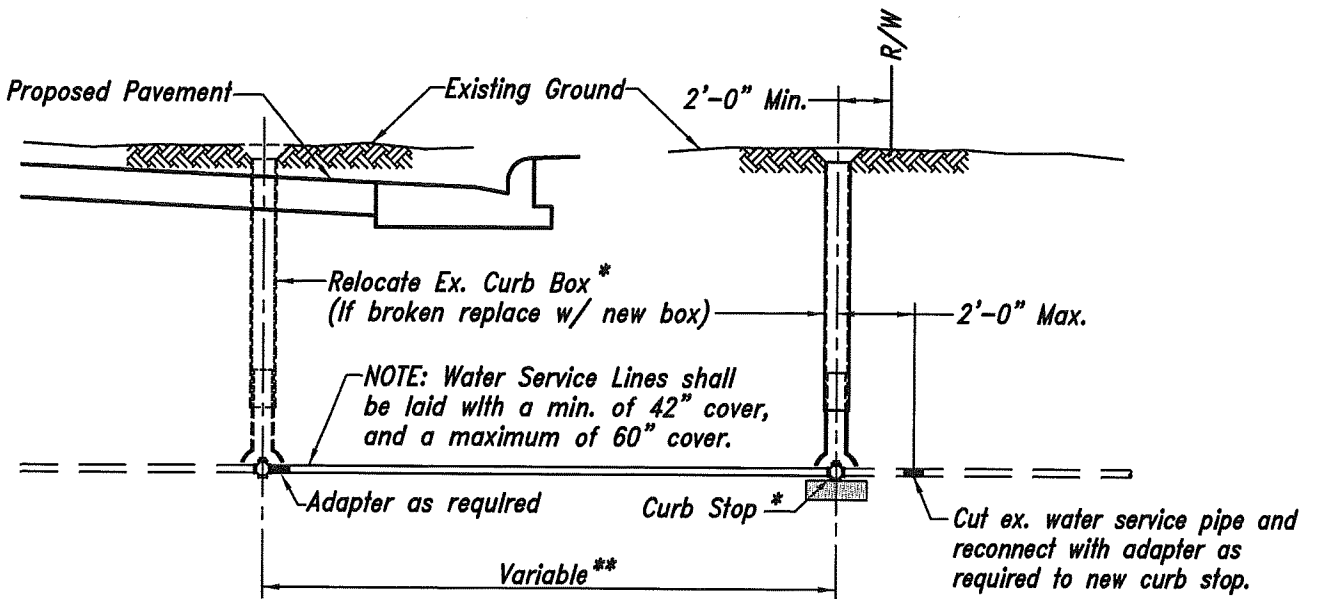
CITY OF COLUMBUS DEPARTMENT OF PUBLIC UTILITIES DIVISION OF WATER	STANDARD DETAIL <b>ALLOWABLE LEAKAGE TABLE</b>	
APPROVED: <i>R.C. Westerfield</i> ADMINISTRATOR	5-16-13 DATE	



**\* NOTE:**  
For reference in placing new curb stops  
and relocated curb boxes see L-9901.

**Detail "A"**  
(w/ Sidewalk)

**\*\* NOTE:**  
Should Poly tubing, Galvanized or Lead  
material be encountered the entire  
Service Line shall be replaced w/ Copper  
from the existing Corporation Stop to  
the new Curb Stop. Pipe shall be Copper  
Tubing Size (C.T.S.).



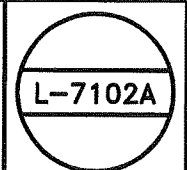
**Detail "B"**  
(w/o Sidewalk)

L-7102A.Dwg Revision Date: 10/30/15

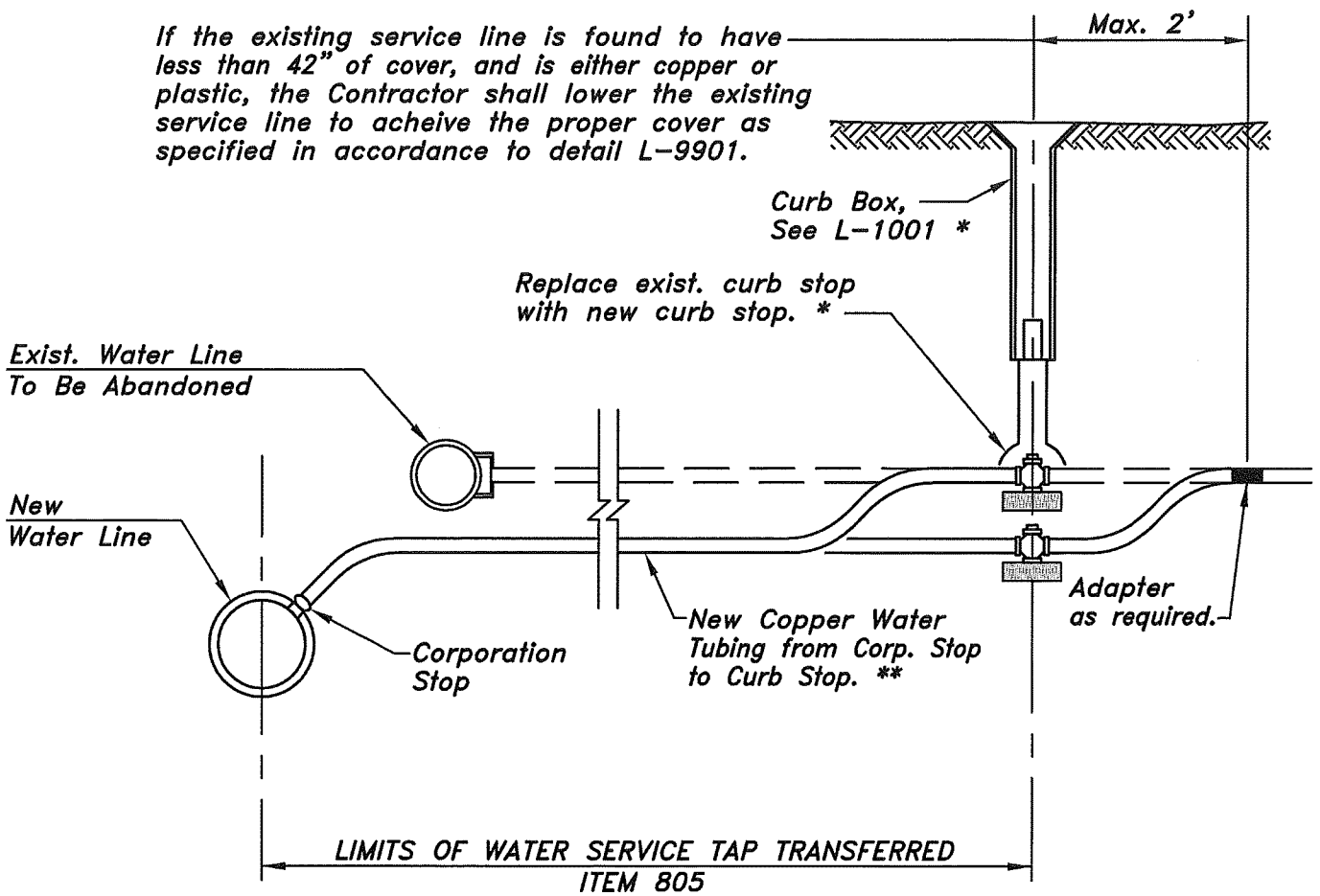
CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*RC Westerfield* 11-5-15  
ADMINISTRATOR DATE

STANDARD DETAIL  
WATER SERVICE EXTENSION  
AND  
CURB BOX RELOCATION



If the existing service line is found to have less than 42" of cover, and is either copper or plastic, the Contractor shall lower the existing service line to achieve the proper cover as specified in accordance to detail L-9901.



ALL SERVICES 2 INCHES AND UNDER SHALL BE TYPE "K" COPPER MEETING THE REQUIREMENTS OF SECTION 805.03.

CONTRACTOR SHALL REPLACE ANY DAMAGED CURB BOX ENCOUNTERED IN TRANSFERRING WATER SERVICE TAPS AS DETERMINED BY THE ENGINEER. REFER TO THE GENERAL NOTES FOR ESTIMATED CONTINGENCY QUANTITIES WHICH HAVE BEEN INCLUDED IN THE QUANTITY SUMMARY FOR REPLACING DAMAGED CURB BOXES.

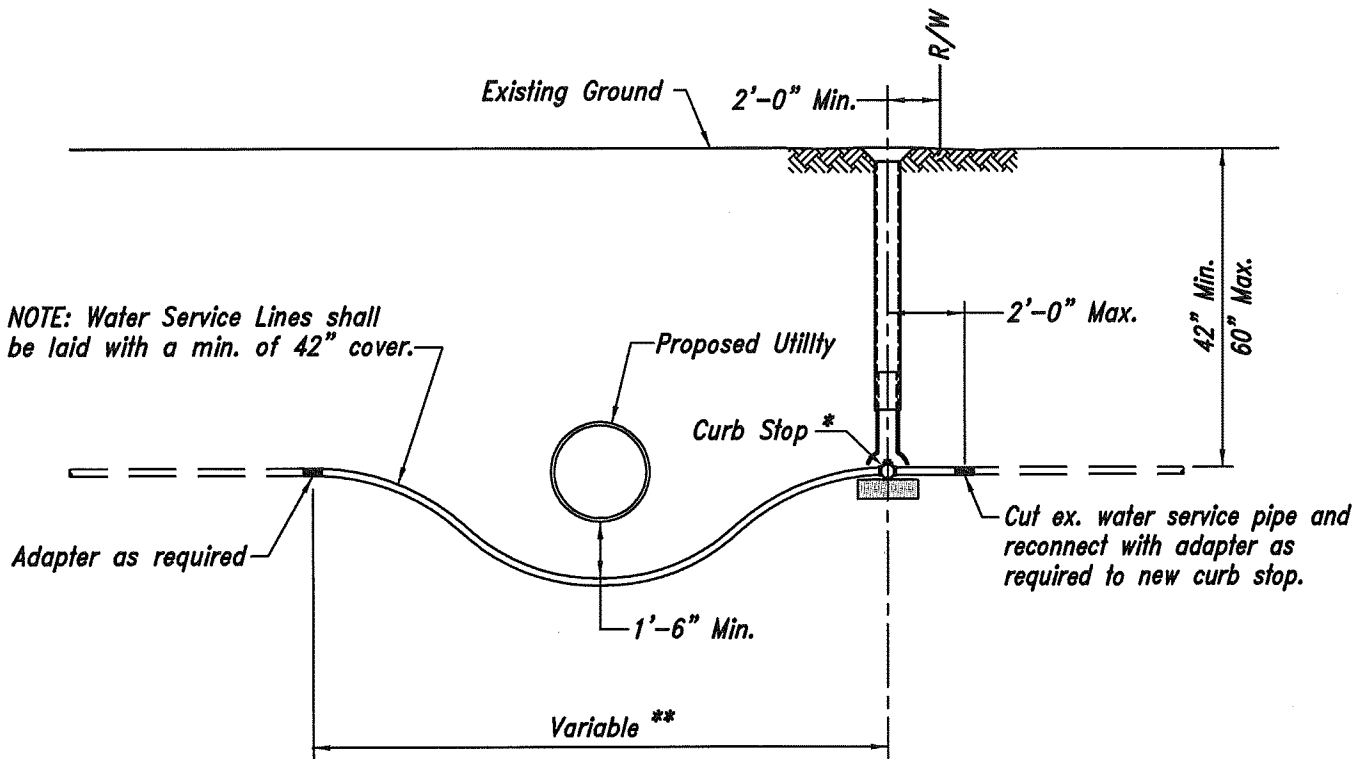
ANY CURB BOXES DAMAGED BY THE CONTRACTOR SHALL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CITY.

\* FOR REFERENCE IN PLACING NEW CURB STOPS AND CURB BOXES SEE "L-9901".

\*\* PIPE SHALL BE COPPER TUBING SIZE (C.T.S.)

L-7102B.Dwg Revision Date: 10/30/15

CITY OF COLUMBUS DEPARTMENT OF PUBLIC UTILITIES DIVISION OF WATER	STANDARD DETAIL ITEM 805 WATER SERVICE TAP TRANSFERRED	
APPROVED: <i>RC Westfield</i> 11-5-15 ADMINISTRATOR	DATE	



\* **NOTE:**  
For reference in placing new curb stops and relocated curb boxes see L-9901.

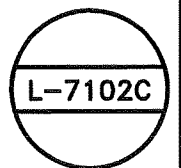
\*\* **NOTE:**  
Should Poly tubing, Galvanized or Lead material be encountered the entire Service Line shall be replaced w/ Copper from the existing Corporation Stop to the new Curb Stop. Pipe Shall Be Copper Tubing Size (C.T.S.).

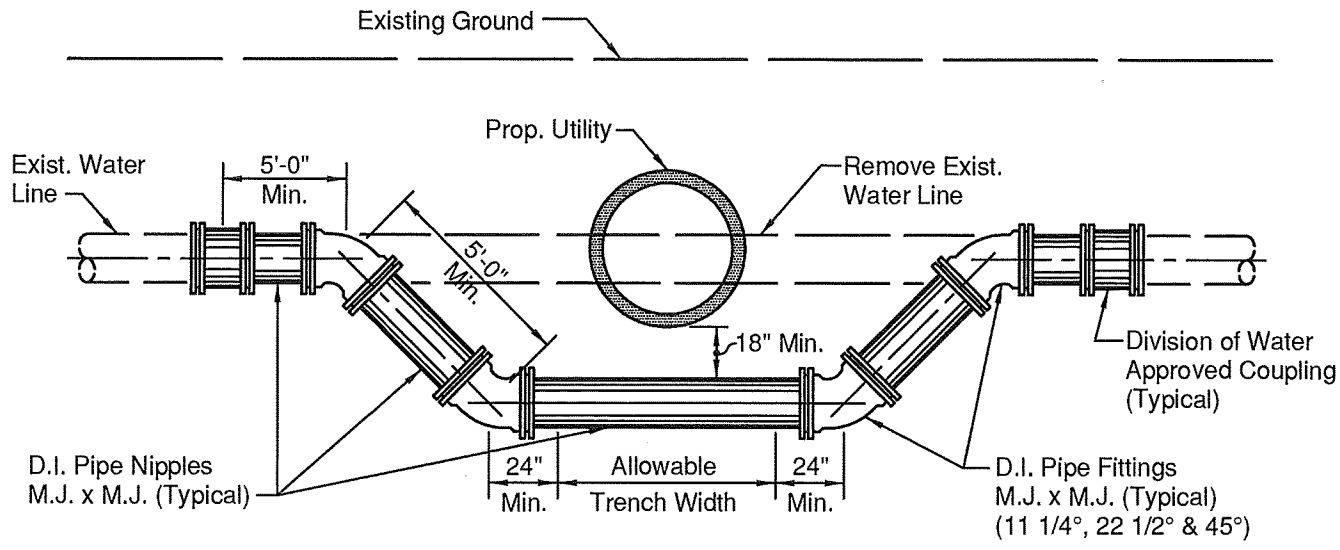
L-7102C.Dwg. Revision. Date: 10/30/15

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*R C Westfield* 11-5-15  
ADMINISTRATOR DATE



STANDARD DETAIL  
WATER SERVICE  
RELOCATION

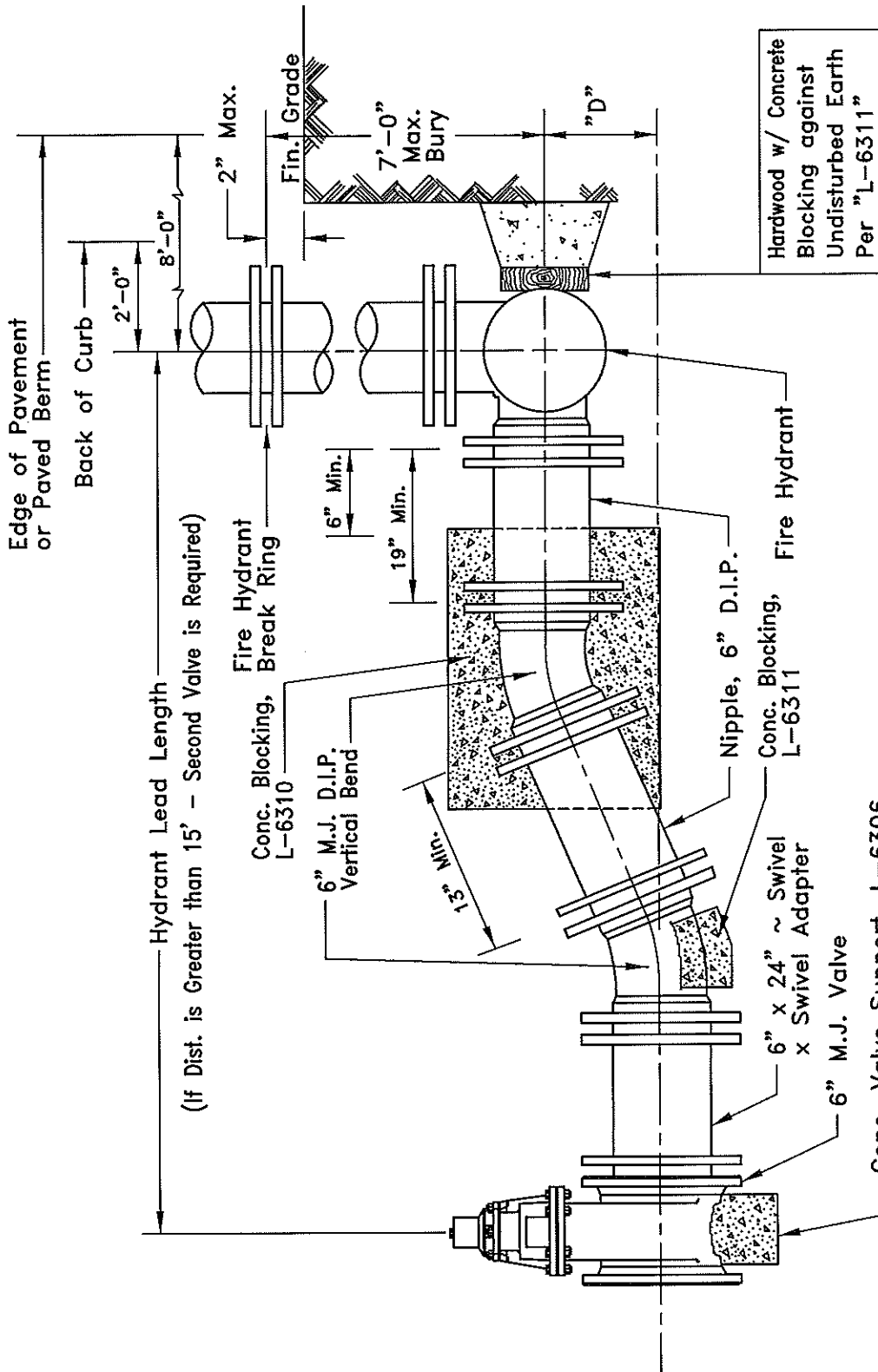




1. The scheduling of any water shut downs shall be as per Item 801 of the current CCMS. Time and duration of all shut downs shall be determined by Division of Water. The Contractor shall notify all water customers effected by the proposed work at least 24 hours in advance of the scheduled shut down.
2. All bends shall be secured by retaining glands, rodding or other methods as approved by the Engineer to restore the water main to service as soon as possible. For water lines 16" and under concrete backing shall then be provided in accordance with Standard Detail L-6310 for over bends and L-6311 for sag bends.
3. Existing Water Lines 20" and greater must have prior approval of DOW to lower under a proposed utility. Approval will only be given under special circumstances and contingent upon the Contractor submitting a designed drawing, stamped by a Professional Engineer, detailing how the lowered water line will be restrained to the existing water main.
4. The relocated lines shall be laid to the new line and grade, tested and disinfected prior to shut down of existing main and connection of the relocated lines to the existing main.
5. All water lines shall be disinfected by swabbing with a 5 per cent Hypochlorite solution in accordance with the applicable sections of A.W.W.A. C-651.

L-7401.Dwg Revision Date: 10/30/15

CITY OF COLUMBUS DEPARTMENT OF PUBLIC UTILITIES DIVISION OF WATER	STANDARD DETAIL <b>TYPICAL WATER LINE          LOWERING</b>	
APPROVED:  ADMINISTRATOR	11-5-15 DATE	



**NOTES:**

1. Vertical Bends Shall Be 11 1/4", 22 1/2" or 45"
2. Where "D" is 18" or Less, a Mechanical Joint Ductile Iron Offset may be used in lieu of the two Vertical Bends and the Inclined Nipple, as Approved by the Engineer.
3. Fire Hydrants shall be set a minimum of 6' from all Driveway Radius Returns.
4. All Bends are to be Included in the Cost of Item 801.
5. No Hydrant Extensions Will be Permitted without Prior Approval from DOW.

CITY OF COLUMBUS  
 DEPARTMENT OF PUBLIC UTILITIES  
 DIVISION OF WATER

APPROVED:  
*R.C. Westerfield* 5-16-13  
 ADMINISTRATOR DATE

STANDARD DETAIL  
 TYPICAL HYDRANT SETTING  
 (TO ELIMINATE EXCESSIVE BURY)



**NOTES:**

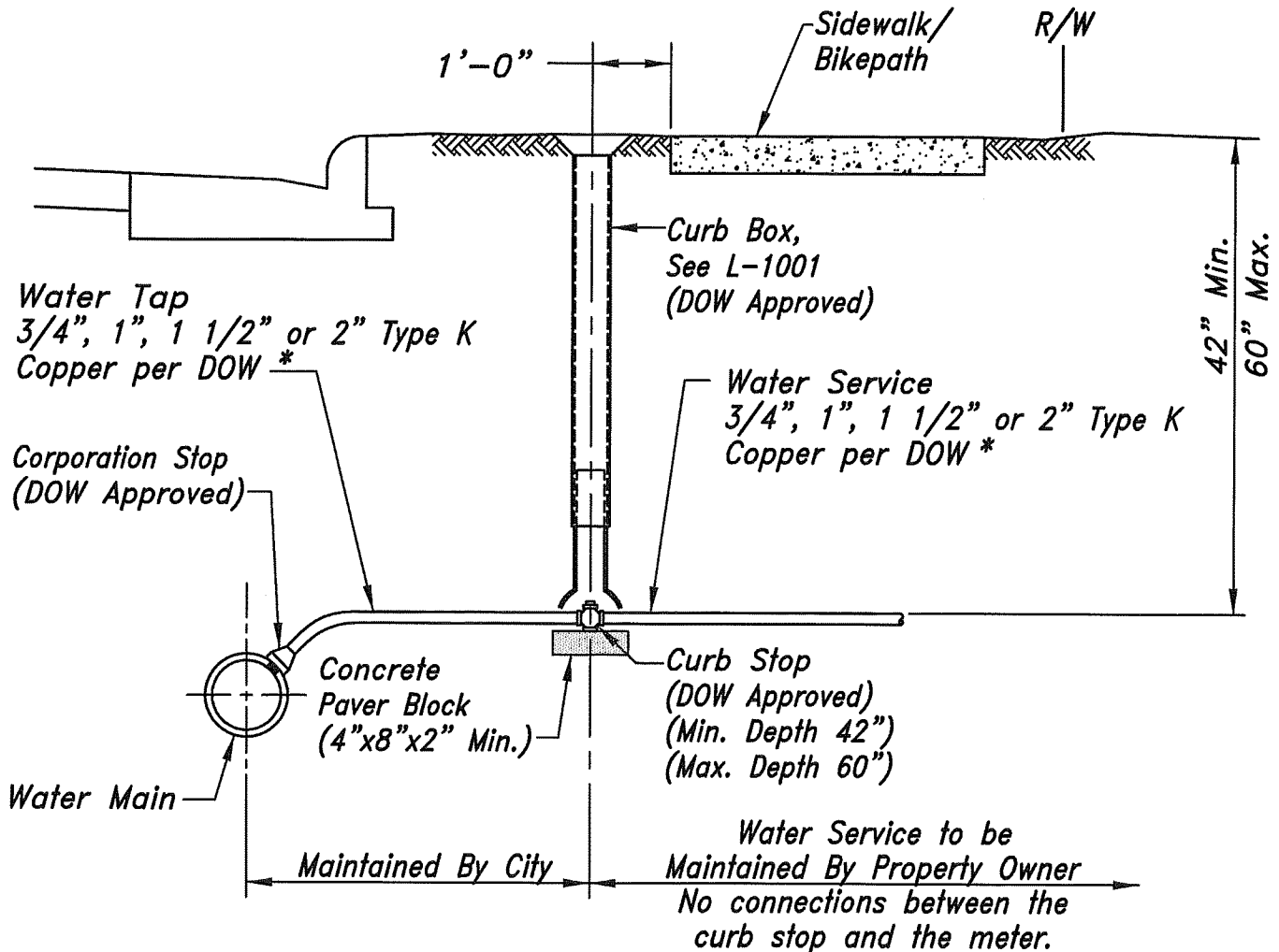
The Curb Box shall be placed 1'-0" from the streetedge of the proposed or existing sidewalk/bikepath, or 2 feet inside the right-of-way or easement line when no sidewalk/bikepath is present or proposed.

When a curb box is installed within a traveled area, the contractor shall install a C.I. Ferrule Box per "L-6320".

The Curb Stop Shall Be Installed with Valve Opening Facing the Structure to be served. The Curb Stop Shall Turn "1/4 Turn" Clockwise From On to Off Position. (Typical)

**\* NOTE:**

Pipe Shall Be Copper Tubing Size (C.T.S.)



L-9901.Dwg Revision Date: 10/30/15

CITY OF COLUMBUS  
DEPARTMENT OF PUBLIC UTILITIES  
DIVISION OF WATER

APPROVED:  
*R.C. Westerfield* 11-5-15  
ADMINISTRATOR DATE

STANDARD DETAIL  
**CURB BOX INSTALLATION**  
3/4" THRU 2"



**CITY OF COLUMBUS, OHIO**

**SUPPLEMENTAL SPECIFICATION 1100  
REVISIONS TO THE 2012 CONSTRUCTION  
& MATERIAL SPECIFICATIONS**

**DATED NOVEMBER 1, 2017**

**101.02 Abbreviations (New Abbreviation)**

Page 1

**101.02 Abbreviations.**

[AIA American Institute of Architects](#)

**101.03 Definitions (New Definition)**

Page 3

**101.03 Definitions.**

[Allowance. An amount of money established by the City and included in the contract, which is set aside for a specific purpose, when the exact quantity of work for that specific purpose is not known at the time of bid.](#)

**101.03 Definitions**

Page 3

**101.03 Definitions.**

**Advertisement (~~or Invitation for Bids~~).** The public announcement, as required by law, inviting Proposals for Work to be performed or materials and equipment to be furnished. Such ~~Proposal~~Advertisement will indicate with reasonable accuracy the type, quantity and location of the Work to be done or the character and quality of the materials to be furnished and the time and place of the opening of Proposals.

**Bid Documents.** The Bid Documents include the Advertisement ~~for Bids~~, Invitation for Bid, Instructions to Bidders, Addenda, ~~Proposal~~, Electronic Bidding Software file(s), Contract, Contract forms and required ~~bonds~~Guarantees, Specifications, Supplemental Specifications, Supplements, Special Provisions, Plans, Plan Notes, Standard Drawings, Technical Specifications, and any other document specifically designated by the Department as a Bid Document, all of which constitute one instrument. Any other documents provided with the bid are for informational purposes only and are not part of the Bid Documents. The City may request



that the Bidder sign an acknowledgement that such informational documents are expressly excluded from the Contract.

**101.03 Definitions (New Definition)**

Page 4

**101.03 Definitions.**

**Business Day.** Wherever indicated inside these specifications, business days are defined as: Monday, Tuesday, Wednesday, Thursday, and Friday, excluding National Holidays and, if applicable, the day that a National Holiday is observed.

**101.03 Definitions**

Page 4

**101.03 Definitions.**

**Completion Date (Interim or Final).** The date ~~on~~by which the Work shall be completed (Final) or the date by which a portion of the Work defined by the contract shall be completed (Interim).

**101.03 Definitions**

Page 5-6

**101.03 Definitions.**

**Contract Documents.** The Contract Documents include the Advertisement ~~for Bids~~, Invitation for Bid, Instructions to Bidders, Addenda, Proposal, Affidavits, Contract, Contract forms and required ~~bonds~~Guarantees, Specifications (CMSC), Supplemental Specifications, Supplements, Technical Specifications, Special Provisions, Plans, Plan Notes, Standard Drawings, Notice to Proceed, Notice of Commencement, and Auditor's Purchase Order as the same are published or may be published and amended by the ~~several Divisions of the~~ City, Change Orders, Contract Modifications, and any other document included by reference by the City as a Contract Document, all of which constitute one instrument.

**Contract Sum.** The Contract Sum is stated in the Contract and, including authorized adjustments thereto, is the ~~total~~maximum amount payable by the City to the Contractor for the performance of the Work under the Contract Documents. The Contract Sum may include a contingency amount; however, the contingency amount is not due to the Contractor unless approved by Change Order.

**101.03 Definitions (New Definition)**

Page 7

**101.03 Definitions.**

Invitation for Bid. A written invitation to contractors or equipment suppliers to submit a Proposal on a specific project to be realized or a product or service to be furnished.

### 101.03 Definitions

Page 7

#### 101.03 Definitions.

**National Holidays.** New Years Day, January 1; Martin Luther King's Birthday - the Third Monday in January; Presidents' Day, the Third Monday in February; Memorial Day, the last Monday in May; Independence Day, July 4; Labor Day, the First Monday in September; Columbus Day, the Second Monday in October; Thanksgiving Day, the fourth Thursday in November; Christmas Day, December 25.

### 101.03 Definitions

Page 7

#### 101.03 Definitions.

**Notice of Intent to Award.** Written notice by the City to the apparent successful bidder stating that upon compliance with the conditions enumerated therein, ~~within the time specified,~~ the City intends to enter into a Contract.

### 101.03 Definitions (New Definition)

Page 8

#### 101.03 Definitions.

**Registered Architect.** An Architect registered with the Ohio Architects Board to practice architecture in the State of Ohio.

### 101.03 Definitions (New Definition)

Page 9

#### 101.03 Definitions.

**Technical Specification.** Written depiction of design drawings and a detailed and exact statement of particulars, especially a statement prescribing materials, dimensions, and workmanship for something to be built or installed.

### 102.01 Pre-qualification of Bidders

Page 10-11

~~**102.01 Pre-qualification of Bidders.** Prior to the City awarding a Contract, the Bidder must have an active contract compliance number. If the Bidder does not have a contract compliance number (or if it has lapsed) at the time of Proposal submission, the Bidder must include a completed contract compliance certification application (or reactivation) with its Proposal under provisions of City Code, Title 39; Chapter 3907.~~

~~In addition, if any Work includes work on any water or sanitary main line or service, Bidders must have in effect at the time of Bid and at the time of Work, effective sewer or water tapper's license(s). Pursuant to Chapter 329 of the Columbus City Code, Bidders shall be prequalified.~~

## 102.02 Availability and Contents of Bid Documents

Page 11

**102.02 Availability and Contents of Bid Documents.** Bid Documents are available to prospective bidders at the location stated in the ~~advertisement~~Advertisement. The Bid Documents will state the location and description of the contemplated Work and will show the approximate estimate of the various quantities and kinds of work to be performed or materials to be furnished, and will have a schedule of items for which unit bid or lump sum prices are invited. The Bid Documents will state the Contract Time, the amount and type of the Proposal Guaranty, and the date, time and place of the opening of Proposals. The Plans, Specifications, Supplemental Specifications, Special Provisions, standard drawings or other documents designated in the Bid Documents, will be considered a part of the Proposal whether attached or not.

## 102.03 Preparation of Proposals

Page 11-13

**102.03 Preparation of Proposals.** Prepare a Proposal according to this subsection and the requirements found in the Bid Documents.

**A. General.** Provide prices for each item listed in the Proposal.

When an item in the Proposal contains a choice to be designated by the Bidder, the Bidder shall indicate that choice in accordance with the Specifications for that particular item, and thereafter no further choice will be permitted.

The Proposal shall include all documents, duly executed as applicable, that are required to be submitted as directed in the Advertisement and as described in Section 102.02.

### ENTITY SUBMITTING PROPOSAL REQUIRED SIGNATURE

Individual	The individual or a duly authorized agent.
Partnership	A partner or a duly authorized agent.
Joint Venture	A member or a duly authorized agent of at least one of the joint venture firms.
Corporation	An authorized officer or duly authorized agent of the corporation. Also, show the name of the state chartering the corporation and affix the corporate seal.
Limited Liability Company	A manager, a member, or a duly authorized agent.

Anyone signing a Proposal in a representative capacity must provide evidence of his or her authority to bind the bidder by Affidavit.

Before a contract will be awarded to a foreign corporation or an individual or partnership non-resident of the State of Ohio, such foreign corporation, individual, or

partnership non-resident shall ~~file~~ register with the Secretary of State's ~~office-a power-of attorney designating them or their agent or the Secretary of State, as agent,~~ for the purpose of accepting service of summons, in any action in law or equity, or both, brought in the State of Ohio.

**B. Submitting Bids Electronically.** When submitting a Bid electronically, properly complete the electronic file and submit it using the software specified in the Bid Documents rather than completing it by handwriting, typing, or using unauthorized computer-generated forms. Properly execute the Proposal by completing all of the required fields and attaching the required signatures in the spaces provided in the electronic file.

**C. Submitting Paper Bids.** When submitting a paper Bid, submit the Proposal upon the forms furnished by the City ~~or on an acceptable form generated by a computer.~~

Specify a unit price in figures for each proposal item for which a quantity is given in the "Unit Price" column. Calculate and place the products for the respective unit prices and quantities in the "Bid Amount" column. For a lump sum item, place the same price in the "Unit Price" column and in the "Bid Amount" column pertaining to that item. Indicate the total Proposal amount by adding the values entered in the "Bid Amount" column for the listed items. All the words shall be in ink or typed.

Computer Generated Bid Sheet: If permitted in the Bid Documents, the Bidder may submit an 8 1/2 x 11 inches (216 x 279 mm) computerized bid sheet or sheets attached to the Proposal. The computerized bid sheet or sheets must meet the following requirements:

1. reference numbers, description, units and quantities included,
2. a unit price per/item,
3. an extension price per/item,
4. project name, number, and date on each sheet,
5. subtotals and totals clearly identified,
6. blanks where appropriate,
7. in the event of a deleted item - the word deleted inserted,
8. lines between columns and items,
9. each page numbered.
10. a general summary of subtotals must be shown on the last sheet,
11. the Contractor's contract compliance number must appear on each computerized sheet,
12. the following statement must appear on the last sheet of the computerized bid:

**"The Bidder's TOTAL is only for reference at the bid opening. The City will verify that the TOTAL price and the individual unit and/or lump sum prices correspond. If there is a discrepancy, the unit and/or lump sum prices shall govern."**

Be advised further that the Bidder is solely responsible to prepare its computerized bid sheets in accordance with the above requirements and the remaining requirements of this Section. Failure to fully comply with the designated format may result in the rejection of the Bidder's bid.

## 102.08 Non-Responsive Proposals

Page 14-15

**102.08 Non-Responsive Proposals.** The City reserves the right to disqualify or refuse to consider a Proposal for any of the following reasons:

- ~~1. More than one Proposal for the same work from an individual, firm, or corporation under the same or different name, or corporation under the same name or corporations with one or more of the same persons as officers or directors of such corporations, or corporations which are holding companies, parent companies or holding companies that are subsidiaries of such corporations.~~
- ~~2. Bid prices are materially unbalanced as defined by 102.09.~~
- ~~3. Bidder failed to comply with pre-qualification requirements of 102.01.~~
- ~~4. Proposal contains conditions or qualifications not provided in the Bid Documents.~~
- ~~5. Either the Bidder fails to acknowledge addenda or the Proposal does not contain completed forms required to be included in the Proposal and the City determines that the Bidder's Proposal does not respond to the Bid Documents in all material respects and contains irregularities or deviations which affects the amount of the bid or otherwise gives the bidder a competitive advantage.~~
- ~~6. Bidder adds any provision reserving the right to accept or reject an award.~~
- ~~7. Bidder fails to submit a unit price for each Contract item listed.~~
- ~~8. Bidder fails to submit lump sum price where required.~~
- ~~9. Bidder fails to furnish Proposal Guaranty or Bid Bond for the amount required.~~
- ~~10. Proposal contains other alteration, omission, or error that in the judgment of the City does not respond to the Bid Documents in all material respects and contains irregularities or deviations from the Bid Documents that affect the amount of the Bid or otherwise gives the Bidder a competitive advantage.~~
1. Whether bidder has submitted more than one bid for the same work from an individual or entity under the same or different name, or corporation under the same name, or corporations with one or more of the same persons as officers or directors of such corporations, or corporations which are holding companies, parent companies or holding companies that are subsidiaries of such corporations.
2. Whether bid prices are materially unbalanced as defined in the relevant sections of the technical specifications manual specified in the invitation for bid, where applicable.
3. Whether bidder has failed to comply with pre-qualification requirements as defined in the relevant sections of the technical specifications manual specified in the invitation for bid, where applicable.
4. Whether the bid contains conditions or qualifications not provided in the invitation for bid.

5. Whether the bidder failed to acknowledge addenda or the bid does not contain complete forms required to be included in the bid and the city determines that the bidder's bid does not respond to the invitation for bid in all material respects or contains irregularities or deviations which affects the amount of the bid or otherwise gives the bidder a competitive advantage.
6. Whether bidder adds a provision reserving the right to accept or reject an award.
7. Whether bidder fails to submit a unit price for each contract item listed, when required by the invitation for bid.
8. Whether bidder fails to submit a lump sum price where required.
9. Whether the bidder fails to submit the required bid guarantee or submits an irregular bid guarantee for the amount required.
10. Whether the bid contains other alterations, omissions, or errors such that, in the judgment of the city, the bid does not respond to the invitation for bid in all material respects, or contains irregularities or deviations from the invitation for bid that affect the amount of the bid or otherwise gives the bidder a competitive advantage.
11. Whether the bidder has complied with the requirements of Columbus City Code section 329.20(h) regarding subcontractors.

However, should the City accept a non-responsive Proposal, the Bidder must meet all remaining requirements set forth in the Bid Documents.

## 102.10 Proposal Guaranty

Page 15

**102.10 Proposal Guaranty.** ~~No Proposal will be considered unless accompanied by Proposal Guaranty comprised of a Bid Bond or a certified check drawn on a solvent bank made payable to the City of Columbus, Ohio, in an amount not less than 10 percent of the Bidder's Proposal, conditioned upon execution of the Contract and the furnishing of a performance and payment bond in the event the Contract is awarded to the Bidder. The amount of the Bid Bond shall be expressed either as a percentage of the total bid (10%) or numerically in dollars and cents. The amount indicated in the Proposal Guaranty shall include the total amount of the Bid including all alternates submitted which increase the Bid. The Proposal Guaranty amount shall be equal to or exceed 10 percent of this total amount. The required type of bid guarantee shall be identified in the invitation for bid and may take the form of a bid or proposal bond, a certified or cashier's check drawn on a solvent bank, or a letter of credit pursuant to Chapter 1305 of the Ohio Revised Code. If a bid or performance and payment bond is required, the bid or performance and payment bond shall be issued by a guaranty company authorized to do so under the Ohio Revised Code or by a surety who is: (1) a resident of this state; (2) worth, in the aggregate, double the sum to be secured, beyond the amount of their debts; and (3) have property liable to execution in the state equal to the sum to be secured. The bid guarantee shall be for a minimum ten (10) percent of the bid amount.~~

## 102.11 Delivery of Proposal

Page 15

**102.11 Delivery of Proposal.** Unless otherwise indicated in the Bid Documents, all Proposals must be submitted using the electronic Bid submission software specified in the Proposal. The City will accept Proposals until the time and date designated in the Advertisement and the Invitation for Bid. If a paper bid is provided, the City will return Proposals received after the designated time to the Bidders unopened, at the Bidder's expense.

### **102.12 Withdrawal of Proposals Prior to Bid Opening**

Page 15

**102.12 Withdrawal of Proposals Prior to Bid Opening.** Prior to the opening of Proposals, a Bidder may withdraw its Proposal. If a paper bid ~~is provided~~ has been submitted, the Bidder must make a written request that is received by the Director prior to the time of Proposal opening. The Proposal will be returned to the Bidder unopened.

### **102.13 Withdrawal of Proposal after Bid Opening (Mistake in Bid)**

Page 15-16

**102.13 Withdrawal of Proposal after Bid Opening (Mistake in Bid).** The Director may permit a Bidder to withdraw the Bid from consideration without forfeiture of the Proposal Guaranty ~~or bid bond~~ provided that the Bidder identifies the mistake and provides a written request to the Director within ~~forty-eight hours of~~ two business days after the Bid opening. The written request must also include a sworn notarized statement specifying the grounds for withdrawal together with the original bid work sheets which document the mistake.

The following conditions must be met for Bid withdrawal after Bid opening:

1. The Bid was substantially lower than the other Bids;
2. The Bid was made in good faith;
3. The mistake was a non-judgmental, clerical or mathematical error or an unintentional omission of a substantial quantity of work, labor or material; and
4. The amount of the error must have a significant monetary effect on contract performance.

The City may require a meeting with the Bidder before a determination is reached. The City will notify the Bidder in writing of its determination.

If the Director determines that the conditions for withdrawal have not been met, he may award the Contract to such Bidder. If such Bidder does not enter into the Contract and/or furnish the required performance and payment bond, the Director may, as applicable, declare the Proposal Guaranty forfeit and deposit to the City's account the Bidder's check or file a claim with the Surety for the amount of the Bid Bond. In addition, the Director may award the Contract to the next lowest responsive and responsible Bidder or reject the remaining Bids and re-advertise the Project.

If the Bidder is permitted to withdraw its Bid, it will not be permitted to participate in the Project for which the Bid is withdrawn.

### 103.01 Consideration of Proposals

Page 17

**103.01 Consideration of Proposals.** After the Proposals are opened and read, as required by Columbus City Code, the City will compare the Bidders' proposed prices. The proposed price is the summation of the products of the estimated quantities shown in the Proposal and the unit prices and, if applicable, lump sum bid prices. In the event of a discrepancy between unit bid prices and extensions, the unit price shall govern.

The City reserves the right, without any liability, to reject any or all Proposals, to waive minor technicalities, or to advertise for new Proposals.

### 103.03 Cancellation of Award

Page 17

**103.03 Cancellation of Award.** The City reserves the right to rescind the award of any Contract at any time before the final execution of the Contract by the City without any liability.

### 103.04 Return of Proposal Guaranty

Page 17-18

**103.04 Return of Proposal Guaranty.** Within five business days after the opening of the Proposals, the City will return all Proposal Guaranties, except those of the three lowest bidders. The City will return the retained Proposal Guaranties of the two unsuccessful bidders of the three lowest Bidders within ten business days following the award of Contract, and the City will return the retained Proposal Guaranty to that of the successful Bidder after satisfactory contract performance and payment bond(s) have been furnished and the Contract has been executed by all parties.

### 103.06 Execution of Contract

Page 18

**103.06 Execution of Contract.** The successful Bidder shall sign and return the Contract, together with the contract performance and payment bond(s) and other required Contract Documents, within ten business days after receiving the Notice of Intent to Award and the Contract Documents for signature. No Proposal shall be considered binding upon the City until the Director receives approval from Columbus City Council to enter into said Contract, the Contract is executed, and a purchase order is approved by all required applicable City Agencies and City Council. If the Contract is not executed by the City within thirty days following the effective date of the authorizing legislation approved by City Council, the successful Bidder will have the right to withdraw its Bid without prejudice.

The Contractor must obtain one copy of the Specifications (CMSC) at its own cost and keep available one copy of the CMSC, and one set of the Contract Documents at the Project site at all times. The City will supply the Contractor with up to five sets of Plans.



Any extra sets of Contract Documents required by the Contractor may be purchased from the appropriate Owner ~~Division~~.

### **103.08 Responsibility to General Public**

Page 18-19

**103.08 Responsibility to General Public.** The Contractor shall defend, indemnify and hold harmless the City of Columbus and any of its agents or representatives, employees, assigns and successors in interest, from and against any lawsuits and causes of action, claims, losses, demands and expenses, including but not limited to reasonable attorney fees and the cost of litigation, damages or liability of any nature whatsoever, for death or injury to any person, including employees or agents of the Contractor, or for damage to or destruction of property of either party hereto or any third party, which arise in any manner from the negligent acts, errors, omissions or willful misconduct of the Contractor and any of its agents, employees or representatives, including any of its subcontractors, in the performance of the Contract for the City of Columbus.

The Contractor shall procure and maintain during the term of the Contract and any applicable warranty period insurance for the liability of damages, which are imposed by law or assumed under Contract with the City of Columbus, in the kind and minimum amounts as specified hereinafter, from insurance companies which are authorized to transact business under the laws of the State of Ohio. The insurance shall protect the Contractor and any Subcontractor performing work under the Contract with the City of Columbus from claims for damages which may arise from operations under the Contract, whether such operation is performed by the Contractor or by any Subcontractor or by anyone directly or indirectly employed by either of them. The cost of such insurance shall be incidental to all contract items. The City of Columbus shall be listed as an 'Additional Insured' on the Commercial General Liability and Comprehensive Automobile liability insurance policies.

Prior to the execution of the Contract, the Contractor shall provide the City of Columbus with a 'Certificate of Insurance', in a satisfactory form, which demonstrates compliance with the requirements of this subsection. The 'Certificate of Insurance' will also reference the Contract and ~~or~~ Project Number for which the work is being performed. The Contractor shall also be responsible for providing a 'Certificate of Insurance' within ten business days after the insurance is renewed. If the insurance is subject to cancellation, then the insurance company shall immediately notify the City of Columbus of such cancellation in accordance with the policy terms for affording such notice. Also, if the insurance is cancelled, then the Contractor will immediately cease all operations until the required kind and limits of insurance have been restored. Upon request, the Contractor shall furnish the City of Columbus with a certified complete copy of each policy of insurance.

### **103.09 Contractor's Insurance**

Page 19-21

**103.09 Contractor's Insurance.** For purposes of complying with 103.08, the Contractor shall furnish evidence of procuring the following types of insurance prior to the execution of the Contract:

**A. Commercial General Liability Insurance.** This policy shall provide coverage for bodily injury or property damage which may arise from the operations of the Contractor and any of its subcontractors. The policy shall include coverage for premises and operations; independent contractors; products and completed operations; broad form property damage; hazards of explosion, collapse, and underground damage; and contractual liability as applicable to any indemnification hold harmless agreements in the Contract. The minimum limits of liability shall be \$1,000,000 for each occurrence subject to an aggregate liability for products and completed operations of \$2,000,000 and a general aggregate liability of \$2,000,000.

**B. Comprehensive Automobile Liability Insurance.** This policy shall provide coverage for owned, non-owned, and hired automobiles for all damages arising from bodily injury and property damage with limits of liability of not less than \$1,000,000 per accident with respect to bodily injury, property damage, or death.

**C. Workers's Compensation Insurance.** The Contractor shall comply with all provisions set forth by the Ohio Bureau of Workers' Compensation during the term of the Contract for the benefit of all employees employed at the project site. If the Contractor shall engage the services of Subcontractors, then it shall require all such Subcontractors to also provide Worker's Compensation insurance for its employees who are employed at the project site. In order to comply with this requirement, the Contractor shall provide the City of Columbus with a copy of the Workers' Compensation Certificate as evidence that ~~it's~~ its insurance premium and that of any Subcontractor has been paid. In the event any class of employees engaged in hazardous work under the Contract at the site of the project is not protected under the Worker's Compensation statute, the Contractor shall provide and cause each Subcontractor to provide suitable insurance for the protection of their employees not otherwise protected.

**D. Employers Liability Insurance.** This policy shall provide coverage for accident or disease which is incurred by an employee of the Contractor in an amount of not less than \$100,000 for bodily injury by Accident for each accident, \$100,000 for bodily injury by Disease for each employee, and a policy limit of \$500,000 for bodily injury by disease.

**E. Builders Risk Insurance.** When required, the Contractor shall procure and maintain during the term of the Contract Builders Risk insurance to protect the work being performed under the Contract from loss as a result of fire, hail, lightning, theft, wind storm, and vandalism in the full amount of the Contract. The cost for this insurance shall be included in the unit price for 'Item Special – Builders Risk Insurance'. If the price is bid as a lump sum, Builders Risk Insurance shall be included in the lump sum price the same as other overhead costs.

**F. Railroad Protective Liability Insurance.** When required, the Contractor shall procure and maintain during the term of the Contract a Railroad Protective Liability insurance policy, for the benefit of the named railroad as respect the operations of the Contractor and its Subcontractors, with limits of liability as specified by the railroad, for damages arising from bodily injury, death, or property damages combined in any one occurrence. The cost for this insurance shall be included in the unit price for 'Item Special – Railroad Protective Insurance'.

**G. Professional Liability Insurance.** When required, the Contractor shall furnish evidence that it or any of its Sub-consultants maintain Professional Liability insurance, for liability which may arise from the negligent acts, errors, or omissions of operations performed under the Contract, in an amount not less than \$1,000,000 for each claim. If such policy is written on a 'claims-made' form, then it shall have a retroactive date of no later than the effective date of the Contract, and such policy shall be maintained for a period of not less than two years after the project has been accepted by the City of Columbus. If the price is bid as a lump sum, Professional Liability Insurance shall be included in the lump sum price the same as other overhead costs.

An excess liability insurance policy may be utilized to satisfy the requirements of insurance for Commercial General Liability and Comprehensive Automobile Liability insurance. If such a policy is utilized, then the City of Columbus shall be listed as an 'Additional Insured'. If the insurance required of this Section is not renewed or if the available insurance is less than the required minimum amounts specified herein as a result of a change or modification in coverage or if the limits of liability are impaired by claims so as to reduce the amount of available insurance, then the Contractor shall so notify the City of Columbus in which case the City of Columbus may at its sole discretion consider the Contractor in default of its Contract, refuse to make any further payment to the Contractor until such time the deficiency in insurance is satisfactorily resolved, or use any retained funds which are due the Contractor in order to remedy the deficiency. If any part of the Contract is let to a Subcontractor, then the Contractor is responsible for the part subcontracted work being adequately covered by insurance herein-above described.

#### **104.02 Modifications of the Contract Documents**

Page 21-22

##### **104.02 Modifications of the Contract Documents.**

**A. General.** The City may at any time, without invalidating the Contract and without notice to or release of the sureties, by written Change Order or Contract Modification, as applicable, make any change or modification in the Work or add to the Work within the general scope of the Contract, including, but not limited to, changes in the Contract Documents; in the sequence of the Work; or in the City-furnished facilities, equipment, materials, services, or site. The Contractor shall ensure that the amount of the surety bonds is modified as necessary from time to time to be consistent with any changed Contract scope, Sum or Time in accordance with any Change Order(s) or Contract Modification(s).

The Contractor shall have no right to compensation above the ~~original~~ Contract Sum until the extra work is included in a written Contract Modification approved by the City Council and executed by all required City Agencies.

#### **105.04 Coordination of the Contract Documents**

Page 33

**105.04 Coordination of the Contract Documents.** In case of discrepancy, the Engineer will resolve any discrepancies using the following descending order of precedence:

- A. ~~Contract Form Addenda~~
- B. ~~Addenda Special Provisions~~
- C. ~~Proposal Plans (Calculated dimensions on the Plans will govern over scaled dimensions.)~~
- D. ~~General Provisions (Section 100) Technical Specifications~~
- E. ~~Special Provisions Supplemental Specifications and Supplements~~
- F. ~~Plan Notes Standard Drawings~~
- G. ~~Plans (calculated dimensions will govern over scaled dimensions) Specifications (CMSC)~~
- H. ~~Supplemental Specifications~~
- I. ~~Standard Drawings~~
- J. ~~Standard Specifications (Sections 200 through 1000)~~

### 105.10 Photographs and Videos

Page 37-38

**105.10 Photographs and Videos.** The Engineer, Inspectors or other duly authorized City personnel or agents, ~~from time to time~~ during the progress of the Work, may take photographs or videos of the Work. The Contractor shall furnish access to the Work at all times for this purpose and shall furnish such assistance as may be required. The photographs or videos thus taken shall be the property of the City. Nothing herein contained shall be construed as prohibiting the taking of photographs or videos by the Contractor or its agents, provided, however, that it is done at no cost or expense to the City.

### 105.11 Inspection of Work

Page 38

**105.11 Inspection of Work.** All materials and each part or detail of the Work shall be subject to inspection by the Engineer, Inspector or duly authorized City representative. The Engineer, Inspector or duly authorized City representative shall be allowed access to all parts of the Work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection. Notify the Engineer at least twenty four hours prior to all required special inspections and testing as specified in the Contract Documents or as required by the Engineer.

If the Engineer requests it, the Contractor, at any time before acceptance of the Work or any portion thereof, shall remove or uncover such portions of the finished Work as may be directed. After examination, the Contractor shall restore said portions of the Work to the standard required by the Contract Documents. Should the Work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as Extra Work; but should the Work so exposed or examined prove unacceptable, the uncovering or removing and

the replacing of the covering or making good of the parts removed, shall be at the Contractor's expense.

The Contractor shall notify the Engineer at least forty eight hours in advance of any changes in the work schedule. This notification is required to accommodate construction inspection scheduling. The notification shall include the beginning date and time of the work, and the duration of the work. The notification shall be submitted to the Engineer in writing. In the absence of such notification, and if the work is performed without inspection, the Engineer may require the work to be removed and redone.

If the City assigns an inspector(s) to the project and the Contractor does not notify the City of its intent not to work, charges incurred by the City for inspection services will be deducted from monies owed to the Contractor/Developer, unless such charges are waived by the Director.

Any Work done or materials used without supervision or inspection by an authorized City representative may be ordered removed and replaced at the Contractor's expense. Failure to reject any defective Work or materials shall not in any way prevent later rejection when such defects are discovered, or obligate the City to final acceptance of the Work.

When any unit of government or political subdivision or railroad or any corporation is to pay a portion of the cost of the Work covered by this Contract, its respective representatives shall have the right to inspect the Work. Such inspection shall not make any unit of government or political subdivision or railroad or any corporation a party to this Contract, and shall in no way interfere with the rights of the Contractor or City hereunder.

#### **105.14 Maintenance during Construction**

Page 39-40

**105.14 Maintenance during Construction.** The Contractor shall maintain the Work in a presentable and safe condition during construction and until the Project is accepted. Maintenance of the Work shall include continuous and effective work prosecuted day by day, with adequate equipment and forces so that the roadway, conduits or structures are kept in satisfactory condition at all times. The Contractor shall be responsible for damage done by its equipment and the Contractor shall defend, indemnify, and hold harmless the City as provided in 107.24 relating to damage caused by the Contractor's or its subcontractors' or suppliers' equipment.

The Contractor shall maintain the previous courses or subgrade during all construction operations, when placing a course upon other courses of embankment, base, subgrade, concrete or asphalt pavement, or other similar items previously constructed. This maintenance includes, but is not limited to draining, re-compacting, re-grading, or if destroyed, the removal of Work previously accepted by the City.

Maintain Stormwater Best Management Practice (BMP) features. Prevent sediment laden surface water from coming in contact with BMP features during construction.

Temporary restoration of street surfaces shall be made on installation of underground lines and structures, surplus excavation shall be removed, and the street graded and put in a safe and passable condition. Settlements occurring in or adjacent to trenches shall be immediately refilled to a proper grade. Failure on the part of the Contractor to restore the street surface to the satisfaction of the Engineer may be considered a cause sufficient for suspending the applicable work until such restoration. In the event the Engineer orders the Work suspended for conditions under this Section, the expense and time, whether direct or indirect, for such suspension shall be borne solely by the Contractor and shall not be considered a suspension of work under 104.02.C.

The Contractor shall repair, restore and clean streets and other public facilities outside the Construction Limits that are affected by its operations, including hauling and delivery of materials.

If the Contract does not contain an Item 616 – Dust Control, all costs of maintenance work and dust control during construction and before the Project is accepted shall be included in the ~~unit prices bid of the various pay items~~Contract Sum.

All costs of maintenance work during construction and before the Project is accepted shall be included in the ~~unit prices bid of the various pay items~~Contract Sum and the Contractor shall not be paid an additional amount for such work.

### **105.17 Use of Fire Hydrants**

Page 41-42

**105.17 Use of Fire Hydrants.** In accordance with City Code and the Division of Power and Water rules and regulations, the Contractor shall obtain the proper hydrant permits(s), and pay any applicable fees, for the use of hydrants(s) deemed necessary for work performed under this Contract. Permit(s) must be obtained from the jurisdiction owning and maintaining the hydrant (for areas outside Columbus corporation limit) and from the Division of Power & Water (Water) Permit Office. The Contractor shall adhere to all rules and regulations governing said permit and must have the original permit on site anytime in which the hydrant is in use.

Cost of the permit and application fees shall be included in the ~~various bid items~~Contract Sum.

### **105.19 Construction and Demolition Debris, Vegetative Debris, and Clean Soil.**

Page 42

#### **105.19 Construction and Demolition Debris, Vegetative Debris, and Clean Soil.**

A. Construction ~~and~~ Demolition ~~and~~ Debris. The Contractor shall manage Construction and Demolition Debris generated in carrying out the Work in compliance with the requirements of ORC Chapter 3714, OAC Chapter 3745-400, the regulations of the

Franklin County Board of Health, and the City of Columbus Health Code. The Contractor shall dispose of Construction and Demolition Debris at a licensed Construction and Demolition Debris facility or as otherwise authorized in OAC 3745-400-04.

### 107.01 Laws to be Observed

Page 47-48

**107.01 Laws to be Observed.** The Contractor shall keep fully informed of all Federal, State and local laws, ordinances, codes and regulations and all orders and decrees of authorities having any jurisdiction or authority, which in any manner affect those engaged or employed on the Work, or which in any way affect the conduct of the Work. The Contractor shall at all times observe and comply with all such laws, ordinances, codes, regulations, orders, and decrees; and shall protect and defend, indemnify and hold harmless the City as provided in 107.24 relating to violation of any such law, ordinance, code, regulation, order, or decree, whether by the Contractor or its employees or agents, or the Contractor's subcontractors or suppliers.

The Contractor agrees that in the hiring of employees for the performance of work under this Contract or any subcontract hereunder, no Contractor or subcontractor, nor any person acting on behalf of such Contractor or subcontractor, shall, by reason of race, sex,  ~~creed or~~ sexual orientation, gender identity or expression, color, religion, ancestry, national origin, age, disability, family status, or military status discriminate against any citizen of the United States in the employment of labor or workers, who is qualified and available to perform the work to which the employment relates. ~~That no~~ No Contractor, subcontractor, nor any of their employees or agents shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, sex,  ~~creed or~~ sexual orientation, gender identity or expression, color, religion, ancestry, national origin, age, disability, family status, or military status.

### 107.02 Permits, Licenses and Taxes

Page 48

**107.02 Permits, Licenses and Taxes.** The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work.

Prior to the closure of or working in or on any portion of a street the Contractor shall obtain a permit from the Department of Public Service, ~~Division of Planning and~~ Operations.

The Contractor shall include and pay all state and local sales, consumer and use taxes. Materials purchased for incorporation into the work will be exempt from state and local sales tax. A sales tax exemption certificate will be issued by the City at the request of the Contractor.

A. Licensed Water Contractor Requirement. It shall be unlawful for any person to perform any work on City of Columbus water line systems without first securing license

to engage in such work, as indicated in Columbus City Code Section 1103.06. This work includes any attachments, additions, alterations, or rehabilitation of any city service pipe or appurtenances (including water service lines and taps). This requirement may be met by utilization of a subcontractor who holds a City of Columbus Water Contractor License or a Combined Water/Sewer Contractor License to perform this work. Utilization of a subcontractor must meet the licensing requirements of City of Columbus Building Code, in particular Section 4114.119 and 4114.529. The License must be in effect the day of the bid opening and at the time of Work.

B. Licensed Sewer Tapper Requirement. It shall be unlawful for any person to engage in the business of sewer tapping and sewer building, or to open or tap any sewer in any street, alley or any public or private place or rehabilitation of any sewer or appurtenances (including manholes, inlets, and service laterals) in the City of Columbus without first securing license to engage in such business, as indicated in Columbus City Code Section 1131.01. Utilization of subcontractor must meet the licensing requirements of City of Columbus Building Code, in particular Section 4114.119 and 4114.529. The License must be in effect the day of the bid opening and at the time of Work.

#### **107.05 Federal-Aid Provisions**

Page 49

**107.05 ~~Federal~~Governmental-Aid Provisions.** When the United States Government or the State of Ohio Government pays for all or any portion of the Project's cost, the federal or State laws and the rules and regulations made pursuant to such laws must be observed and the Work is subject to the inspection of the appropriate Federal and/or State agency.

Such inspections shall not make the Federal or State Government a party to this Contract and such inspections will in no way interfere with the rights of the Contractor or the City under the Contract.

#### **108.01 Subletting of Contract**

Page 60

**108.01 Subletting of Contract.** ~~The Contractor must obtain the Director's written consent to sublet, sell, transfer, assign, or otherwise relinquish any rights, title, or interest in the Work. Upon the Engineer's request, the Contractor shall also promptly furnish copies of subcontracts and supply agreements.~~ A Contractor must obtain written consent from the director or designee of the Department prior to subletting, selling, transferring, assigning, or otherwise relinquishing any rights, title, or interest in the work to any subcontractor not listed in the bid submittal or contract. The director or designee must, within a reasonable time, approve or disapprove a contractor's request. The decision shall be final. The contractor may seek the aforementioned written consent for reasons including, but not limited to, the following:

1. After reasonable opportunity to do so, the subcontractor fails or refuses to execute a written contract for the scope of work specified in the bid and at the price specified in the bid;



2. The subcontractor becomes insolvent or the subject of an order for relief in bankruptcy;
3. The subcontractor fails or refuses to meet the requisite licensing or bonding set before bid submittal;
4. The contractor demonstrates to the contracting agency that the name of the subcontractor was listed as the result of an inadvertent clerical error;
5. The subcontractor fails or refuses to perform its subcontract after reasonable opportunity to do so; or
6. The contractor determines that additional specialty work not reasonably anticipated in the bid must be performed by subcontract.

Upon request, the contractor and its subcontractors shall promptly furnish copies of all subcontracts and supply agreements.

The Contractor must perform Work amounting to not less than 50 percent of the Contract Sum with its own organization, unless otherwise approved by Director. Any items set forth in the Proposal to be "specialty items" may be performed by subcontract and the cost of any such specialty items so performed by sub-contract may be deducted from the Contract Sum before computing the amount of work required to be performed by the Contractor's own organization. The Contractor's percentage of the Contract Sum includes the cost of materials and manufactured products purchased by Contractor, but not the cost of materials and manufactured products purchased by subcontractors. The Engineer will calculate Contractor's percentage based on the quantities shown in the Proposal and the unit prices of the Contract items to be performed by the Contractor's organization.

All subcontractors must hold a valid contract compliance certification number before the City will approve the subcontractor pursuant to this Section.

## **108.02 Preconstruction Conference**

Page 60-61

**108.02 Preconstruction Conference.** Unless otherwise provided for in the Contract Documents, no Work shall be commenced under this Contract until the Contract is fully executed and a Notice to Proceed has been issued.

The Preconstruction Conference shall not occur until after the Contract is fully executed. In general, fourteen days are required to notify all interested parties of a Preconstruction Conference. The Contractor shall take due note of this requirement and aid in the timely scheduling of the Preconstruction Conference to avoid unnecessary delays in the commencement of the Work.

At or before the Preconstruction Conference, the Contractor shall submit, to the Engineer, the baseline construction schedule prepared according to 108.03. The Contractor shall furnish a list of proposed subcontractors and material suppliers at or before the Preconstruction Conference. If the Contractor fails to provide the required submissions at or before the Preconstruction Conference, the Engineer may order the Preconstruction Conference suspended until they are furnished.

~~Unless otherwise provided for in the Contract Documents, no Work shall be commenced under this Contract until a Preconstruction Conference has been held.~~

~~After the Contract is fully executed, the City will send Preconstruction Conference notices to all parties. In general, fourteen days are required to notify all interested parties of a Preconstruction Conference. The Contractor shall take due note of this requirement and aid in the timely scheduling of the Preconstruction Conference to avoid unnecessary delays in the commencement of the Work.~~

~~At or before the Preconstruction Conference, the Contractor shall submit to the Engineer the baseline construction schedule prepared according to 108.03. Furnish a list of proposed subcontractors and material suppliers at or before the Preconstruction Conference. If the Contractor fails to provide the required submissions at or before the Preconstruction Conference, the Engineer may order the Preconstruction Conference suspended until they are furnished.~~

## 108.03 Prosecution and Progress

Page 63

### 108.03 Prosecution and Progress.

**c. Delay and Analysis of the Construction Schedule.** The Contractor shall not be entitled to and hereby waives any extension of time resulting from any event, circumstance, condition or cause unless a Claim for an extension of time is made in accordance with the requirements of 104.03. In the event the Contractor requests an extension of the Contract Time, it shall furnish such justification and supporting evidence as the Engineer may deem necessary for a determination of whether or not the Contractor is entitled to an extension of time under the provisions of the Contract.

The written claim seeking an extension of time must include the following information:

- i. Nature of the delay.
- ii. Date (or anticipated date) of commencement of delay.
- iii. Identification of person(s) or organization(s) or events affected by delay.
- ~~vi~~iv. Activities on the Construction Schedule affected by the delay, or new activities created by the delay and their relationship with existing activities.
- v. Identification of person(s) or organization(s) or event(s) the Contractor believes responsible for the delay.

- vi. Anticipated extent of the delay.
- vii. Recommended action to avoid or minimize the delay.
- viii. Identification of the pertinent contract provisions and supporting documents or project records.

**108.03 Prosecution and Progress**

Page 71

**108.03 Prosecution and Progress.**

**b. Recovery Schedules.** If the Monthly Update Schedule or Revised Monthly Update Schedule projects a finish date ~~for the Project more than fourteen calendar days later than the current Completion Date~~ beyond the Completion Date, submit a recovery schedule showing a plan to finish by the current Completion Date if requested by the Engineer, at no additional cost to the City. The recovery schedule shall also include a written plan detailing how the Contractor proposes to recover the lost time and meet the Completion Date. Such measures may include, but are not limited to, increasing the size of the workforce; increasing the number of working hours per shift, shifts per work day, work days per week, the amount of equipment or combination thereof; or rescheduling of work activities to achieve maximum concurrence of work efforts, all at no additional cost to the City. The Contractor shall submit the recovery schedule within ten days after the request is made by the Engineer.

**108.07 Failure to Complete on Time**

Page 78 - 79

**108.07 Failure to Complete on Time.** If the Contractor fails to complete the Work by the Final Completion Date, then the Engineer, if satisfied that the Contractor is making reasonable progress, and deems it in the best interest of the City, may allow Contractor to continue in control of the Work. If the Contractor is permitted to continue, Contractor must provide for the Engineer’s approval a written work plan and schedule for completion of the Project and shall diligently prosecute the Work in such a manner as required by the Contractor’s approved work plan.

If the Contractor fails to complete the contract specified Work by the Interim Completion Date, the City will deduct Liquidated damages according to Table 108.07-1. The amount of Liquidated Damage will be based on the Total Amount of the Bid of the Original Contract.

For each Calendar Day that Work remains uncompleted after the Completion Date, the City will deduct the sums specified herein from any money due Contractor, not as a penalty, but as liquidated damages based on the following schedule:

**TABLE 108.07-1 SCHEDULE OF LIQUIDATED DAMAGES**

<b>Original Contract Amount</b>	<b>Amount of Liquidated</b>
---------------------------------	-----------------------------

<b>(Total Amount of the Bid)</b>		<b>Damages to be Deducted for Each Calendar Day of Overrun in Time</b>
<b>From More Than</b>	<b>To and Including</b>	
\$0	\$50,000	\$150.00
\$50,001	\$150,000	\$250.00
\$150,001	\$500,000	\$500.00
\$500,001	\$2,000,000	\$1,000.00
\$2,000,001	\$5,000,000	\$2,000.00
\$5,000,001	\$10,000,000	\$2,500.00
	Over \$10,000,001	\$3,000.00

If the Contract Documents contain a special provision for liquidated damages, it shall be used in lieu of the schedule listed above.

In addition to the amounts specified above, for each Calendar Day after the Final Completion Date the Contractor will be charged for all City inspection and contract administration services. The Contractor acknowledges that these costs are in addition to the liquidated damages set forth above to compensate the City for its inability to use the Work as scheduled for its intended purpose and the Contractor expressly waives any right to assert or plead that such costs are duplicative of the liquidated damages set forth above.

The City will continue to pay the Contractor for Work performed on the Project less any liquidated damages set forth in this Section. The City may deduct the liquidated damages and inspection costs from all estimates due and payable to the Contractor after the Final Completion Date.

### **109.11 Final Inspection and Acceptance**

Page 93-95

#### **109.11 Final Inspection and Acceptance.**

**A. Partial Acceptance.** Upon completion of a portion of the Work, the Contractor may request acceptance of the completed portion of the Work.

1. An inspection may be performed on a completed portion of the project roadway section provided:
  - I. All safety items are in place, including permanent pavement markings.
  - II. Traffic is in its final pattern.
  - III. The completed portion of the project Work constitutes a completed geographic section of the project or a direction of traffic on a divided highway.
  - IV. The request is in accordance with all other contract provisions.

2. An inspection may be performed on a completed bridge provided:
  - I. All work on the bridge and approaches is complete, including all safety items and permanent pavement markings.
  - II. Traffic is in its final pattern.
  - III. The Contractor will not return to the bridge for any further work except as allowed for by item IV.
  - IV. Painting of structural steel is either completed or scheduled to be performed.
  - V. The request is in accordance with all other contract provisions.
  
3. An inspection may be performed on completed portions of the Work otherwise not listed above given:
  - I. The Work completed is of substantial completion as recognized by the Engineer.
  - II. Work is fully functioning as intended in the project.
  - III. If necessary, outside agencies have accepted the Work.
  - IV. The request is in accordance with all other contract provisions.

The Engineer shall grant written partial acceptance for the portion of the Work if accepted. The Engineer will have exclusive rights to reject the Contractor's request for the convenience of administering the contract. The written partial acceptance will identify what portion of the Work is being accepted, the date of acceptance, and the warranty provisions initiated by the partial acceptance.

Partial acceptance shall relieve the Contractor of maintenance responsibility for the accepted portion of the Work. Partial acceptance shall not relieve the Contractor of the responsibility to correct defective Work or repair damage caused by the Contractor, nor shall it waive the right to any other remedy to which the City is entitled by law or in equity.

**AB. Final Inspection.** The Final Inspection shall be a limited visual review of the Work and shall only serve as the City's verification that the Work appears substantially complete. Final Inspection does not waive any available rights or remedies of the City, nor divest the Contractor of any responsibility for compliance with the Contract Documents or liability for damages.

When the Contractor completes all or portions of the Work to be accepted by the City, a request by the Contractor for a Final Inspection shall be made. If the Engineer agrees the Work is complete, then within ten business days the Inspector will inspect the Work and categorize it as one of the following:

1. Unacceptable or not complete.
2. Substantially complete with punch list items found by the Inspector.
3. Substantially complete.

If the Inspector finds the Work substantially complete or substantially complete with punch list items, then the Contractor's maintenance responsibilities end on the day of the Final Inspection, except for any maintenance related to unfinished punch list items. This shall not relieve the Contractor of responsibility to correct defective Work or repair damage caused by the Contractor or waive any other remedy to which the City is entitled under the Contract, applicable law, in

equity, or otherwise. The Inspector will issue a Final Inspection Report that will document the findings of the inspection and start any guarantee and warranty period(s).

**BC. Punch List.** As provided in this Section, the Inspector will issue to the Contractor a written punch list of work required as a condition of acceptance. The Inspector's punch list will stipulate a reasonable time to complete the required work unless the Contractor can demonstrate to the Inspector that completion of the punch list work within the Inspector's time frame is unreasonable.

Notify the Engineer in writing when all of the punch list items are complete.

**CD. Finalization.** The Contractor will receive the Engineer's list of final quantities within forty-five Calendar Days from the date that the Work is determined to be substantially complete by the Inspector. The Contractor shall accept the final quantities as determined by the Engineer or provide a written notice indicating the reason for disagreement within thirty Calendar Days of receiving the Engineer's list of final quantities. The prescribed 30 Calendar Day period can be modified by mutual agreement of the Contractor and the Engineer. If no notice of disagreement is received, then the final estimate shall be based on the Engineer's list of final quantities.

Within sixty Calendar Days from receipt of the Engineer's list of final quantities, the Contractor shall supply Final Project Documents for Project closeout, to include, but not be limited to:

1. Material certificates
2. Payrolls
3. Wage affidavits
4. DBE/MBE/WBE affidavits, if applicable
5. As-built drawings as required
6. Warranties
7. O&M Manuals
8. Lien Waivers
9. Final Force Account Statement(s)
10. Surety Consent for Final Payment
11. Spare Parts List
12. Certificate of Completion
13. Bond Rider (Check with the bond form)
14. Affidavit of Final Payment

Failure to submit these acceptably completed documents will result in an administrative fee of \$100.00 per Calendar Day deducted from the Final Pay Estimate for every day that any of the required documents remain delinquent, starting with thirty Calendar Days after receipt of written notification from the Engineer of a document deficiency.

**DE. Final Acceptance/Project Closeout Process.** After the Final Inspection and the issuance of the Punch List, the Contractor must complete the items on the Punch List in the stipulated time frame. After completing the items on the punch list, the Contractor shall notify the Engineer to confirm that the items have been completed. When the work noted on the Punch List has been confirmed to be complete, the Engineer will issue a Notice of Final Acceptance.

Final Acceptance of the Work does not waive any available rights or remedies of the City under the Contract, applicable law, in equity, or otherwise, and shall not discharge the Contractor from any obligations it has under the Contract, including, but not limited to: unsettled liens and

claims against the City; faulty, defective, or nonconforming work discovered or appearing after Final Acceptance; failure of the Work to comply with the requirements of the Contract Documents; the terms of any warranties or guarantees contained in or required by the Contract Documents; any indemnification rights including damages or costs incurred by the City resulting claims or lawsuits brought against the City based on actions on the part of the Contractor, its subcontractors, sub-subcontractors, suppliers, or any of their employees, representatives or agents; fraud or bad faith committed by the Contractor or any subcontractor or supplier during performance of Work, but discovered by the City after Final Payment; and the City's audit and adjustment rights under the Contract.

**EF. Final Estimate.** Final payment to the Contractor is based on:

1. The agreed final quantities or as determined by the Engineer;
2. Finding of Final Acceptance by the Engineer;
3. Receipt of acceptable Final Project Documents; and
4. Contractor certification that the Work was performed in accordance with the Contract Documents.

As soon as practical after the Final Acceptance of the Work by the City and after approval of the final Change Order, or the final Contract Modification if the final Contract Amount exceeds the amount authorized by City Council, there shall be issued a final estimate for payment based upon the actual quantities of completed and accepted Work performed under the Contract. Compensation will not be made for any Work that was not authorized.

Final Estimates shall be approved by the City, after which the City shall pay the entire sum found to be due, after deducting all previous payments under 109.07. All prior estimates are subject to correction in the Final Estimate.

**FG. Completion of Contract and Continuation of Contractor's Responsibility.** The Engineer will issue a letter confirming completion of the Contract, noting any exception as provided in Items 659 and 661 and any guarantee or warranty.

The Contract is complete, except for items covered by any required bonds, when the Contractor receives final payment.

Neither Substantial Completion, Partial Acceptance, Final Acceptance nor Completion of the Contract relieves the Contractor of any responsibilities to properly perform or correct the Work or to repair damage or waives any remedies to which the City is entitled under the Contract, at law, in equity, or otherwise.

### **109.13 Guarantee**

Page 96

**109.13 Guarantee.** Unless otherwise noted in the Contract Documents, the guarantee period begins upon Final Acceptance of the Work by the City. The guarantee period extends for one year from the date of Final Acceptance.

Under the Contractor's guarantee the Contractor warrants to the City that materials and equipment furnished under the Contract are of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work is free from defects not inherent in the quality required or permitted; that the Work conforms to all these

requirements or the occurrence of any defects or failures in the Work shall be remedied by the Contractor promptly and at no cost to the City.

In addition to the Contractor's guarantee and without in any way diminishing or changing it, the Contract Documents may also specify other express Contractor warranties or subcontractor, manufacturer or supplier warranties that apply during, or after, the Contractor's guarantee period. Notwithstanding the existence of other warranties, the Contractor shall remain as the responsible party to the City under the Contractor's guarantee for purposes of the City exercising its rights under this Section during the one-year guarantee period.

The guarantee provisions do not relieve the Contractor from completing the Work in accordance with the Contract and do not diminish any rights or remedies the City may have under the Contract, applicable law, in equity, or otherwise.

At any time during the guarantee period, the City may notify the Contractor that certain repairs or other actions are necessary. Within ten days after being so notified, the Contractor shall make such repairs or take such other actions as are declared necessary to restore the Work to a good and serviceable condition consistent with the requirements of the Contract Documents. In the event that the Contractor fails to comply with the order to repair or take other actions, such repairs may be made or other actions undertaken by the City and the Contractor agrees that it shall reimburse the City for any such expenses it incurs within ten days following the receipt of a statement rendered to the Contractor by the City for such expenses. Specifications for the Work performed under this Contract shall govern in the making of repairs or taking other action pursuant to this Section.

Upon the expiration of the one-year guarantee period, the Contractor shall take all steps necessary to transfer to the City all remaining rights and obligations that may exist under any other warranties from the Contractor, subcontractors, manufacturers or suppliers and shall continue to assist the City, as needed, to enforce such warranties.

If the cost of providing security to the City of Columbus for the one year guarantee period is prohibitive, the Contractor may, with approval of the Director, make an assignment of bonds or other form of acceptable security to the City in the amount of 5 percent of the contract cost for the duration of the guarantee period.

## **207.02 Materials**

Page 131

**207.02 Materials.** Furnish commercial fertilizer, seed, and mulch materials conforming to Item 659. Furnish stabilized construction entrances, filter fabric ditch checks, rock checks, inlet protection, perimeter filter fabric fence, straw wattles, bale filter dikes, sediment basins and dams, dikes, slope drains, and rock channel protection materials as specified on the standard construction drawings.

## **207.03.B.1 Construction Requirements**

Page 132 - 133

**1. Perimeter Controls.** Use perimeter filter fabric fence to protect the project



from sheet flow runoff from off Right-of-Way and off construction limit locations. Use perimeter filter fabric fence to protect the following project items from sheet flow runoff: water bodies, wetlands, or other significant items shown on the plans.

Use dikes to prevent sediment flow from coming on to the project and to non-vegetated barren areas on the project.

Install perimeter filter fabric fence, stabilized construction entrances, and dikes concurrent with clearing and grubbing operations.

## **207.06 Method of Measurement**

Page 136 - 137

**207.06 Method of Measurement.** The City will measure fertilizer by the number of tons (metric tons) under 659 Commercial Fertilizer.

The City will measure Construction Seeding and Mulching by the number of square yards (square meters).

The City will measure Slope Drains by the number of feet (meters).

The City will measure Sediment Basins and Dams by the number of cubic yards (cubic meters) of excavation and embankment.

The City will measure Perimeter Filter Fabric Fence, Bale Filter Dike and Construction Fence by the number of feet (meters).

The City will measure Filter Fabric Ditch Check by the number of feet (meters).

The City will measure Inlet Protection by the number of inlets protected (each).

The City will measure Dikes by the number of cubic yards (cubic meters) of excavation and embankment.

The City will measure Construction Ditch Protection and Construction Slope Protection by the number of square yards (square meters).

The City will measure Rock Channel Protection, Type C or D (with or without) filter by the number of cubic yards (cubic meters).

The City will measure Sediment Removal by the cubic yards (cubic meters).

The City will measure Stabilized Construction Entrances by the Cubic Yard (Cubic Meter).

## **207.07 Basis of Payment**

Page 137

**207.06 Basis of Payment.** The City will not pay if temporary erosion and sediment control items are required due to the Contractor's negligence, carelessness, or failure

to install permanent controls as a part of the work as scheduled; install such temporary work at no expense to the City.

The City will not pay for stream crossing work specified in 207.03.B.8.b.

If erosion control items in the Contract are properly placed according to the Contract Documents, the City will pay to maintain or replace erosion control items at the unit bid prices or according to 109.05.

The City will pay for sediment removed from dams, basins, inlet protection, ditch checks, rock checks, perimeter filter fabric fence, bale filter dikes, and all other types of filter fabrics, straw or hay bales, or any other temporary sediment control items under 207 Sediment Removal.

The City will pay for accepted quantities at the contract prices as follows:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
207	Square Yard (Square Meter)	Construction Seeding and Mulching
207	Foot (Meter)	Slope Drains
207	Cubic Yard (Cubic Meter)	Sediment Basins and Dams
207	Foot (Meter)	Perimeter Filter Fabric Fence
207	Foot (Meter)	Bale Filter Dike
207	Foot (Meter)	Filter Fabric Ditch Check
207	Each	Inlet Protection
207	Cubic Yard (Cubic Meter)	Dikes
207	Square Yard (Square Meter)	Construction Ditch Protection
207	Square Yard (Square Meter)	Construction Slope Protection
207	Cubic Yard (Cubic Meter)	Rock Channel Protection Type C or D with Filter
207	Cubic Yard (Cubic Meter)	Rock Channel Protection Type C or D without Filter
207	Cubic Yard (Cubic Meter)	Sediment Removal
207	Foot (Meter)	Construction Fence
207	Square Yard (Square Meter)	Geo-textiles
<u>207</u>	<u>Cubic Yard</u> <u>(Cubic Meter)</u>	<u>Stabilized Construction Entrance</u>

**255.08 Opening to Traffic**

**255.08 Opening to Traffic.** Do not open the rigid replacement to traffic until the concrete attains a split tensile strength of ~~250~~ 350 pounds per square inch, as tested per ASTM C496 (1.7 MPa). If maintaining traffic in adjacent lanes, schedule work in order to place the concrete in the prepared repair area within 48 hours after removing the existing pavement. If unable to complete placement of the concrete in the exposed repair area by the end of the daily work shift, cover unfilled repair areas 10 feet (3 m) or less in length with a steel plate. Do not leave repair areas unfilled with concrete when work is suspended on weekends or holidays. If unable to complete placement of the concrete in the exposed repair area before suspending work for a weekend or holiday or within the time specified above, fill the excavation with an asphalt concrete mixture or other suitable temporary patch material with a durable surface as the Engineer directs. Maintain the temporary patches while they are in service.

### **259.03 Classification**

Page 154

**259.03 Classification.** Based upon the Engineer's selection as described in 259.02, furnish one of the following pavement types:

#### **Permanent Pavement Replacement (Standard Drawing No. 1441-~~Dr.~~A)**

Type I - Bituminous  
Type III- Brick  
Type V – Concrete

#### **Driveway Pavement Replacement (Standard Drawing No. 2160-~~Dr.~~A)**

Type IIIA - Asphalt Driveways  
Type IIIB - Concrete Driveways  
Type IIIC - Gravel Driveways

### **306.01 Description**

Page 163

**306.01 Description.** This work consists of constructing a PCC base on a prepared subgrade or base course. This work shall conform to the requirements of Items 305 and 451 except that:

1. For concrete proportioning, meet the requirements of Item 499, Concrete, Class F.
2. Conform to the opening-to-traffic requirements as specified in 451.16 except that the split tensile strength shall be ~~1.7~~ 2.4 MPa), as tested per ASTM C496.

3. Load transfer devices are not required.

### **401.20 Asphalt Binder Price Adjustment**

Page 181

**401.20 Asphalt Binder Price Adjustment.** A Contract Item is eligible for a price adjustment when the Contract's Proposal specifically includes an Asphalt Binder Price

Adjustment note ~~and the Contract Item meets the quantity limitations of the ODOT proposal note for Asphalt Binder Price Adjustments for Single Year or Multi Year, as applicable.~~

#### 407.06 Application of Asphalt Material

Page 199

**407.06 Application of Asphalt Material.** Uniformly apply the asphalt material with a distributor having clean nozzles functioning properly. Obtain the Engineer's approval for dilution with water, if desired to achieve a more uniform application. The City will not pay for diluted tack used without approval. Ensure any diluted asphalt material used for tack has a minimum viscosity of 20 seconds Saybolt Furol (702.04).

For irregular areas such as driveways and intersections, apply the asphalt material using a method the Engineer approves.

If paving asphalt concrete directly onto PCC, Roller Compacted Concrete, or brick pavement, tack the pavement with rubberized asphalt emulsion conforming to 702.13.

#### 423.09 Method of Measurement

Page 224

**423.09 Method of Measurement.** The City will measure Crack Sealing, of the type specified, either by the number of pounds (kilograms), the number of square yards (meters), or the number of linear feet (meters), of hot applied sealant in place, completed, and accepted.

~~The City will measure Crack Sealing, of the type specified, by the number of linear feet (meters) of sealant in place, completed and accepted.~~

#### 423.10 Basis of Payment

Page 224-225

**423.10 Basis of Payment.** The City will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
423	Pound (Kilogram), <sup>2/</sup> <u>Square Yard</u> <u>(Square Meter),</u> <u>or Linear Foot (Meter)</u>	Crack Sealing, Type I
423	Pound (Kilogram), <sub>2</sub> <u>Square Yard</u> <u>(Square Meter),</u> <u>or Linear Foot (Meter)</u>	Crack Sealing with Routing, Type I
423	Pound (Kilogram), <sub>2</sub> <u>Square Yard</u> <u>(Square Meter),</u>	Crack Sealing with Sawing, Type I

423	<u>or Linear Foot (Meter)</u> Pound (Kilogram), <u>Square Yard</u> <u>(Square Meter),</u> <u>or Linear Foot (Meter)</u>	Crack Sealing, Type II
423	Pound (Kilogram), <u>Square Yard</u> <u>(Square Meter),</u> <u>or Linear Foot (Meter)</u>	Crack Sealing, Type III
423	Pound (Kilogram), <u>Square Yard</u> <u>(Square Meter),</u> <u>or Linear Foot (Meter)</u>	Crack Sealing, Type II or III
423	Pound (Kilogram), <u>Square Yard</u> <u>(Square Meter),</u> <u>or Linear Foot (Meter)</u>	Crack Sealing, Type IV

**441.09 Quality Control Tests**

Page 232

**441.09 Quality Control Tests.** Perform quality control tests to control the asphalt concrete mix within the specifications. Ensure that these quality control tests measure the asphalt binder content, gradation, air voids, and Maximum Specific Gravity (MSG) according to the Contractor’s approved QCP. ~~Perform each quality control test a minimum of one time each half of a production day or night (two tests per production day or night), or one each 1400 tons (1300 metric tons), whichever is less. Perform quality control testing according to the following schedule of testing based on material loaded for delivery during each shift:~~

<u>0 to 100 tons</u>	<u>No testing required</u>
<u>101 to 200 tons</u>	<u>One “Basic” test per Item 403.05</u>
<u>201 to 500 tons</u>	<u>Complete set of QC tests per this section</u>
<u>501 to 1000 tons</u>	<u>Complete set of QC tests per this section</u>
<u>1001 to 1500 tons</u>	<u>Complete set of QC tests per this section</u>

All QC testing requirements will be based on delivery ticket load times for material delivered to City of Columbus projects during a shift. No QC testing is required for shift quantities of less than 100 tons unless visual observations indicate a potential issue may exist with the mix. A shift is defined as one twelve-hour period starting at either 6:00 am or 6:00 pm. The basic test and first complete set of tests may be combined to account for the first 500 tons produced and loaded for the shift.

**448.04 Small Quantity Asphalt Concrete Testing and Acceptance**

Page 241

~~**448.04 Small Quantity Asphalt Concrete Testing and Acceptance.** This procedure is intended for the use of the Contractor. However, small quantity acceptance is not permitted for JMF's that have not been verified by acceptable production under normal testing during the current construction season. The use of new JMF's for small quantities must be approved by the Engineer. The total seasonal production per project for each material type shall not exceed 1500 tons.~~

~~The City can sample, test and/or reject any material received under this procedure. Material may be rejected by visual inspection by the project or reject thru City comparison testing. Poor plant or mix control, poor mix performance, poor mix quality, failure to submit the required form as required or ongoing City sample failures can mean disallowing further use of this procedure on the project or future projects. This procedure may be disallowed by the City for any contractor when documented pre-mature small quantity mix failure in any application has occurred on the contractor's previous project(s).~~

~~When material is being produced under this procedure and has a quantity of less than 200 tons a day for each type, the acceptance is by contractor certification as outlined below. No quality control testing is required. A quick check plant calibration must have been performed in accordance with the contractor's QCP as outlined in 403. Computerized plant operation tickets, a copy of the dated and signed quick check calibration(s) and a TE-199-SMQ form must be submitted as outlined below.~~

~~If the daily production does not exceed 500 tons a day for each type, the acceptance shall be by contractor certification as outlined below. The contractor shall perform an asphalt binder content test for every two hours of production. The asphalt binder content shall be determined by a nuclear gauge that has been properly offset for the JMF being used. Computerized plant operation tickets and a TE-199-SMQ form must be submitted as outlined below. Contractor samples shall be held at the lab for three days.~~

~~The required certification (TE-199-SMQ form) and other required information must be submitted by the next working day to the Laboratory unless otherwise notified by the Engineer. The TE-199-SMQ form shall be signed by an employee of the contractor having authority to represent the contractor as outlined in the contractor's QCP. The TE-199-SMQ form shall be sent to the Engineer if requested.~~

## **451.061(2) Depositing and Curing Concrete During Cold Weather**

Page 247

### **451.061(2) Depositing and Curing Concrete During Cold Weather.**

2. Once placed, cover the entire surface of the top and the sides of the newly placed concrete and protect from freezing for seven days, unless split tensile-beam specimens have attained the required minimum strength specified. Accomplish protection as directed in Item 511.12 with insulated blankets or with a combination of loose straw 12 inches (0.3 m) thick covered with a securely fastened exterior cover of waterproof material.

## 451.07 Placing Reinforcement

Page 248

**451.07 Placing Reinforcement.** Place pavement mesh of the size and at the locations within the concrete slab shown on ~~the~~ ODOT standard construction drawings BP-1.1.

## 451.09 Finishing

Page 251

**451.09 Finishing.** Use 10-foot (3 m) straightedges to continually check the finished concrete surface for trueness. If the pavement surface is dragged with a diagonal pipe float machine, occasionally check the surface while the concrete is plastic. Do not add water or finishing agent to aid finishing.

Before the concrete initially sets, round the edges of the pavement along each side of each slab and on each side of transverse expansion joints to the radius specified using an approved edging tool. Before texturing the surface, eliminate tool marks left by the edging tool.

~~Texture the surface in the longitudinal or transverse direction using a broom or artificial turf drag to produce a uniform, gritty, texture.~~

The surface shall be textured by use of a broom or artificial turf drag in the longitudinal direction so as to produce a uniform, gritty, longitudinal texture. In addition to and immediately following the above specified longitudinal drag texture, the pavement shall be textured in the transverse direction by an approved device that will produce a relatively uniform pattern of grooves. The grooves shall be spaced at approximately 5/8 inch (16 mm) centers and shall be approximately 0.15 inches (3.8 mm) deep and 0.10 (2.5 mm) inches wide. Variation from the texturing requirements will be permitted only with the written permission of the Director.

Before the concrete finally sets, impress complete station numbers into the pavement every 100 feet (50 m), e.g., 1+00 (2+050). Mark station equations in the pavement as shown on the plans. Ensure that the numerals are 3 to 4 inches (75 to 100 mm) high and 1/4 inch (6 mm) deep. Place the station numbers parallel with and facing the right edge of the pavement, and centered 12 inches (0.30 m) in from the right edge. On divided highways, provide station numbers on both pavements. When placing concrete shoulders with the traveled lane, place station numbers 12 inches (0.30 m) in from the outside edge of the shoulder and facing the pavement.

## 499.04 Proportioning Options for Portland Cement Concrete

Page 264

**499.04 Proportioning Options for Portland Cement Concrete.** The Contractor may substitute one of the following options for each respective class of concrete given in Table 499.03-2 and Table 499.03-3. Use the same air content specified in Table 499.03-2 and Table 499.03-3. Comply with slump requirements of Table 499.03-1. Submit requests to use any of the following optional mix designs to the Engineer Laboratory for approval before use. The SSD weights specified in Table 499.04-1 through Table 499.04-3 were calculated using the specific gravities in 499.03.C. Make adjustments to the mix

design when specific gravities differ by more than  $\cdot 0.02$ . Make other adjustments allowed in 499.03.D and approved by the Engineer.

## **501.05 Submittal of Working Drawings and Calculations**

Page 275-276

**501.05 Submittal of Working Drawings and Calculations.** Design and perform all procedures as directed by the AASHTO STANDARD SPECIFICATIONS or the AASHTO LRFD BRIDGE except as modified below:

Perform daily inspections to ensure the work governed by the working drawing is functioning as designed. Report malfunctioning work to the Engineer immediately.

**A. Projects with Railroad Involvement.** Prepare and provide working drawings listed in this section as follows:

Have an Ohio Registered Engineer prepare, sign, seal and date each working drawing. Submit working drawings to all involved railway companies at least 50 days before construction begins. Obtain acceptance from all involved railroad companies. Furnish the Engineer copies of all correspondence with the railroad, documentation of railroad acceptance and the working drawings accepted by the railroad. City acceptance is not required.

Perform all work in accordance with the accepted working drawings. Immediately cease all operations that deviate from the accepted working drawings. If a deviation is necessary, furnish the Engineer a copy of a revised working drawing including documentation of acceptance from all involved railroad companies as least 24 hours before construction on deviated work begins. The revised working drawing shall be sealed and dated by an Ohio Registered Engineer. City acceptance of revised working drawings is not required. The City will consider delays resulting from working drawing deviations as non-excusable in accordance with 108.06.E.

This section applies to working drawings for the following:

1. Bracing adjacent to the railroad tracks. Perform work according to 501.05.B.1.
2. Demolition of structures over or within 14 feet of railroad tracks. Perform work according to 501.05.B.2.
3. Erection of structural members over or within 14 feet of railroad tracks. Perform work according to 501.05.B.4.

**B. Projects without Railroad Involvement.** Prepare and provide working drawings listed in this section as follows:

Have an Ohio Registered Engineer prepare, sign, seal and date each working drawing. ~~Have a second Ohio Registered Engineer check, sign, seal and date each working drawing. The preparer and checker shall be two different Engineers.~~



Submit the working drawing to the Engineer at least 7 days before construction begins. City acceptance is not required.

Perform all work in accordance with the prepared working drawings. Immediately cease all operations that deviate from the prepared working drawings. If a deviation is necessary, furnish the Engineer a copy of a revised working drawing at least 24 hours before construction on the deviated work begins. The revised working drawing shall be signed, sealed and dated by an Ohio Registered Engineer ~~and checked, signed and sealed and dated by a Second Ohio Registered Engineer~~. City acceptance of revised working drawings is ~~not~~ required. The City will consider delays resulting from working drawings deviations as non-excusable in accordance with 108.06.E.

This section applies to working drawings for the following:

1. Excavation Bracing, adjacent to active traffic, except when a complete design is already shown in the plans. Perform all work as specified below:
  - a. Locate Excavation Bracing per contract, if shown.
  - b. Maintain temporary horizontal and vertical clearances per contract.
  - c. Include the effects of AASHTO live and dead load surcharges as necessary.
  - d. Design Excavation Bracing in accordance with the latest AASHTO Guide Design Specifications for Bridge Temporary Works, Section 4
  
2. Demolition of ~~structures over or adjacent to active traffic~~ the entire or portions of the following: Bridges, Culverts with 8 feet or more of fill, Walls with 8 feet or more of fill retained. Perform all work as specified below:
  - a. Provide temporary devices or structures necessary to protect traffic during all demolition activities. Provide traffic protection when demolition is located less than 12' horizontally from active traffic on structures of less than 25' vertical clearance. Increase the 12' minimum horizontal distance 1 foot for each 2 feet of additional height greater than 25'.

## **511.17 Curing and Loading**

Page 312

### **511.17-1 (Table).**

TABLE 511.17-1			
	Span <sup>[1]</sup>	Age of Concrete in Days	
		No <del>Beam</del> Split Tensile Test	Beam Split Tensile Test <sup>[2]</sup>
Removing Falsework	Over 10 feet (3 m)	14	5
	10 feet (3 m) or less and all pier caps	7	3
Traffic <sup>[3]</sup>	Any	14	7

[1] Span is defined as the horizontal distance between faces of the supporting elements when measured parallel to the primary reinforcement.

[2] Applicable only when the average ~~Split Tensile psi modulus of rupture~~ for two tests is not less than ~~400 650~~ psi (~~2.76 4.5~~ MPa).

[3] When placing Class HP concrete for a superstructure between October 15 and March 15, open the deck to traffic no sooner than 30 days after placement.

**514.13 Surface Preparation**

Page 364

**514.13 Surface Preparation.**

**2. Non-Hazardous Solid Waste.** For all waste that is determined to be a Non-Hazardous Solid Waste ~~by the DRWE~~, the Contractor is required to:

**603.02 Materials**

Page 420

**603.02 Materials.** Furnish materials conforming to:

- Soil and granular embankment ..... 203.02.R
- Structural backfill, Types 1 and 2 ..... 703.11

~~The Engineer will allow Type 3 structural backfill, conforming to 703.11, to be used as bedding below the pipe only when pumping operations do not control severe ground water problems. Place at least 12 inches (300 mm) of Type 1 structural backfill on top of the Type 3 structural backfill to prevent piping.~~

- Embankment ..... 203.02.R

**603.11 (D) Placement and Compaction Requirements.**

Page 431

~~(D) — Place Structural Backfill Type 3 in layers not to exceed 12 inches (300 mm) loose depth. Vibrate, tamp, or compact to approximately 85 percent of the original layer thickness.~~

**604.03 Construction Methods, General.**

Page 435

**604.03 Construction Methods, General.**

**B. Adjustment to Grade.**

1. Carefully remove and clean the existing frame, adjust the height of supporting walls, and reset the existing frame in a bed of concrete mortar or structure concrete to the new grade.
2. Carefully remove the existing cover or grate and install a casting or an adjusting device approved by the Engineer to the new grade and install per the manufacturer's recommendations.
3. Secure extension ring in place by applying mastic, conforming to 706.10, to the entire contact surface between the casting and extension.

#### **604.06 Precast Concrete Modular Construction.**

Page 436

**604.06 Precast Concrete Modular Construction.** Furnish precast bases on a compacted structural backfill bed having a minimum thickness of 3 inches (75 mm). Ensure that the structural backfill bed is level and uniformly support the entire area of the base.

Catch basins and inlets manufactured with knock-out panels will only be permitted where the construction drawings show a pipe entering the structure that will replace the panel.

~~After placing the pipe, grout all openings between the pipe and structure less than 4 inches (100 mm) with mortar and grout all openings between the pipe and structure greater than 4 inches (100 mm) with nonshrink mortar. Seal all joints between modules with materials specified in Item 603 for Type A, B, C, D, or F conduit.~~

All joints between modules shall be as follows:

Sanitary manholes shall conform to the requirements of ASTM C443 as it pertains to the use of a confined gasket.

Storm sewer applications shall be in conformance with ASTM C443, 706.10 or 706.11.

Pipe entrances to the precast modular sections for sanitary sewers 8 inches (203 mm) to 48 inches (1.2 m) in diameter shall be a flexible watertight joint in accordance with 706.16.

Pipe entrances to the precast modular sections for storm sewers shall be in accordance with 706.16, or neatly grouted in place.

All lift holes and other openings in the structure shall be thoroughly and neatly grouted with cement mortar or other suitable material approved by the Engineer, after all pipes are placed into the structure.

All sanitary manholes shall be watertight structures.

Cure median inlets with the same materials and methods specified in 622.07.

**609.02 Materials**

Page 449

**609.02 Materials.** Furnish materials conforming to:

Concrete, Class C..... 499  
Expansion joint material ..... 705.03  
Aggregate base..... 304, 703.04  
Preformed filler..... 705.03  
Tie bar steel, epoxy coated  
..... 709.00, 709.01, 709.03, 709.05  
Coated dowel bars..... 709.13

For 609.03 Stone Curb furnish the best quality of Berea or Amherst gray sandstone, or sandstone of equal quality.

Furnish asphalt concrete curb conforming to a 448 intermediate course, designed for medium traffic, using a PG 64-22. Set the fine aggregate content at the maximum allowed under 448 intermediate. Provided the Contractor meets the composition requirements, the Contractor may add mineral filler conforming to 703.07. Add the mineral filler using a method approved by the Laboratory. Provide asphalt concrete meeting the mix composition requirements of Item 448, with the fine aggregate content set at the maximum permitted under the applicable composition tables. Use the same type of mix as specified for the surface course on the project. Furnish Granite Curb with straight face per ~~Supplemental Specification 1552~~ the standard drawing to match existing granite curbs, produced in random lengths of not less than 36 inches (900mm) from granite complying with ASTM C615. Ensure the curb face is sawed and flamed, with a sawed and flamed top. Include all labor, materials, equipment and incidentals necessary for construction in the unit cost of Item 609 Granite Curb.

**630.02 Materials**

Page 513-514

**630.02 Materials.** The acceptance of materials and products is based on Certified Test Data, furnished in triplicate, or on test results of samples according to 106.02, as required by the Engineer.

Transfer manufacturers' guarantees or warranties on all traffic sign material to the City or other maintaining agency upon completion and acceptance of the project.

Furnish materials conforming to:

Concrete, Class C ..... 499, 511  
Steel:  
Structural steel..... 711.01  
Reinforcing steel ..... 509.02  
U-channel posts..... 730.015  
Square posts ..... 730.016  
~~Wooden Box Beam ..... 730.017~~

Street name sign supports.....730.017

Tube and pipe.....	730.01
Anchor bolts and nuts .....	730.02
Poles and arms .....	730.03
Base and arm plates.....	730.04
Handhole covers.....	730.05
Pole caps .....	730.06
Arm caps .....	730.07
Hardware .....	730.08
Stainless steel .....	730.09
Stainless steel hardware .....	730.10
Messenger wire .....	732.18
Aluminum:	
Sheet and plate .....	730.11
Extrusions.....	730.12
Tube and pipe.....	730.13
Castings.....	730.14
Forgings .....	730.15
Welding rods .....	730.16
Hardware .....	730.17
Other materials:	
Decals .....	725.21
Reflective sheeting, Type F.....	730.18
Reflective sheeting, Type G.....	730.19
Reflective sheeting, Type H....	730.192
Reflective sheeting, Type J .....	730.193
Nonreflective sheeting .....	730.20
Silk screen inks .....	730.22
Transparent electronic cuttable films	730.23
<u>Cantilevered offset brackets.....</u>	<u>730.24</u>

## 630.04 Sign Fabrication

Page 514-516

**630.04 Sign Fabrication.** Sign types include flat sheet, double faced, extrusheet, and temporary overlay. Flat sheet signs consist of one-piece units made of aluminum. Double faced signs consist of flat sheet aluminum or extruded aluminum blanks with legend on both sides. Extrusheet signs consist of a number of horizontal panels assembled to form a complete sign. Temporary overlay signs consist of an aluminum sheet covering portions or entire surfaces of extrusheet signs.

Prior to reflective sheeting application, clean aluminum sign surfaces either by total immersion in a tank containing an alkaline solution of the manufacturer's specification or by steam cleaning with an alkaline solution of the manufacturer's specification, followed by a thorough rinsing with running water. After cleaning, etch the surface with an acid solution, and dry. Do not allow cleaned and etched surfaces to become contaminated by contact with oil or grease. Drill or punch bolt holes to finish size.

Use sign legends according to the (a) City Sign Design Manual, (b) OMUTCD and (c) the ODOT Sign Design Manual. In case of a conflicting specification statement, the specification document hierarchy shall be in the order listed from (a), highest, to (c) lowest. Use Clearview font for positive contrast legends on freeway and expressway guide signs and on all other guide signs when permitted in the ODOT Sign Design Manual and City Sign Design Manual, respectively. Use capital legends and upper/lower case legends in accordance with the City Sign Design Manual. When either is permitted in the City Sign Design Manual, use upper/lower case legends.

For flat sheet, double faced mile marker, double faced street name and ground mounted extrusheet signs, use Type G, H or J reflective sheeting for background and reflective legends. For overhead extrusheet signs, use Type H reflective sheeting for the background, and use Type H reflective sheeting for reflective legends, shields and symbols (including hazardous cargo plate, airport symbol, arrows and borders). Apply reflective sheeting to the surface according to the manufacturer's recommendations, with no blisters, wrinkles, tears, or blemishes. Do not use reboundable or damage control sheeting for permanent signs.

For reflective legends on flat sheet, double faced street name signs and double faced mile marker signs, use reverse silk screen transparent ink or electronic cuttable film. For nonreflective legends, use direct silk screen black ink or direct applied nonreflective black sheeting copy. For double faced mile marker signs, use flat sheet aluminum and apply reflective sheeting and legend to both sides.

Street Name Sign faces shall be bonded to 0.063 inch (1.6 mm) thick sign blanks according to the sheeting manufacturers' recommendation. There shall be 2 sign faces on each sign blank, 1 on each side, unless otherwise noted. Street name legends shall be printed in heights of 4" on 9" blade, 6" on 12" blade, and 8" on 18" blades (102, 152 and 203 mm) upper and lower case. Standard FHWA Series D 2000 EX lettering shall be used on all signs 9" and 18" blades and FHWA Series C 2000 EX lettering for all 12" sign blades. Prefixes and suffixes shall be printed in heights of 2, 3, and 4 inch (50, 76, and 102 mm) upper and lower case. All letters shall be centered on the vertical dimension and the legend will be centered on the various sign blades horizontally. Street name letter heights will be as follows: 4 inch (102 mm) legend with 2 inch (50 mm) prefix and suffix on a 9 inch (228mm) blade, 6 inch (152 mm) legend and 3 inch (76 mm) prefix and suffix on a 12 inch (305 mm) blade, and an 8 inch (203 mm) legend and 4 inch (102 mm) prefix and suffix on an 18 inch (457 mm) blade. The minimum distance between the edge of the sign and the first or last letter of the street name, prefix, or suffix shall be 4 inch (102 mm). See City of Columbus Standard Drawing(s) for fabrication of street name signs.

Extrusheet panels consist of flat sheet aluminum reinforced with aluminum extrusions attached by spot welding. The Contractor may use panels extruded in a single operation in lieu of extrusheet panels. Do not use extruded panels and extrusheet panels in the same sign. Bolt together the minimum number of full length, sheeted panels to achieve the sign height, using aluminum bolts, washers, lock washers and nuts. For reflective legends, shields and symbols (including hazardous cargo plate, airport symbol, arrows and borders) use direct applied reflective sheeting. Apply all reflective legend on a sign

with the same rotation angle orientation. For nonreflective legends, use direct applied nonreflective black sheeting copy.

For temporary overlay signs, use 0.063-inch thick flat sheet aluminum, with a maximum panel size of 8 × 4 feet. Apply sheeting and legend as described above for extrusheet signs. Attach temporary overlays to extrusheet signs in the shop or field using aluminum blind rivets at a maximum spacing of 18 inches on the peripheries of the temporary overlays and 24 inches within the interior. Position rivots so as not to disturb the legend on the underlying sign.

Use fluorescent yellow green reflective sheeting for the following signs: SCHOOL (S4-3), School Crossing (S1-1), yellow portions of school speed limit (S5-H3, S5-H4, S5- H5), SCHOOL ENTRANCE (S3-H3), SCHOOL BUS STOP AHEAD (S3-1), SCHOOL BUS TURN AHEAD (S3-H2), Bicycle Crossing (W11-1), Pedestrian Crossing (W11-2), Handicap Crossing (W11-9), SAFETY ZONE (W11-H15), and Playground (W15-1). Fabricate supplemental signs [such as SHARE THE ROAD (W16-1), Advisory Speed Plate (W13-1), Distance Plates (W16-2, W16-2a, W16-3, W16-3a), Supplemental Arrows (W16- 5p, W16-6p, W16-7p and AHEAD Plate (W16-9p)] from fluorescent yellow green sheeting when used with a sign above.

Use fluorescent yellow reflective sheeting for all yellow signs, yellow portions of multi-colored signs, and yellow sign post reflectors, except for signs and portions of signs required to be fabricated with fluorescent yellow green reflective sheeting.

For lighted signs, cover glare shield and rectangular luminaire support tube with nonreflective sheeting matching the predominant sign color.

Place identification decals of Type G silver white reflective sheeting with silk screened black numerals on signs in accordance with Figure 1. These sign identification decals shall be 6 inches by 3 inches in size and positioned so they can be read horizontally and are clearly visible, not near bolt holes or rivets. Place the decals on the back side of the sign in the lower right-hand corner of rectangular signs, or in an equivalent location of other sign shapes, approximately 3 inches from side and bottom sign edges (for smaller signs, these dimensions may be less).

The Engineer will reject signs delivered at the site without a properly applied decal. At the time of sign installation, indicate the installation data by scratching out the appropriate month and year. Do not allow the sign installation contractor to erect any such signs, or overlays, that do not have a properly completed and affixed sign decal.

## **630.06 Sign Supports**

Page 517-518

**630.06 Sign Supports.** Sign supports consist of ground mounted, rigid overhead, span wire, and overpass structure mounted types. Fabricate sign supports according to the applicable requirements of Item 513, and weld according to 513.21. The approval of fabricators according to 501.03 will not apply. Hot-dip galvanize steel structural members according to 711.02. Galvanize steel hardware according to 730.08.

Tighten threaded fasteners, except anchor bolt nuts, by the “turn of the nut” method according to 513.20.

Furnish anchor bolts with a leveling nut, plain washers, lock washer, and anchor nut conforming to 730.02. Use anchor nuts with a plain washer against the base plate upper surface and a lock washer between the plain washer and anchor nut.

Tighten anchor bolt nuts according to 513.20, except that under Table 513.20-3, use the “nut rotation from snug tight condition” from 1/12 to 1/6 turn instead of 1/3 turn.

Apply anaerobic adhesive complying with Federal Standard MIL S 46163, Type II, Grade N to anchor bolts and other threaded connections 1/2-inch (13 mm) diameter or larger, according to the manufacturer’s recommendations. Do not use anaerobic adhesive with torque-limiting nuts.

Submit alternate designs or materials for sign supports for acceptance at least 21 days in advance of a bid opening date. The Director will give notification of the acceptance or rejection of the alternate design to the bidder at least 7 days in advance of a bid opening date.

**A. Ground Mounted Supports.** Ground mounted supports consist of structural sections of the material and weights required. Drive the ground mounted supports into the earth or embed them in concrete, as specified. Install supports in exposed locations in accordance with the performance requirements of NCHRP 350. The support lengths shown on the plans are approximate. Determine the exact length of supports before fabrication.

**1. Post Supports.** Mark each driven post with a line of paint 6 inches above the specified driving depth. Drive posts to the specified depth without bending, distortion, or end mutilation. Do not splice posts. Do not place posts in drainage ditches. If unable to install the post at the specified location, relocate the post with the Engineer’s approval at no cost to the City.

Install posts located in paved areas through a hole provided by sleeving or core drilling. After the post is in position, patch the hole with a non-shrink grout; except when the hole is in asphalt, patch with bituminous material.

For groupings of flat sheet signs in multiple arrangements mounted on posts, provide sign backing assemblies.

For temporary sign supports and their placement, conform to the OMUTCD.

**2. Structural Beam Supports.** Furnish ground mounted structural beam supports from rolled steel sections. The alternate design shown on ODOT Standard Drawing TC-41.10 is not acceptable in the City of Columbus. Furnish slip base connections when specified. Bolt the pieces of each beam together, and preload the assembly bolts before delivery to the project. Carefully handle assembled breakaway beams during transportation and erection. Upon erection, perform the final specified torquing on all threaded fasteners.

At least 4 weeks after erecting signs on breakaway beams, inspect the breakaway feature for evidence of shifting or loose fasteners. Re-torque all loose fasteners to specified values. Loosen and re-torque slip base plate fasteners even if no shifting or looseness is detected. However, if the base plate connection was made with torque limiting nuts, re-torque only if looseness is detected. Apply anaerobic adhesive to the



re-torqued conventional nuts, or, as an alternate, use new torque limiting nuts with the proper range.

**3. Pipe Supports.** Furnish ground mounted pipe supports from structural steel pipe and tubing. Furnish bolt down anchor installations in existing concrete. Furnish triangular slip base connection when specified.

~~**4. Wooden Box Beam Supports.** Furnish wooden box beam supports from laminated veneers pressure treated with wood preservative. Install breakaway feature after installation when specified.~~

**4. Street Name Sign Supports.** Supports for double-faced street name signs shall be either 2.5 inch (63.5 mm) nominal post size (NPS) (2.875 O.D. x 0.203 inch wall) (73 mm O.D. x 5 mm) x 14 foot (4.3 m) long post, or 4 inch (102 mm) NPS (4.0 O.D. x 0.226 inch wall) (102 mm x 5.7 mm) x 21 foot (6.4 m) long post fabricated from new, hot dipped galvanized steel pipe in accordance with Section 711.02. All supports shall be embedded in concrete in accordance with 499 Class C, according to 511. The 2.5" (63.5mm) NPS supports shall be concreted in a hole with a minimum depth of 3 feet (0.91 m), and a diameter of 10 inches (254 mm). The post shall have a minimum of 11 feet (3.3 m) above ground level. 4.0 inches (102 mm) NPS supports shall be concreted in a hole with a minimum depth of 4 feet (1.2 m), and a diameter of 10 inches (254 mm). The post shall have a minimum of 14 feet (5.2 m) above ground level. All spoils from installation shall be removed from the worksite. The maximum allowable sign area for a 2 sign installation is 10 square feet (0.95 square meters). If the total street name sign area is greater than 10 square feet (0.9 m<sup>2</sup>), 1 sign support per sign shall be used. For street name sign support installation and locations see City of Columbus Standard Drawing(s).

## 630.14 Method of Measurement

Page 521-523

**630.14 Method of Measurement.** The City will measure Ground Mounted Post Support by the number of feet, and will include driving, hardware for anchor base installation, and furnishing and placing of patching materials for excavations in paved areas.

The City will measure Foundations for ground mounted pipe supports, ground mounted structural beam supports, rigid overhead sign supports and span wire sign supports by the number of each for one pipe, structural beam, pole, end frame or strain pole, and will include excavation, reinforcing steel, concrete, backfilling, and when required the 10 foot foundation section of concrete barrier, and the disposal of surplus excavation.

The City will measure Ground Mounted Structural Beam Support by the number of feet measured from the bottom of the foundation to the top of the sign, and will include furnishing and placing of patching materials for excavations in paved areas.

The City will measure Ground Mounted Pipe Support by the number of feet measured from the bottom of the foundation to the top of the sign and will include u-bracket,

tubing, posts and hardware for sign attachment, bolt-down anchor and furnishing and placing of patching materials for excavations in paved areas.

~~The City will measure Ground Mounted Wooden Box Beam Support by the number of feet, and will include excavation, backfilling, disposal of surplus material, and installation of breakaway feature.~~

The City will measure Street Name Sign Support as the size and number of pipe supports, including excavation and concrete embedment.

The City will measure Street Name Sign as square footage (square meters) of sign blank, including brackets assemblies, mounting fittings and hardware.

The City will measure One Way Support ~~and Street Name Sign Support~~ by the number of feet, and will include driving and furnishing and placing of patching materials for excavations in paved areas.

### 630.15 Basis of Payment

Page 523-524

**630.15 Basis of Payment.** The City will not pay for relocating posts from their planned location without prior approval by the Engineer.

The City will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
630	Each	Ground Mounted Structural Beam Support Foundation
630	Each	Ground Mounted Pipe Support Foundation
630	Each	Rigid Overhead Sign Support Foundation
630	Each	Span Wire Sign Support Foundation
630	Foot	Ground Mounted Support, ___ Post
630	Foot	Ground Mounted Structural Beam Support, ___ Beam
630	Foot	Ground Mounted Support, Pipe
630	Foot	Ground Mounted Wooden Box Beam Support, _____ Beam
630	Foot	One-Way Support, ___ Post
<del>630</del>	<del>Foot</del>	<del>Street Name Sign Support, _____ Post</del>
<u>630</u>	<u>Each</u>	<u>2.5 inch (63.5mm) Street Name Sign Support</u>
<u>630</u>	<u>Each</u>	<u>4.0 inch (102mm) Street Name Sign Support</u>
<u>630</u>	<u>Square Foot</u>	<u>Street Name Sign</u>
630	Foot	Temporary Sign Support, ___ Post
	or Each	
630	Each	Breakaway Structural Beam Connection
630	Each	Triangular Slip Base Connection
630	Each	Overhead Sign Support, Type TC-____, Design____
630	Each	Combination Overhead Sign Support, Type TC-____, Design____

630	Each	Sign Attachment Assembly
630	Each	Luminaire Support Assembly
630	Each	Span Wire Sign Support, Type TC-17.10, Design ____
630	Each	Overpass Structure Mounted Sign Support, Type TC-____, Design____
630	Each	Sign Hanger Assembly, (Span Wire, Mast Arm)
630	Each	Sign Support Assembly, (Pole or Bridge Mounted)
630	Square Foot	Sign, (Flat Sheet, Ground Mounted Extrusheet, Overhead Extrusheet, Temporary Overlay)
630	Each	Sign, Double-Faced, (Mile Marker)
630	Square Foot	Sign Erected, (Flat Sheet, Extrusheet, Temporary Overlay)
630	Each	Sign Backing Assembly
630	Each	Sign Post Reflector
630	Square Foot	Covering of Sign
630	Each	Removal of Ground Mounted(Major) Sign and (Storage, Reerection, or Disposal)
630	Each	Removal of Ground Mounted(Structural Beam, Post, Pipe, Wooden Box Beam) Support and (Storage or Disposal)
630	Each	Removal of Overhead Mounted Sign and (Storage, Reerection, or Disposal)
630	Each	Removal of Overhead Sign Support and (Storage, Reerection, or Disposal), Type TC-____
630	Each	Removal of Overlay Sign

## 632.02 Contractor Personnel Requirements

Page 530

**632.02 Contractor Personnel Requirements.** ~~Conform to the requirements of City Supplement 1063 for the installation or testing of traffic signal equipment. Assign a full time employee of the Contractor to act as the project supervisor. Do not change the project supervisor without giving the Engineer written notice. Provide International Municipal Signal Association (IMSA)-certified documentation for Contractor employees if requested by the City.~~

~~An IMSA level two-certified technician shall perform all of the following controller work:~~

- ~~1. Back panel wiring terminations~~
- ~~2. Programming~~
- ~~3. Testing or turn on~~

#### 4. Troubleshooting

~~Assign a foreman to each crew performing work for the project. A foreman shall be present at all times when work is performed by the crew. Each foreman shall be an IMSA level one certified technician. Provide prior verbal notice to the Engineer in order to replace a crew foreman.~~

~~In addition, any trade person performing the following work shall be an IMSA level one certified technician:~~

- ~~1. Cable splices~~
- ~~2. Signal head installation~~
- ~~3. Cable and wire installation~~
- ~~4. Power service installation~~
- ~~5. Ground rod testing~~
- ~~6. Cable insulation testing~~
- ~~7. Field wiring terminations~~

### 632.14 Foundations

Page 537 - 538

**632.14 Foundations.** Locate support foundations, and stake with the proper elevation. If underground or overhead obstacles are encountered during stakeout, or to correct slope and subsurface difficulties, change foundation location and orientation with the approval of the Engineer. Ensure that the approved location provides a safe clearance from overhead power lines for construction operations, in compliance with the National Electrical Safety Code. The Contractor is responsible for the correct location, elevation, and orientation for all poles and pedestals installed on the foundations.

Orient one side of the anchor base pole foundation cap parallel to the sidewalk, back of-curb or edge-of-pavement, edge of the curb ramp, as shown on the signal plans. Make the top of the foundation flush with any adjacent sidewalk or concrete area, except where the ground rises steeply behind the sidewalk or concrete area. In this case, match the back side of the foundation to the ground slope and set the street side of the foundation above the sidewalk or concrete area and completely out of the sidewalk or concrete area. Edge the pole foundation top using a 1/2-inch sidewalk edger and do not chamfer.

Install anchor bolts in the angular position shown in the plans. Install a minimum of two 2-inch conduit ells, used or unused, in each pole foundation.

Excavate for foundations using an earth auger to specified dimensions according to 503.04. Exercise caution when excavating in areas of underground installations to avoid their disturbance or damage. When a cave-in occurs or at the direction of the Engineer, excavate using casing, sleeving, or other methods, with the Engineer's approval according to 732.10. If subsurface obstructions are encountered, remove the obstructions, or replace the excavated material and relocate the foundation, with the Engineer's approval. If bedrock is encountered, the Contractor may reduce that portion of

the specified foundation depth within the bedrock up to 50 percent. Perform all necessary dewatering of the excavation.

Perform foundation concrete work according to Item 511, except that the loading restrictions in 511.17 are modified by this subsection. Place the concrete against undisturbed soil or compacted embankment. Form the top of the foundations to a nominal depth of 6 inches below the groundline. Place the concrete foundation, including formed top, in one continuous concrete pour.

For foundations for anchor base type supports, provide the required reinforcing rods, and have anchor bolts and conduit ells accurately held by a template.

Remove forms and templates once the concrete has hardened sufficiently so as not to be susceptible to damage. After 14 days, erect and load supports on anchor base foundations. The Contractor may erect and load supports after 7 days if the tests of two ~~split tensile beam~~ specimens of concrete yield an average ~~modulus of rupture~~ of not less than ~~400~~ 650 pounds per square inch.

### **632.23 Cable and Wire**

Page 540

**Replace unreadable table 632.23-1 with the following:**

**TABLE 632.23-1 FIELD WIRING HOOKUP**

PED UNIT FIELD WIRING HOOKUP

PED UNIT LOCATION	CROSSWALK DISPLAY	WIRE COLOR
SOUTH CROSSWALK	WALK	BLACK
	DONT WALK	ORANGE
WEST CROSSWALK	WALK	GREEN
	DONT WALK	RED
NORTH CROSSWALK	WALK	BLUE
	DONT WALK	WHITE W/BLACK TRACER
EAST CROSSWALK	WALK	GREEN W/BLACK TRACER
	DONT WALK	RED W/BLACK TRACER

SIGNAL HEAD & CABINET FIELD WIRING HOOKUP

SIGNAL DISPLAY	WIRE COLOR PER APPROACH
THRU R	RED
THRU Y	ORANGE
THRU G	GREEN
L/T R	BLACK (FUTURE USE ONLY)
L/T ↗	WHITE W/BLACK TRACER
L/T ↖	BLUE
R/T R	NOT USED BY CITY
R/T ↗	RED W/BLACK TRACER
R/T ↖	GREEN W/BLACK TRACER

WHITE SHALL BE USED FOR THE COMMON. SPLICE ALL WIRES IN THE SIGNAL HEAD OR PED UNIT. USE A #14 AWG 2 WIRE SPADE TERMINAL FOR EVERY 2 WIRES PER CONNECTION AND A #14 AWG 1 WIRE SPADE TERMINAL FOR EACH SINGLE WIRE CONNECTION TO CONNECT ALL WIRES TO ALL FIELD TERMINALS. USE BUTT SPLICES ON ALL THROUGH WIRES. ALL UNUSED WIRES SHALL BE SPLICED THROUGH AND SHALL HAVE A DEAD-END TERMINAL AT THE END OF THE WIRE.

**632.28 (H) Cabinet Assembly Testing By the City of Columbus**

Page 544

**H. Cabinet Assembly Testing.** ~~By the City of Columbus. Perform all cabinet assembly and signal testing and installation following the requirements of Supplemental Specification 1611. The Division of Planning and Operations Electronic Systems Shop will bench test the intersection controller and its complete cabinet assembly prior to the equipment being installed in the field. Testing will not begin unless complete and correct cabinet assembly wiring schematics, loop detector units, and if specified, the intersection tranceiver unit are submitted with the cabinet. The test procedures will consist of operating the equipment for a minimum of forty eight (48) hours. Deliver the controller and complete cabinet assembly for testing to the Division of Planning and Operations Traffic Maintenance Shop at 1820 East 17<sup>th</sup> Avenue, Columbus, Ohio 43219. Load and unload all equipment and obtain a receipt from shop personnel that lists all delivered materials by manufacturer, model number, and serial number. The Division will complete testing on the controller and cabinet assembly within ten (10) City working days. Upon completion of the testing the Division will notify the Contractor that the equipment can~~

~~be picked up. Replace, repair or correct as necessary all devices found to be unsatisfactory and resubmit for testing. The Division will schedule testing of this returned equipment as quickly as possible but will only provide a forty five (45) day guarantee for the turn around time period. The Contractor shall be solely responsible for any delay caused by this testing. Do not install control equipment, which has not passed testing or which has not been tested by the Division, in the field to control traffic. The Contractor may have a representative in attendance during the testing process. There are no costs associated with the testing. Any cost associated with the delivery and pick up shall be incidental to the cost of the equipment. Contact the Division of Planning and Operations Electronic Systems Coordinator for equipment status.~~

### **661.21 Basis of Payment**

Page 606-607

~~**661.21 Basis of Payment.** The City will pay 50 percent of the bid price when delivered to the project site and the remaining 50 percent of the bid price when planted.~~

~~At the end of the establishment period, the City will make the final inspection and determine the actual number of living plants. The City will pay an additional 20 percent of the bid price for all plants living at the end of the establishment period. The City will not pay the additional 20 percent payment for plantings that did not survive the establishment period. Replace all plants not surviving the establishment period at no additional cost to the City. The City will extend the establishment period for all replacement plantings with no additional payment.~~

~~The City will pay 40 percent of the bid price for plant materials delivered and accepted at the project site. The City will pay 40 percent of the bid price when the plant materials have been installed. The City will pay the remaining 20 percent of the bid price at the end of the establishment period following final acceptance. Replace all plants not surviving the establishment period at no additional cost to the City.~~

### **703.01 General.**

Page 624

#### **703.01 General**

The following abbreviations apply:

CCS	Crushed Carbonate Stone.
ACBFS	Air Cooled Blast Furnace Slag
GS	Granulated Slag
RACP	Reclaimed Asphalt Concrete Pavement
RPCC	Recycled Portland Cement Concrete
OH	Open Hearth Slag
EAF	Electric Arc Furnace Slag
BOF	Basic Oxygen Furnace Slag
PCS	Petroleum Contaminated Soil

**Pre-qualified Aggregate Supplier Program (City Supplement 1069). Provide**

aggregate materials to the City of Columbus from pre-qualified suppliers.

**A. Soundness.** When the major portion of the unsound material in a coarse aggregate acquires a mud-like condition when tested for soundness, ensure a maximum loss of 5 percent for all uses.

### **703.08 Aggregate for Pipe Bedding and Initial Backfill (New Section)**

Page 632

#### **703.08 Aggregate for Pipe Bedding and Initial Backfill.**

1. Provide No. 57 coarse aggregate, as specified in 703.01, consisting of washed gravel, or CCS.

Do not use RPCC for any bedding or initial backfill materials.

Do not use reclaimed asphalt concrete for any bedding or initial backfill materials.

### **703.11 Structural Backfill for 603 Bedding and Backfill.**

Page 632 - 633

**703.11 Structural Backfill ~~for 603 Bedding and Backfill.~~** Furnish structural backfill ~~for 603 bedding and backfill~~ consisting of CCS, gravel, natural sand, sand manufactured from stone, ~~or~~ foundry sand, or RPCC (Type I only).

Do not use RPCC for any bedding or initial backfill materials.

Do not use RPCC as backfill material for any metallic pipe.

Do not use reclaimed asphalt concrete for any bedding or backfill materials.

Use foundry sand if the material meets these requirements and meets the requirements of the Ohio EPA, Division of Surface Water, Policy 400.007 “Beneficial use of Non-Toxic Bottom Ash, Fly Ash and Spent Foundry Sand and Other Exempt Waste,” and all other regulations. Ten days before using foundry sand on the project, from the Ohio EPA, the Contractor may elect to have an independent consultant pre-qualified by ODOT in remedial design environmental site assessment review the proposed usage. The consultant will provide all documentation utilized to usage according to all Ohio EPA regulations. Ensure that the consultant coordinates all EPA required meetings, documentation, and testing requirements. Ensure that the consultant certifies this to the City.

#### **A. Structural Backfill Type 1.**

1. Furnish Type 1 structural backfill that meets the gradations of Item 304, except 0 to 20 percent may pass the No. 200 sieve.



2. Physical properties.

Percent of wear, Los Angeles test, maximum (CCS or washed gravel)	50 %
Loss, sodium, sulfate soundness test, maximum	15 %
<del>Percent by weight of fractured pieces (one or more faces), minimum (Type 3 only)</del>	<del>90 %</del>

Do not exceed the following percentages of deleterious substances:

Material Type	Percent by weight
Shale and shaly material	5.0
Chert, that disintegrates in 5 cycles of the soundness test	5.0

Ensure that the portion of the material passing through the No. 40 (425 µm) sieve has a maximum liquid limit of 25 and a maximum plasticity index of 6.

When using RPCC, ensure that the maximum percentage passing the #200 sieve is 10%.

**B. Structural Backfill Type 2.**

1. Furnish Type 2 structural backfill that meets the gradation below:

Sieve Size	Total Percent Passing
2 1/2 inch (63 mm)	100
1 inch (25.0 mm)	70 to 100
3/4 inch (19.0 mm)	–
3/8 inch (9.5 mm)	–
No. 4 (4.75 mm)	25 to 100
No. 8 (2.36 mm)	–
No. 40 (425 µm)	10 to 50
No. 50 (300 µm)	–
No. 200 (75 µm)	5 to 15

2. Physical properties:

Percent of wear, Los Angeles test, maximum (CCS or gravel)	50 %
Loss, sodium sulfate soundness test, maximum	15 %

Ensure that the portion of the material passing through the No. 40 (425 mm) sieve has a maximum liquid limit of 25 and a maximum plastic index of 6.

**703.13 Coarse Aggregate for Items 305, 451 and 452.**

Page 633

**703.13 Coarse Aggregate for Items 305, 306, 451 and 452.**

**703.15 Suitable Materials for Embankment Construction.**

Page 636

**~~703.15~~ 703.16 Suitable Materials for Embankment Construction.**

**703.16 Aggregate Materials for 304.**

Page 638

**~~703.16~~ 703.17 Aggregate Materials for 304.**

**703.17 Materials for Items 410, 411, and 617.**

Page 639

**~~703.17~~ 703.18 Materials for Items 410, 411, and 617**

**703.18 Rock and Aggregate Materials for Item 601.**

Page 640

**~~703.18~~ 703.19 Rock and Aggregate Materials for Item 601.**

**706.05 Precast Reinforced Concrete Box Sections.**

Page 661

**706.05 Precast Reinforced Concrete Box Sections.** Provide precast reinforced concrete box section conforming to ASTM C 1577, with the following modifications:

Use precast concrete member manufacturers certified by the Laboratory according to City Supplement 1073.

Submit shop drawings according to 501.04 (A).

6.2.1 Provide cement according to 701, except 701.07.

6.2.2 Provide fly ash according to 701.

6.3 Provide aggregates conforming to the quality requirements of 703.02.

6.5 Provide reinforcement according to 709.10 or 709.12. Provide longitudinal distribution reinforcement according to 709.01, 709.10 or 709.12.

7.1 Use only the following box sizes with a span by rise of 8 x 4, 5, 6, 7; 10 x 5, 6, 7, 8, 9; and 12 x 4, 6, 8, 10 feet.

9.1 Provide hardened concrete that contains a minimum of 4 percent entrained air for wet-cast sections with spans less than 14 feet and for all sections with spans 14 feet and greater.

9.4 Do not use lift holes. Use handling devices that do not require a hole through the box.

10.1 Verify concrete strength using cylinders. Do not ship items before the concrete reaches its design strength.

11.5 Ensure a minimum cover of 1/2 inch over both circumferential and longitudinal reinforcement at the mating surfaces of joints.

15 In addition, mark the identification of the plant on each box section. For box sections 14 feet or greater, mark the reinforcing steel areas for the section on each box section. Place the manufacturers' name and required product information on the inside of the box section within the top one-half of the culvert.

#### **706.051 Precast Reinforced Concrete Three-Sided Flat Topped Culverts**

Page 662

**706.051 Precast Reinforced Concrete Three-Sided Flat Topped Culverts.** Provide precast concrete three-sided flat topped culverts according to ASTM C 1504, with the following modifications:

Provide flat deck culvert structures with a minimum clear span (measured normal to the structure at the bottom of the haunch) of 14 feet and a minimum opening rise (measured from bottom of leg to bottom of deck at the centerline of the structure) of 4 feet; and a maximum clear span of 34 feet and maximum opening rising of 10 feet. Ensure minimum wall and deck thicknesses of 10 inches and 12 inches respectively, measured under the haunch normal to the structure and at the centerline of the span measured perpendicular to the structure.

Use precast concrete member manufacturers certified according to City Supplement 1073.

Ensure that the manufacturer submits design calculations, a structural load rating and shop drawings according to 501.04 (A) for review and approval by the City. Do not produce any units until approved drawings have been submitted to the City receiving approval. Submit a minimum of five copies of the drawings. Allow a minimum of four weeks for approval. Ensure that the shop drawings include the following:

1. Load rate the structure according to the requirements of Section 900 of ODOT's Bridge Design Manual.
2. All material specifications.
3. All plan view.
4. All elevation view.

5. All headwall and wingwall attachment requirements.
6. All dimensions.
7. All maintenance of traffic phases.
8. All section sizes.
9. All design handling strength.

The manufacturer may modify an approved shop drawing and resubmit according to 501.04 (A) for approval to the City.

### **706.052 Precast Reinforced Concrete Arch Sections**

Page 666

**706.052 Precast Reinforced Concrete Arch Sections.** Provide precast reinforced concrete arch sections according to ASTM C 1504, with the following modifications:

This item shall consist of manufacturing precast reinforced concrete arch sections for culverts.

Use precast concrete member manufacturers certified according to City Supplement 1073.

~~5~~ Ensure the manufacturer submits design calculations, a structural load rating and shop drawings according to 501.04 (A) for review and approval by the City. Do not produce any units until approved drawings have been submitted to the City receiving approval. Submit a minimum of five copies of the drawings. Allow a minimum of 4 weeks for approval. Ensure the shop drawings include the following:

1. Load rate the structure according to the requirements of Section 900 of ODOT's Bridge Design Manual.
2. All material specifications.
3. All plan view.
4. All elevation view.
5. All headwall and wingwall attachment requirements.
6. All dimensions.
7. All maintenance of traffic phases.
8. All section sizes.
9. All design handling strength.

The Contractor may modify an approved shop drawing and resubmit according to 501.04 (A) for approval to the City.

### **706.053 Precast Reinforced Concrete Round Sections**

Page 670

**706.053 Precast Reinforced Concrete Round Sections.** Provide precast reinforced concrete elliptical and circular arch sections according to ASTM C 1504, with the following modifications:

This item consists of manufacturing precast reinforced concrete elliptical and circular arch sections for culverts.

Use precast concrete member manufacturers ~~of~~ certified according to City Supplement 1073.

~~5-~~ Ensure the manufacturer submits design calculations, a structural load rating and shop drawings according to 501.04 (A) for review and approval by the City. Do not produce any units until approved drawings have been submitted to the City, receiving approval. Submit a minimum of five copies of the drawings. Allow a minimum of 4 weeks for approval. Ensure the shop drawings include the following:

1. Load rate the structure according to the requirements of section 900 of ODOT's Bridge Design Manual.
2. All material specifications.
3. Plan view.
4. Elevation views.
5. Headwall and wingwall attachment requirements.
6. Dimensions.
7. All maintenance of traffic phases.
8. Section sizes.
9. Design handling strength.

The City will allow the Contractor to modify an approved shop drawing and resubmit according to 501.04 (A) for approval to the City.

#### **706.13 Precast Reinforced Concrete Manhole Riser Sections, Catch Basins Inlet Tops, and Portable Barriers**

Page 676

**706.13 Precast Reinforced Concrete Manhole Riser Sections, Catch Basins Inlet Tops, and Portable Barriers.** All manhole and barrier structures will conform to ASTM C478. All catch basins, inlets, and inlet tops will conform to ASTM C913.

#### **706.16 Resilient Connectors Between Precast Manhole Riser Sections, Catch Basins, Inlets, and Pipes.** (New Section)

Page 676

**706.16 Resilient Connectors Between Precast Manhole Riser Sections, Catch Basins, Inlets, and Pipes.** Material and performance requirements shall meet the standards of ASTM C923, and be approved by the Engineer. The actual joint may be one of the following designs:

- (a) Rubber sleeve with stainless steel band
- (b) Rubber gasket compression
- (c) Rubber gasket expansion

#### **711.12 Gray Iron Castings**

Page 699

**711.12 Gray Iron Castings.** Provide gray iron casting in accordance with ASTM A 48, Class ~~35B30B~~, with the following modifications:

### **711.31 Reinforced Propylene Plastic Manhole Steps**

Page 705

**711.31 Reinforced Propylene Plastic Manhole Steps.** Provide reinforced propylene plastic manhole steps conforming to the details shown on the plans and in accordance with ASTM C 478.

Provide steel rod in accordance with 709.01, Grade 60, continuous through the entire length of legs and tread. ~~Coat the steel~~The steel may be coated in accordance with ASTM A 934/A 934M. Submit the manufacturer's written certification to the Engineer. Provide propylene plastic in accordance with ASTM D 4101, Table B 33430. Submit to the Engineer the manufacturer's certified test data for the propylene plastic used in each lot of steps.

### **720.13 Polypropylene Corrugated Double Wall Pipe**

Page 716

**720.13 Polypropylene Corrugated Double Wall Pipe.** Provide polypropylene corrugated double wall pipe for non-pressure sanitary sewer and storm sewer pipe from 6 to 30-inch diameters in accordance with ASTM F 2736, and storm sewer pipe from 36 to 60-inch diameters according to ASTM F2881 or AASHTO M 330, with the following modification.

9.1 Provide a letter of certification to cover each shipment of material verifying that it meets specification requirements.

### **730.017 Street Name Sign Supports (New Section)**

Page 736

**730.017 Street Name Sign Supports.** Provide street name sign posts fabricated from new hot-dipped galvanized steel pipe as in 711.02 and in accordance with ASTM Specification Number A53 with a minimum yield strength of 30,000 psi and a minimum tensile strength of 48,000 psi. Evidence of prior rusting or pitting shall be cause for rejection of the posts. The street name sign post shall have a tubular section of uniform diameter and wall thickness. The diameter and wall thickness shall be for the standard weight (Schedule 40) nominal pipe size (NPS) as specified for each bid item. The finished post shall be straight, have a smooth finish and be free from defects affecting their strength, durability or appearance. All cut ends shall be free from burrs. Each piece shall be continuous with no butt welds.

Provide materials in accordance with the City's QPL.

### **730.24 Cantilever Offset Bracket (New Section)**

Page 739

**730.24 Cantilever Offset Bracket.** Finished street name sign blanks shall be riveted to 2 cantilevered offset bracket assemblies with universal saddle clamps and a double tee section in accordance with 711.01. For signs greater than 48 inch (1.2m ) in length, a special assembly is required. This assembly shall consist of 2 cantilevered offset brackets

placed back to back and placed on top and bottom of sign assembly and riveted to the appropriate double tee section. The signs shall be attached to the sign supports using a stainless steel buckle-strap combination. For fabrication see City of Columbus Standard drawing(s).

### 733.02 Controller Units

Page 757

#### 733.02 Controller Units.

**B. C.** Type TS-2/A2. Provide a controller unit meeting NEMA TS-2...

### 801.02 Design Criteria

Page 782

#### 801.02 Design Criteria.

##### 8. Design Plans:

~~C.~~, Prior to start of work, provide the Engineer 4 copies of a laying schedule, including laying dimensions and pipe calculations for 20" and greater diameter pipe.. The Engineer may require a pictorial layout. Provide a complete and accurate laying schedule conforming to Drawings. For Concrete Pipe, stock additional bevel adapters and short lengths of pipe at the job site to permit field adjustment of the alignment. The unit price bid of Item 801 includes payment for these items..

C. Prior to start of work, provide the Engineer 4 copies of a laying schedule, including laying dimensions and pipe calculations for 20" and greater diameter pipe. The Engineer may require a pictorial layout. Provide a complete and accurate laying schedule conforming to Drawings. For 20" and greater diameter pipe, stock additional bevel adapters and short lengths of pipe at the job site to permit field adjustment of the alignment. The unit price bid of Item 801 includes payment for these items.

### 801.03 Ductile Iron Pipe

Page 784

#### 801.03 Ductile Iron Pipe.

Polyethylene Encasement: Wrap all ductile iron pipe with tube style 8-mil linear low density polyethylene (LLDPE) film made from virgin material (no recycle material) in accordance with AWWA C 105/A21.5 ~~for all open cut installations~~. Provide black film with nominal 2% carbon black UV inhibitor and printed per the C105 Standard. Adhere to the following Physical Properties:

### 801.03 Ductile Iron Pipe

Page 785

#### 801.03 Ductile Iron Pipe.

Installation: Deliver film to the jobsite contained in a sound sacrificial sleeve of UV Protected Polyethylene to protect contents during storage prior to installation.

Install the polyethylene encasement per Method A of ANSI/AWWA C105/A21.5. Remove all lumps of clay, mud, cinders, etc. from the pipe surface before encasing the pipe. Keep soil, or bedding material, from becoming trapped between the pipe and the polyethylene sleeve. When lifting polyethylene-encased pipe use a fabric type sling or padded cable to protect the polyethylene. Overlap joints (double coverage) and tape. Fold excess slack over the top of the pipe and tape in place every three feet. Carefully backfill the pipe according to Item 801.11 and 801.12. To avoid damage during backfilling allow adequate slack in the film tube at joints. Use backfill material free of cinders, rocks, boulders, nails, sticks or other material that could damage the polyethylene sleeve.

### **801.10 Excavation and Pipe Laying**

Page 794

#### **801.10 Excavation and Pipe Laying.**

##### **Pipe Laying and Initial Backfill:**

Use a fabric type sling or padded cable when handling pipe. Do not use chains or unpadded cables. Use backfill material free of large rocks or stones, or other materials which could damage coatings.

Pipe Haunching (for 20 inch ~~inch~~ diameter and greater): Provide Crushed Carbonate Stone (CCS) Size No. 57 as specified in 703 – Aggregate. Place backfill carefully and simultaneously on each side of pipe to avoid lateral displacement of pipe and damage to joints. Extend the depth of haunching ~~extend~~ from the trench bottom up to 1/2 times the pipe diameter. If the pipe requires adjustment after placement, remove and re-lay as new pipe. Prevent damage to coating when placing backfill. Place haunching material manually around pipe and spade full depth of lift to prevent bridging and provide uniform bearing and side support.

### **801.10 Excavation and Pipe Laying**

Page 795

#### **801.10 Excavation and Pipe Laying.**

##### **Thrust Restraints:**

Provide concrete blocking, supports and/or buttresses on all water mains 16” diameter and smaller and at connections to existing pipes, regardless of diameter, as required. Also provide concrete blocking at all tees, bends, dead ends and at any other locations shown on the plans or directed by the Engineer. Build these concrete structures to the lines, grades and dimensions shown on the Standard Detail Drawings, L-6310, L-6311, L-6312, and L-7001, or as ordered by the Engineer, and construct with Class "C"



concrete as per Item 499. Include the cost of temporary timber backers and the cost of excavating to line and grade shown for the supports in the unit price bid for Item 801.

On all water mains 20 inch diameter and larger, provide adequate restrained joint lengths. Provide joint restraint for each tee, bends, or dead end with limits designed by an engineer in accordance with manufactures suggested recommendations unless otherwise shown on the drawings. Prior to ordering the pipe and commencing with construction, submit a pipe laying schedule showing the proposed designed restraining system for the entire water main improvement for approval by the City of Columbus Division of Power and Water.

**801.11 Backfill Within The Influence of Pavement**

Page 796

**801.11 Backfill Within The Influence of Pavement.** This section discusses backfilling above the initial backfill up to ground surface or beneath pavement subgrade within the influence of pavement as defined by Standard Drawing L-6309E.

Unless otherwise shown, specified, or ordered, provide granular backfill material meeting the requirements of ~~Section 304.02 or Section~~ Item 703.11. The City will allow use of ~~f~~Flowable Control Density Fill, Type II complying with the requirements of Item 613 as an alternate to compacted granular material. Do not use RPCC for any bedding or backfill material.

Ensure that the moisture content does not exceed less than minus 4 percent of optimum moisture prior to spreading. Shovel in-place and compact material using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Do not exceed 8 inches for a single layer of compacted thickness. See ~~Section~~ Item 801.12 for compaction requirements. Extend the compacted backfill to the top of the pavement subgrade for trenches within traveled areas, and to within 6 inches of the existing ground in all other areas.

**801.12 Backfill Outside The Influence of Pavement**

Page 797

**801.12 Backfill Outside The Influence of Pavement.** Backfill in conformance with the requirements of Section 801.11 above, outside the influence of pavement, as defined by Standard Detail L-6309E, except as herein modified..

Provide suitable backfill material native to the project, or granular backfill material conforming to the requirements of ~~Section 304.02 or Section~~ Item 703.11. Do not use RPCC for any bedding or backfill material. Dispose of excavated material unsuitable for backfill compacting at no additional cost to the City. Provide granular backfill material from somewhere else. Spread material in successive layers not exceeding a depth of 8 inches. Compact from above the initial backfill to within 6 inches of the existing ground. The following requirements apply to granular material conforming to Section 304.02, Section 703.11, and to native material:

<b>Max. Lab. Dry Wt.</b>	<b>Min. Compaction</b>
--------------------------	------------------------

<b>Lbs./cu. Ft.</b>	<b>Requirements % Lab. Max.</b>
90-104.9	102%
105-119.9	100%
120 and more	98%

Backfill the remaining 6 inches of excavation with approved material without mounding of fill. Maintain trenches in good and safe condition up to the time of acceptance of the work.

Backfill traveled areas in accordance with Section 801.11.

### **801.14 Hydrostatic Tests**

Page 798

**801.14 Hydrostatic Tests.** Apply a hydrostatic test to the mains and fire hydrant leads as required in Section 5 of the Standard AWWA Specification C600 for Ductile Iron Pipe, Section 4 of AWWA Specification C604 and M11 for Steel Pipe or AWWA M9 for Concrete Pipe. Test all new services to the curb stop. Test each valved section of water main independently of one another unless otherwise approved by the Engineer. Conduct pressure test with all watch valves open and hydrant foot valves closed.

Maintain 150 psi of pressure in any tested section for a minimum of two hours.

~~Maintain 150 psi of pressure in any tested section.. Test for at least two hours, except when the test indicates zero leakage after the first hour. The City may approve termination of the pressure test after one hour with zero leakage..~~

Furnish all materials, make all taps required and furnish a pump, metering equipment, piping, other equipment and all necessary assistance for conducting the tests.

### **801.15 Chlorination of Completed Pipe Line**

Page 799

**801.15 Chlorination of Completed Pipe Line.** After satisfactory hydrostatic testing, the City will chlorinate the completed pipe in accordance with AWWA C651. The City will furnish the chlorine, pumping equipment necessary to introduce the chlorine into the chlorination tap, and one man. Furnish and pay for all other labor, material and equipment including chlorination taps and blow-off taps. Only one connection to an existing water main is permitted before disinfection of a new water line has been completed. All other connections must be made after the line has been disinfected. No service connection permits shall be issued or connections made to any service taps until water mains have been disinfected by the City. Provide taps with tapping valves, sufficient tubing or pipe to extend outside the trench, and an operable valve above ground. Provide blow-offs with sufficient tubing to extend to an approved drainage facility. Provide blow-offs with adequate protection from pedestrian and vehicular traffic. Install blow-offs of ~~the sizes and at the locations shown on the drawings~~sufficient sizes and at appropriate locations, as per AWWA C651, or as directed by the Engineer. Chlorination taps and blow-offs shall be installed within 2 feet of the end of the tested section, or as directed by the Engineer. Do not reuse corporation Stops, 2-inch and under, used in the chlorination process as part of a water service, air

release, or any other permanent feature of the water main. The Division of Power and Water will approve the time and the section of line for chlorination. The Division of Power and Water will notify the Contractor when to remove the temporary blow-offs and corporation stops. Plug the blow off hole with an approved plug as identified in the Division of Power and Water Approved Materials List.

Hand swab all pipes and fittings not otherwise disinfected. The Division of Power and Water will determine amount of chlorine used during hand swabbing operations.

### **801.16 Main Shuts**

Page 799 - 800

**801.16 Main Shuts.** Prior to the start of proposed water main improvement, submit a plan and an accompanying schedule identifying the location and estimated dates for water main shuts to the Division of Power and Water for approval.

Only Division of Power and Water personnel will operate valves. Operation of existing valves by the Contractor or their representative may result in penalties as identified in Chapter 1113 of the City Code.

Notify Division of Power and Water personnel at least 72 hours in advance to the actual water main shut. Notify and coordinate water main shuts with all affected customers. City personnel will work with the Contractor in identifying affected customers and will provide a sample notification letter. The City will approve the final notification letter. The Division of Power and Water personnel may re-schedule the main shut at its discretion if the Contractor appears unprepared to perform the work scheduled during the shut.. The City will not pay for costs associated with lost time due to lack of preparation by the Contractor. At a minimum, notify critical users (large 801.17 businesses, hospitals, medical centers, industries, etc.) of non-shuts due to rescheduling or delays in the work.

To minimize impacts to customers, the City may require the Contractor to make shuts at night and/or on weekends. Include costs incurred to perform contract work after regularly scheduled hours due to main shuts and all cost associated with coordinating shuts with the City in Item 801.

No shuts are permitted to occur on or one (1) business day before a National Holiday or National Holiday weekend, unless otherwise approved by the Engineer.

### **805.01 Description**

Page 807

**805.01 Description.** Provide all work necessary to furnish and install or transfer water service taps complete and ready for use where shown on the plans or otherwise required and in accordance with these specifications. The City defines water "tap" and "service line" as stated in Columbus City Code 1105.01.

Provide new water service taps consisting of all pipe, valves, fittings and appurtenances required from and including the water main connection to and including the control valve and box. Wrap new service lines with an approved polyethylene wrap or dielectric tape material for a minimum clear distance of 3 feet away from the water main, in accordance with Standard Drawing L-1004. Prior to constructing any new water service tap, obtain a tap permit from the Division of Power and Water.

Provide a transferred water service tap consisting of all pipe, valves, fittings and appurtenances required from and including the water main connection to and including the control valve and connection to the service line and the abandonment of the existing service tap. Relocate the existing curb box to the new curb stop location. If the Contractor discovers a box damaged due to no negligence of the Contractor, provide and install a new curb box. The City will pay for the new curb box and ferrule box, if required, separately under this item. Replace~~d~~ boxes damaged by the Contractor at no additional expense to the City. Verify the location of the curb box prior to installing the corporation stop on the new or existing main.

Complete surface restoration in accordance with the requirements of the appropriate bid items. The City will pay for this work also in accordance with the requirements of the appropriate bid items.

#### **805.04 Control Valves and Boxes**

Page 808

**805.04 Control Valves and Boxes.** Use curb stops without drain in accordance with the current Approved Materials List for control valves for 2 inch and smaller water service taps. Provide boxes in accordance with the current Approved Materials List. Provide box lids with the word "WATER" cast neatly and legibly on it and held securely in place by a bronze or brass bolt. Provide a box with an enlarged base section, in accordance with the current Approved Materials List when using a 2 inch curb stop. Include a Columbus standard ferrule box and cover in the top section of the curb box where installing 2 inch and smaller curb stops within traveled areas. ~~shall~~ Install a concrete paver block, minimum size 4-inches wide by 8-inches long by 2-inches thick, under all curb stops.

Provide control valves for 3 inch and larger water service taps that conform to requirements of Item 802. Provide valve boxes that conform to Items 802 and 804. Provide a control valve and box, in addition to the valve and box installed with the water main connection, for all water service taps 3 inch or larger. Install and restrain the control valve at the location shown on the plans or approved by the Engineer.

For 3 inch and larger water service taps not under pavement or traveled portion of right-of-way use the valve installed at the water main connection as the control valve and provide with a valve box in conformance to Item 802.

#### **805.05 Installation**

Page 808-809

**805.05 Installation.** Install 3 inch and larger taps in accordance with Items 801, 802 and 803. Install water service taps 2 inch and smaller by jacking or open cut methods, unless the plans specify one method or the other. Do not bend or kink the service pipe nor strain the pipe joints when jacking the pipe . Install the pipe from the water main connection to the control valve to the grade and elevations shown on the plans, but in no case provide less than 3 feet 6 inches of cover. Minimize bends in taps and obtain bending approval, if necessary to bend, from the Engineer prior to installation. Wrap new service lines with an approved polyethylene wrap or dielectric tape material for a minimum clear distance of 3 feet away from the water main, in accordance with Standard Drawing L-1004. Locate curb boxes 1 foot from the edge of the proposed or existing sidewalk between the sidewalk and the curb, 2 feet inside the right-of-way or easement line in areas with no existing or proposed sidewalk, or as indicated on the construction plans.

Prior to backfilling, pressure test all water service taps from the water main connection to the control valve and repair all leaks. Test water service taps 2 inch and smaller at normal city water pressure, unless installed with the construction of a water line, in which case test per Item 801. Test water service taps 3 inch and larger at 150 psi in accordance with requirements of Item 801 up to the meter inlet and valve on the meter by-pass line.

After completing testing, connect the transfer water tap to the existing service line and abandon the existing water tap. Attempt to coordinate with the customer prior to performing service transfers. Unless otherwise approved by the Engineer, water service transfers are not permitted on Fridays (or Thursdays if the Contractor is only working Monday through Thursday) unless the Contractor is able to verify the customer has water through verbal confirmation. On Fridays (or Thursdays if the Contractor is only working Monday through Thursday), confirming water service transfer by means of a hose bib only is not permitted.

After performing a successful pressure test backfill all excavations in accordance with the requirements of Item 801.

**805.07 Basis of Payment**

Page 809

**805.07 Basis of Payment.** The City will pay the unit price shown in the proposal and will consider the payment as complete compensation for providing all work necessary to furnish and, install or transfer, the water service tap complete and ready for use or any component part thereof.

The City will make payment at the contract price for:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
805	Each	_____ Inch Corporation Stop
805	Each	_____ Inch Curb Stop
805	Each	Curb Box

805	Each	C.I. Ferrule Valve Box and Cover
805	Linear Foot	_____ Inch Water Tubing
805	Each	_____ Inch Water Service Tap, Complete
805	Each	_____ Inch Water Service Tap, Transferred

**807.03 Basis of Payment**

Page 812

**807.03 Basis of Payment.** The City will consider the price bid for adjusting the various valve boxes or service boxes to grade as full compensation for all labor, material and equipment to complete the work as covered in these specifications including backfill and sidewalk or pavement replacement.

The City will consider the unit prices bid for Columbus Standard heavy duty valve box ~~or C.I. Ferrule Box and Cover~~ as full compensation for the heavy duty valve box complete and installed to final grade.

The City will make payment at the contract price for:

Item	Unit	Description
807	Each	Valve Boxes Adjusted to Grade
807	Each	Valve Boxes Adjusted to Grade using Riser
807	Each	Service Boxes Adjusted to Grade
807	Each	Columbus Standard Heavy Duty Valve Box
<del>807</del>	<del>Each</del>	<del>C.I. Ferrule Valve Box and Cover</del>

**809.01 Scope of Work**

Page 814

**809.01 Scope of Work.** The Contractor shall furnish all labor, tools, material and equipment, and coordinate inspections necessary to furnish and install new fire hydrants at the locations shown on the plans or as ordered and specified.

The item shall include all excavation, furnishing and installing the new fire hydrant complete with all fittings, approved polyethylene wrap, blocking, backfilling and all other incidental work necessary to complete this item of work. The Contractor shall install hydrant watch valves and 6 inch ductile iron hydrant leads where necessary, under Items 801 and 802.

The Contractor shall notify the Division of Fire prior to taking any fire hydrant out of service. All hydrants, whether new or relocated, shall be inspected and approved by the Division of Fire prior to being put into service.

## 809.02 Description of Fire Hydrants

Page 815

### 809.02 Description of Fire Hydrants.

7. **Paint.** Provide hydrants with two good coats in a gloss enamel of one color for the entire hydrant. The color shall be Safety Orange. After installation of the fire hydrants, the contractor is responsible to apply touch-up paint to any damage to the factory-applied hydrant paint. Hydrants will not be accepted until any paint damage from shipping or installation has been repaired. Use hydrant touch-up paint in accordance with the approved material list.

~~7. **Paint.** Provide hydrants with two good coats of special yellow hydrant enamel, with the top 4 inches (102 mm) of the hydrant from operating nut down painted flat black.~~

## 809.03 Installation

Page 816 - 817

**809.03 Installation.** Furnish and install hydrants at the locations shown on the plans. Locate hydrants 2 feet behind the back of the curb line or 8 feet from the edge of paved area on non-curbed roadways unless otherwise shown on the plans or directed by the Engineer. Provide hydrants of the proper length to suit the depth of cover over the water lines at the locations shown on the plans and furnish the necessary extensions to obtain the proper length. Locate fire hydrants a minimum of 6 feet clear of all residential driveway openings and curb returns, and a minimum of 10 feet clear of all commercial driveway openings. Install and restrain a second watch valve within 2 feet of the hydrant if the hydrant lead exceeds 15 feet in length.

Excavate the pit or trench for the fire hydrant so when it installed, the hydrant base rests on a concrete slab on undisturbed soil. Set the hydrant plumb with nozzle outlet approximately 18 inches from ground line. Set hydrants set in accordance with grade line or approximately 2 inches below bottom of break connection on the hydrant standpipe.

Install fire hydrants with hardwood backing against Class "C" concrete backing poured against undisturbed earth, as approved by the Engineer.

Any fire hydrant used between the dates of September 15<sup>th</sup> and April 15<sup>th</sup> shall be pumped dry to the foot valve of the hydrant barrel or a minimum of five (5) feet below the surface of the existing ground, by the contractor, immediately after each time the hydrant is operated or after initial installation.

## 809.06 Hydrant Relocation

Page 817

**809.06 Hydrant Relocation.** Relocate fire hydrants removing the existing hydrant, installing new 6 inch ductile iron pipe and cast iron fittings as required to set hydrant at location and elevation shown on the plans, resetting hydrant, blocking and backfilling to

complete the work. If the new hydrant lead exceeds 15 feet in length, install a second watch valve and restrain within 2 feet of the relocated hydrant. For relocations that parallel the right-of-way, if relocating more than 15 feet abandon the existing fire hydrant per Item 809.07 and a new fire hydrant installed at the proposed location. All piping and/or fittings installed with the relocation, including hydrants, shall be tested at line pressure, visually inspected by the City for leakage, and hand swabbed with chlorine for disinfection.

**901.02 Materials and Material Handling**

Page 824

**901.02 Materials and Material Handling.** Provide pipe of the size and kind specified in the proposal and shown on the plans and meeting the requirements of the relevant parts of Section 706, Section 720 or Section 801. If the proposal or plans do not specifically itemize the type of pipe, the Contractor may use pipe from its list of approved manufacturers. The City will maintain a list of current Approved Manufacturers, Product Types and Sizes, and Authorization Letters on file at the Laboratory.

Provide specific materials as follows unless otherwise specified in the Contract Documents:

- 1. Concrete for encasement, cradle, backing  
and backfill Class A ..... 499, 905
- 2. Concrete for blocking - Class C ..... 499
- 3. Stone or gravel bedding - No. 57 ..... 703
- 4. Compacted granular material ..... 912.02
- 5. Cement for mortar ..... 701
- 6. Sand for mortar ..... 703.03
- 7. Lime for mortar ..... 712.04
- 8. Gaskets for Concrete Pipe Joints ..... 901.15
- 9. Gaskets for Vitrified Clay Pipe Joints ..... 901.15
- 10. Gaskets for PVC Pipe Joints..... 901.15
- 11. Gaskets for Ductile Iron Pipe Joints ..... 901.15
- 12. Non-Reinforced Concrete Pipe ..... 706.01
- 13. Reinforced Concrete Pipe ..... 706.02
- 14. Reinforced Elliptical Concrete Pipe ..... 706.04
- 15. Vitrified Clay Pipe, Extra Strength ..... 706.08
- 16. Polyvinyl Chloride (PVC) Sewer Pipe ..... 720
- 17. Ductile Iron Pipe ..... 801.03
- 18. Precast Reinforced Concrete Box Sections ..... 706.05
- 19. High Density Polyethylene Pipe (HDPE) ..... 720
- 20. High Density Polypropylene Pipe (HDPP) ..... 720

Exercise care in material handling to prevent field and installation damage that could impair the function and durability of the installation. In particular, carefully handle thermoplastic conduits during cold weather.



## 901.11 Bedding and Embedment

Page 826 - 827

**901.11 Bedding and Embedment.** Place cutoff trench dams of native clay or impervious soil across and along the trench at 150 foot (45.7 m) intervals. Place at least 1 trench dam between adjacent manholes regardless of spacing. Compact the trench dams 6 feet (1.8 m) in length, as measured along the sewer centerline and bench into the undisturbed trench sides from the subgrade or top of cradle, to within 5 feet (1.5 m) of the existing surface. If constructing trench dams in rock or hardpan, extend to the top thereof whichever is greater. Where pipe cover is less than 5 feet (1.5 m) ~~the~~ extend the dam to within 1 foot (0.3 m) of the existing surface. Provide the trench dam installation with a minimum of 3 feet (0.9 m) of compacted material above the crown of the pipe.

### Type I.

1. For flexible sanitary and storm sewers 6 inches (152 mm) in diameter up to and including 60 inches (1524 mm) in diameter, provide a bedding of No. 57 stone, ~~conforming to Item 703.08, or compacted granular material in accordance with Section 912.02~~ extending from a point 4 inches (101 mm) below the bottom of the pipe to a point ~~12-6~~ inches (~~305-152~~ mm) above the outside top of pipe as shown on the standard drawings.
2. For rigid sanitary and storm sewers 6 inches (152 mm) in diameter up to and including 27 inches (685 mm) in diameter, provide a bedding of No. 57 stone, ~~conforming to Item 703.08, or compacted granular material in accordance with Section 912.02~~ extending from a point 4 inches (102 mm) below the bottom of the pipe to spring line of the pipe as shown on the standard drawings.
3. For rigid sanitary and storm sewers 30 inches (762 mm) in diameter up to and including 108 inches (2743 mm) in diameter, provide a bedding of No. 57 stone, ~~conforming to Item 703.08, or compacted granular material in accordance with 912.02~~ extending from a point 6 inches (152 mm) below the bottom of the pipe to the spring line of the pipe as shown on the standard drawings.

If using Type I bedding, include the cost of all bedding as described above in the price bid for the various pipe items. ~~If compacted granular material fails to meet the compaction required under Section 912.03, under pipe haunches and around the pipe, the Engineer will direct the use of stone bedding, No. 57, in lieu of compacted granular material at no additional cost to the City.~~

Provide embedment for thermoplastic pipe ~~used in areas where lateral soil support is negligible or questionable~~ in accordance with the recommendations of ASTM D2321, 7.5 ~~Appendix XI Commentary.~~

## 901.12 Laying Pipe

Page 827 - 828

**901.12 Laying Pipe.** Examine each pipe for defects and damage. Do not use defective or damaged pipe. Lay pipelines to the grades and alignment indicated. Provide proper

facilities for lowering sections of pipe into trenches. Do not, under any circumstances lay pipe in water or when trench conditions or weather prove unsuitable for such work. Provide for the diversion of drainage or dewatering of trenches during construction as necessary. Inspect all pipe in place before backfilling, and remove and replace those pipes damaged during placement.

Lay pipes in finished trenches starting at the lowest point so that the spigot ends point in the direction of flow. Lay all pipes with ends abutting and true to line and grade.

Where necessary with bell end pipe, excavate suitable bell-holes in the bedding material for the bell of each pipe so that the bells will not support the weight of the pipe. Fit and match the pipes so that when placed, they will form a conduit with a smooth and uniform invert. Use all possible care when shoving the pipes together to minimize the joints and carefully clean the pipe ends before placing the pipes. Install gaskets in accordance with the manufacturer's recommendations.

Use Class A concrete encasement, in accordance with ~~to~~ the applicable dimensional standard drawing, within the limits of existing or proposed paved areas inside right-of-way, where minimum cover during construction or proposed cover over the outside top of the pipe to top of finished grade is 48 36 inches (762 914 mm) or less.

Make all connections with existing structures after cleaning the structures in a thorough, first class, neat and workmanlike manner acceptable to the Engineer. Include the cost of this work in the price bid for the various pipe items.

## 901.15 Pipe Joints

Page 829

### 901.15 Pipe Joints.

#### Sanitary Sewers

**Concrete.** Provide pipe joints conforming to the requirements of ASTM C 443 and as specified herein. Use solid gaskets of circular cross section confined in an annular space formed by the shoulder on the bell and spigot or in the groove in the spigot of the pipe so that movement of the pipe or hydrostatic and hydrodynamic pressure cannot displace the gasket. When the joint is assembled, compress the gasket to form a watertight seal.

Provide all elliptical reinforced concrete pipe for sanitary sewers with Type B - mortar joints and ASTM C 877 rubber and mastic sealing band.

**Vitrified Clay.** Provide pipe joints conforming to the requirements of ASTM C 425 Compression Joints for Vitrified Clay Bell and Spigot Pipe.

**Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe.** Provide pipe joints conforming to the requirements of ASTM D 3212.

**Ductile Iron.** Use mechanical or push on joints meeting AWWA C111 or restrained joints meeting AWWA C110 or C153.

**Polypropylene Sewer Pipe. Provide pipe joints conforming to the requirements of ASTM D 3212.**

**Storm Sewers**

**Concrete.** Use pipe joints conforming to one of the following:

Type A Rubber Gasket. Meet the requirements of ASTM C 443.

Type B Mortar. On sewers 30 inches (762 mm) in diameter and larger, lay the groove end of the pipe to line and grade and wash with a wet brush and butter the bottom half of the groove with 1 to 2 Portland Cement mortar. Clean the tongue of the next section of pipe with a wet brush and apply a layer of 1 to 2 Portland Cement mortar to the top half of it. Then fit the tongue end of the second pipe into the groove end of the first pipe until the mortar is squeezed out onto the inner and outer surfaces. Point the inner surface of the pipe at the joint and smooth with a long handled brush. Point the outside with a bead of mortar. If the joint opening on the bottom half of the pipe exceeds 1/2 inch (13 mm), fill with 1 to 2 Portland Cement mortar.

Type C Bituminous pipe joint filler. Meet the requirements of Section 706.10.

Type D Preformed butyl rubber material. Meet the requirements of 706.14. For concrete pipe 78 inch (2.0 m) diameter and over, prime the annular mating surfaces.

**Vitrified Clay.** Construct pipe joints conforming to one of the following:

Type A Compression. Meet the requirements for vitrified clay pipe joints used in sanitary sewers as specified herein.

Type C Bituminous filler. Meet the requirements of 706.10.

Type D Preformed butyl rubber material. Meeting the requirements of 706.14.

**High Density Polyethylene/Polypropylene.** Construct pipe joints conforming to one of the following:

Type A pipe joints. Meet the requirements of ASTM D 3212.

Type B pipe joints. Meet the requirements of AASHTO M-252, M-294, and Section 23 of the Standard Specification for Highway Bridges, Division II. Construct joints "silt tight" with bell and spigot connection. Provide bells either integrally joined to the pipe, or with separate sleeves (double-belled) designed to join the pipe in the field. The Contractor may use split couplings or separate sleeves to make field repairs.

For all elliptical reinforced concrete pipe for storm sewers, use Type B – mortar or, Type C Bituminous pipe joint filler. Where conditions dictate the use of other types of joints, the City will note such on the plans.

The Contractor may use preformed rubber coupling rings, Fernco 5000 series or approved equal, if approved by the Engineer, when performing field repairs on both rigid and flexible pipes for both sanitary and storm sewer applications. Ensure the rubber sleeve and steel bands make a tight seal capable of meeting the leakage requirements as

specified in Item 901.20. Use preformed rubber coupling rings, Fernco 5000 series, only to join pipe of similar material. Perform all installations of the Columbus standard drawings.

When connecting pipes of dissimilar materials, use the type of coupler specifically manufactured for making the connection between said materials (i.e. concrete to clay, clay to plastic, etc.). Complete the repair by removing the existing pipe to the nearest structurally sound joint and install the new pipe in accordance with all applicable sections of Item 901. Sawcut existing pipe in a neat workmanlike manner, making the cut perpendicular to the longitudinal axis of the pipe. Include the cost of this work in the price bid for the various pipe items, unless directed otherwise by the Engineer.

### 901.20 Leakage Tests

Page 832

**901.20 Leakage Tests.** Acceptance testing of all sanitary sewers shall require a 30 day waiting period from the date of final backfilling. This shall include all laterals installed as part of mainline construction. Do not exceed the allowable limits of leakage for all completed and installed sanitary and storm sewer pipe as follows:

### 901.20 Leakage Tests

Page 834

#### 901.20 Leakage Tests.

- d. When pressure decreases to 3.5 psig, start stop-watch. Determine the time in seconds required for the internal air pressure to reach 2.5 psig. Use minimum permissible pressure holding times for runs of single pipe diameter and for systems of 6 inches or 8 inches (152 or 203 mm) laterals in combination with trunk lines published in the current tables ~~by~~of the National Clay Pipe Institute for vitrified clay pipe, ASTM C-924 for concrete pipe, ~~and or~~ Table 1 in UNI-B-6-~~\*\*90~~ by Uni-Bell PVC Pipe Association for PVC pipe.

### 912.02 Materials

Page 851

**912.02 Materials.** Use the following materials:

Unless otherwise shown, specified, or ordered, provide granular material meeting the requirements of Section 703.11, incorporated in an 8 inch (203 mm) layer. ~~Granular material consisting of natural or synthetic mineral aggregate such as broken or crushed rock, gravel, slag, sand or cinders incorporated in an 8 inch (203 mm) layer, and conforming to the gradation specified in Section 703.11, Type 1.~~

The Contractor may use controlled density fill mixes as an alternate to compacted granular material, conforming to the requirements of Item 613.

Do not use RPCC as bedding, initial backfill, or final backfill material for any metal sewer pipe installation.

### 912.03 Compaction Requirements

Page 851

**912.03 Compaction Requirements.** Apply the following compaction requirements to granular materials and to native backfill materials if such materials require compaction in accordance with Item 911.

<b>Max. Lab. Dry Wt. Lbs./cu. Ft. (kg/m<sup>3</sup>)</b>	<b>Min. Comp. Requirements % Lab. Max.</b>
90-104.9 (1442-1680)	102%
105-119.9 (1682-1920)	100%
120 and more (1922)	98%

Consider materials having a maximum laboratory dry weight of less than 90 lbs./cu. ft. (1442 kg/m<sup>3</sup>) unsuitable for ~~backfill~~ ~~compaction~~. Spread soil, granular material, or other approved material in successive level layers of a depth to allow compaction to the specified density and of not more than 8 inches (203 mm) in thickness (loose measurement), unless otherwise specified and/or authorized in writing by the Engineer.

Cooperate to the fullest extent to accommodate compaction tests. The City will not pay for delay or time lost due to verification of compaction required.

**REVISED ON A QUARTERLY BASIS, OR AS NEEDED.**

**SUPPLEMENTAL SPECIFICATION 1100**  
**Revision Summary**  
**November 1, 2017**

**No revisions for this quarter.**

**CITY OF COLUMBUS, OHIO**

**SUPPLEMENT 1032  
ASPHALT MATERIAL CERTIFICATION REQUIREMENTS**

**October 31, 2011**

**1032.01 Scope**

**1032.02 Procedures and Requirements**

**1032.01 Scope**

This supplement outlines the requirements under which producers and/or suppliers are authorized to ship asphalt materials under certification. Asphalt material shipped under certification may be used without being independently sampled and pretested by the Laboratory. If supplier is approved by ODOT, supply copy of ODOT certification to the Laboratory.

**1032.02 Procedures and Requirements**

The refiner is defined as any supplier of an asphalt material requesting certification for their product. Refiners must meet all requirements as follows.

- A. The supplier will initiate a request for authorization to ship materials under certification by:
1. Submitting the supplier's Quality Control Plan covering available testing equipment and locations, sampling and testing frequencies, reporting, responsible personnel and phone numbers, equipment inspection and maintenance, employee training, methods of verifying shipment quality at terminals, methods for notifying the City of shipment of non-specification materials and other methods at the refiner's discretion considered routine practice in supplier quality control. (Note: Penetration testing for performance graded (PG) binders is not an acceptable verification test. Viscosity tube testing is not an acceptable verification test for modified PG binders.)
  2. Contacting the Laboratory requesting sampling for certification. Sampling will consist of a minimum of five samples from five sealed tanks of material to be certified. Five consecutive passing samples will be sufficient for the supplier to submit a notarized letter of compliance. Other means of obtaining certification samples will be at the discretion of the Laboratory.
  3. Submitting to the Laboratory a notarized letter of compliance stating that each grade or type of asphalt material proposed for shipment under certification will meet current City specifications for that grade or type of material. Include:

- a. Each grade or type of material will have separate approval for shipment under certification.
- b. A statement that the supplier warrants the City against costs involved in corrective action required due to inclusion in the work of non-specification asphalt material.
- c. Signature by a representative of the supplier having legal authority to bind the company.

B. The supplier in requesting to ship by certification agrees to:

1. Submit a monthly summary of refinery quality control test data by asphalt grade or type for asphalt materials shipped under certification.
2. Permit periodic visits by a representative of the City to the supplier laboratory, at any time, for the purpose of observing the testing of a sample of asphalt material by supplier personnel using their equipment, for the properties required.

The City representative will observe the sampling of a quality control sample and obtain a split portion of this sample for testing in the Laboratory, leaving the remaining portion to be tested by the supplier laboratory. Test results on split samples will be compared to assure reasonable correlation of testing procedures and accuracy of laboratory equipment, and that product specifications are met.

3. Maintain records of production control tests for a period of 3 years.
4. Supplier laboratories must participate in Round Robin testing.

C. The Laboratory will approve the supplier to ship by certification, when the requirements of Section 1032.02.A have been fulfilled. Certification will remain in effect indefinitely unless no production is reported for a period of two calendar years or until otherwise notified by the Laboratory.

D. Following approval to ship by certification, the refiner is authorized to make shipments to City projects.

1. The supplier shipping ticket will contain the following minimum information:
  - a. Name and location of the refinery or terminal.
  - b. Identification of the delivery site.
  - c. Date of shipment.
  - d. Time of shipment.
  - e. Liters (Gallons) of material in the shipment.
  - f. Grade of the asphalt binder or type of asphalt material.
  - g. Tank number or blender number from which the shipment was made.



2. Ensure a Transport Truck Inspection Certification accompanies each load certifying that the container is reasonably free of contaminants. Inspect each transport or distributor and refuse to load if it is not reasonably free of contaminants. Sign the truck inspection form. Supply the forms to transport or distributor drivers. The transport or distributor driver will fill out the transport truck certification form including his signature and the carrier's name.
  3. Retain the Shipping Ticket and Transport Truck Inspection Certification at the delivery site.
  4. Supplier will permit the City representative access to those parts of the refinery engaged in the testing, storage and shipment of materials produced for City projects.
  5. The City will conduct a program of check sampling. These samples will be used for checking material quality at the HMA facility. Sampling will be conducted at the frequencies listed below.
    - a. Asphalt binder. See CMS 700 Material Details
    - b. Liquid Asphalt Material. See CMS 700 Material Details
  6. Certification status of cut-back asphalt emulsions and asphalt emulsions will lapse 3 weeks after date of shipment from the producer, except that when material is to be used for mulching, Item 659, it will be considered certified for a period of 1 month after date of shipment from the producer. Materials which have lost certification status will be sampled and approved prior to use.
- E. The supplier, per the Quality Control Plan, must notify the City of failing material. Failure to comply with the above requirements, failure to meet specifications, or failure to immediately correct faulty material in the producer's tanks may result in removal from certification. In addition, the City may take action under the provisions of 105.12 Removal of Unacceptable and Unauthorized Work.

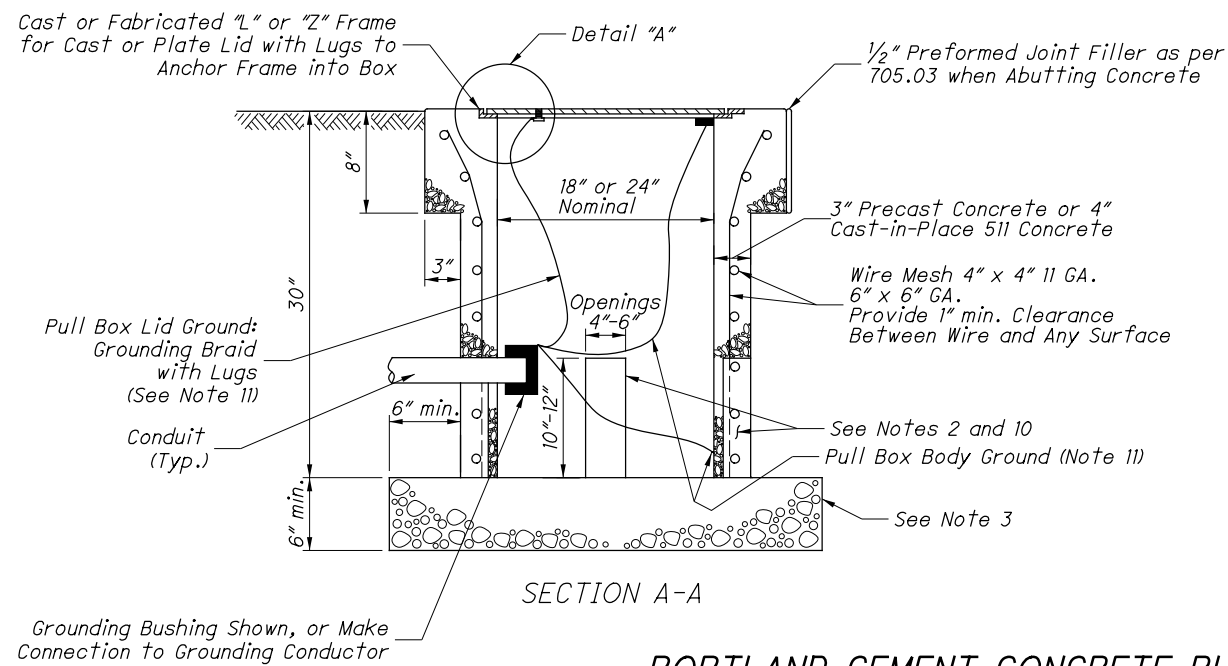
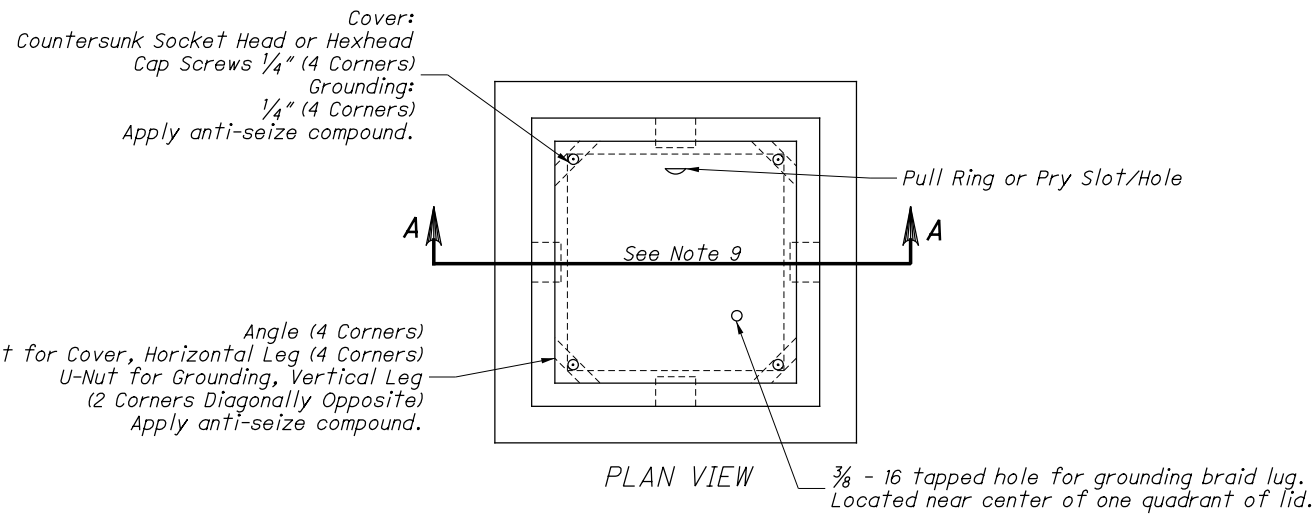
In the event City obtained quality control samples fail specifications, certification of the product can be revoked. If a split sample fails to meet specification, two more split samples will be obtained immediately by the Laboratory. Notification of the failing test will be given to the producer after the additional split samples have been obtained. The supplier may be requested to send the results of his split sample testing to the Laboratory. One of the two additional split samples will be tested. If this sample fails, the supplier will be invited to observe testing of the third sample. Revoking the product certification will be based on analysis of the Laboratory and supplier results. Revoking of the product certification will be in writing to the supplier. Recertification will be contingent upon a review of the supplier quality control program and product failure history. Section 1032.02.A will be followed for recertification.

The supplier can appeal a removal from certification to the Department of Public Service, Division of Design and Construction Control Group which consists of the following City personnel:

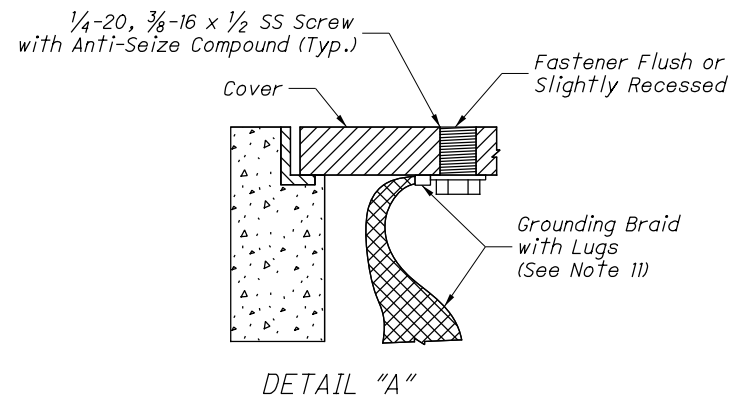
1. Deputy Director, Department of Public Service
2. Administrator, Department of Public Service, Division of Design and Construction
3. Construction Section Manager

Appeals must be in writing with supporting data and be submitted to the Construction Section Manager within 10 work days of notice of removal from certification.

- F. The Laboratory will maintain a current list of suppliers whose materials may be accepted by certification for use on City projects.
- G. All materials shipped prior to or after removal from approval to ship by certification will be sampled, tested and approved before use.
- H. Continued approval to ship by certification will be contingent upon a record of satisfactory performance. Each refiner's quality control program will be subject to a yearly review by the Laboratory.



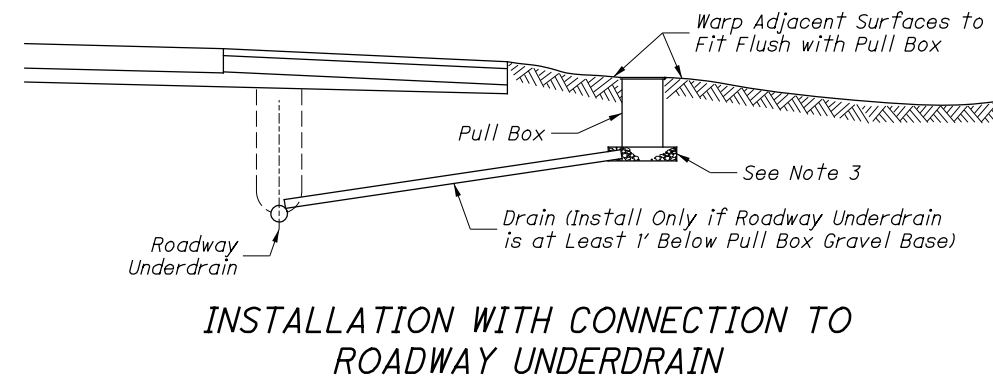
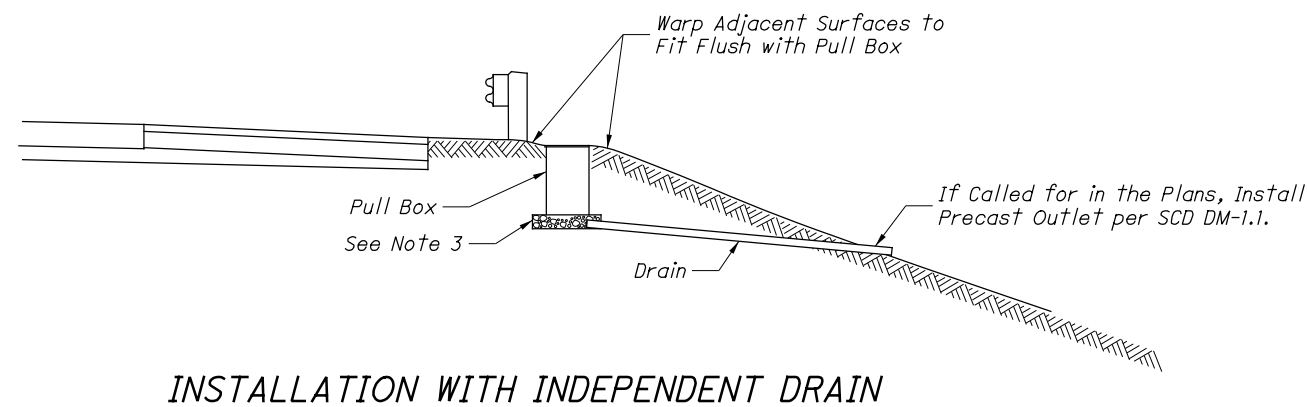
PORTLAND CEMENT CONCRETE PULL BOX (725.08)



NOTES:

1. Pull boxes shall conform with C&MS 625.11 and 725.07 or 725.08 or 725.06.
2. Conduit openings shall be sealed after conduit installation.
3. Aggregate used for pull boxes shall be No. 7 or 8, at least 6" deep. Cost for aggregate shall be included with the unit price bid for each pull box.
4. Pull box drains in accordance with C&MS 611 shall be installed as directed by the Engineer.
5. A durable label reminding of the need to lubricate the threads of the cover hold down screws with grease or anti-seize compound shall be on the inside of the frame or upper wall.
6. See specifications for cover marking requirements.
7. Portland cement concrete pull box covers shall be cast iron with reinforcing ribs and matching frames by Neenah, Josam or Zurn foundries, or approved equal, or covers may be 1/2" minimum galvanized plate steel.
8. Tapered thickness portland cement concrete pull box walls may be used; however, minimum wall thickness shall be as indicated.
9. Lifting rings or wire pulling rings may be incorporated into precast portland concrete pull box walls.
10. Conduit entries for cast-in-place portland cement concrete pull boxes shall be cast as required. Precast portland cement concrete pull boxes may have field core drilled or sawed openings, or may have precast openings or knockouts. Knockouts shall be arranged to avoid compromising the structural integrity of the box.
11. Grounding braid, with lugs, shall be tinned copper, equivalent to #4 AWG. Do not use wire for the lid grounding conductor. Braid shall be bonded to the circuit grounding conductor by an approved (UL-listed) means. Braid length shall allow for complete removal of cover and placement on ground adjacent to the pull box, 48" minimum. Also, ground the pull box body using the braid or #4 AWG green wire. Pull box body ground attachment may be made on the corner angle U-nuts or on a body-mounted grounding stud (if provided).
12. Polymer concrete, fiberglass and plastic pull boxes (725.06, 725.07, and 725.12) shall come in the following nominal sizes based on volume. Linear dimensions shall match to +/- 5% and volume by +/- 10%.

SIZE (nominal)	LENGTH (in.)	WIDTH (in.)	DEPTH (in.)
1.5	11	18	12
4	13	24	24
7	17	30	24
18	24	36	36
30	30	48	36



THIS DRAWING REPLACES HL-30.11 DATED 07-20-2018.

SCD NUMBER  
HL-30.11

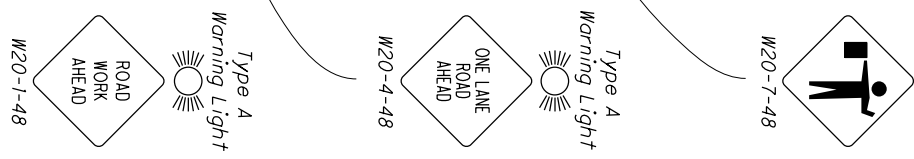
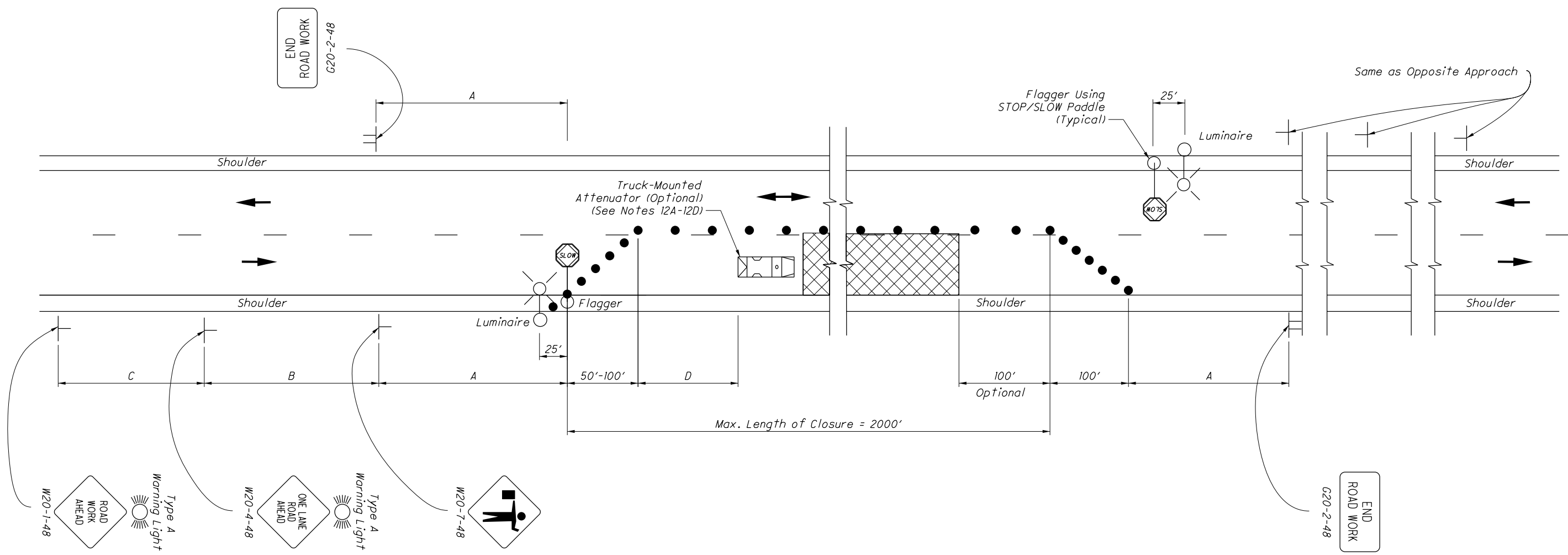
STANDARD ROADWAY CONSTRUCTION DRAWING  
PULL BOX DETAILS

OFFICE OF  
ROADWAY  
ENGINEERING

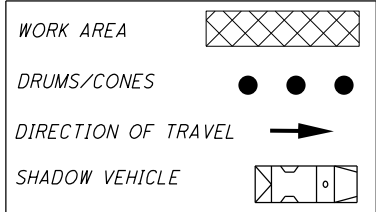
STATUS  
ENGINEER  
Duemmel

STATE OF OHIO DEPARTMENT OF  
TRANSPORTATION ADMINISTRATOR  
David L. Holstein

REVISION DATE  
01-18-2019



**LEGEND**



**TABLE I (SIGN SPACING)**

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
	A	B	C
Two-Lane (≤ 40 MPH)	100	100	100
Two-Lane (45-50 MPH)	350	350	350
Two-Lane (55-60 MPH)	500	500	500

**TABLE II**

SPEED LIMIT (MPH)	BUFFER (D) (FT) MIN.
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570

THIS DRAWING REPLACES MT-97.10 DATED 07-19-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

**FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY - STATIONARY OPERATION**

SD NUMBER  
**MT-97.10**

OFFICE OF ROADWAY ENGINEERING

STATUS  
ENGINEER  
Soisson

STATE OF OHIO DEPARTMENT OF TRANSPORTATION ADMINISTRATOR  
Reynaldo Stargell

REVISION DATE  
07-18-2014

NOTES:

FLAGGERS

- 1. *Flaggers, one for each direction, shall be used to control traffic continuously for as long as a one lane operation is in effect. The flaggers shall be able to communicate with each other at all times.*

LENGTH OF CLOSURE

- 2. *Several small work areas close together should be combined into one work zone. However, the closure shall not be more than 2000' long unless approved by the Engineer. The minimum length between closures shall be 2000'. Only one side of the road shall be closed in any one work zone.*

SIGN LOCATION AND SPACING

- 3A. *The minimum spacing between work zone signs is shown in Table 1. Maximum spacing should not be greater than 1.5 times the distances shown in Table 1.*
- 3B. *Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200' for speeds of 45 mph or less and a minimum of 400' for speeds of 50 mph or greater.*
- 3C. *The location of the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.*

ADJUSTMENTS FOR SIGHT DISTANCE

- 4. *The location of the flagger station and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.*

BASIC SIGNING

- 5A. *ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.*
- 5B. *END ROAD WORK (G20-2) signs are only required for lane closures of more than 1 day. If is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.*
- 5C. *Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any ROAD WORK AHEAD (W20-1) or END ROAD WORK (G20-2) sign which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.*

SIGNING DETAILS

- 6A. *The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.*
- 6B. *36" warning signs may be used when the approach speed limit is 40 mph or less.*

FLASHING WARNING LIGHTS

- 7. *Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the LANE CLOSED AHEAD (W20-5) signs are required whenever a night lane closure is necessary.*

DRUMS / CONES

- 8A. *Drum spacing shall be as follows:*
  - a) *Spacing along the closure shall be 40' center-to-center.*
  - b) *Spacing along the approach taper shall be 10' center-to-center.*
- 8B. *Cones may be substituted for drums as follows:*
  - a) *Cones used for daytime traffic control shall have a minimum height of 28".*
  - b) *Cones used for nighttime traffic control shall have a minimum height of 42".*
  - c) *Use of cones at night shall be prohibited along tapers.*
- 8C. *Provisions shall be made to stabilize the cones and drums to prevent them from blowing over.*
- 8D. *A minimum of two drums shall be used to close the paved shoulder.*

(RESERVED FOR FUTURE USE)

- 9A. *(intentionally blank)*

AREA ILLUMINATION

- 10A. *Adequate area illumination of each flagger station shall be provided at night. Use of portable flood lighting is acceptable. Luminaires shall be located adjacent to each flagger station.*
- 10B. *To ensure the adequacy of floodlight placement and the elimination of glare, the Contractor and the Engineer shall drive through the worksite each night when the lighting is in place. Light placement and shielding shall be adjusted to the satisfaction of the Engineer.*

INTERSECTION / DRIVEWAY ACCESS

- 11. *Within the length of closure, provision shall be made to control traffic entering from intersecting streets and major drives as necessary to prevent wrong-way movements and to keep vehicles off of new pavement not ready for traffic. The Contractor shall:*
    - a) *Place across the closed lane, either three drums (cones) or barricades, and/or*
    - b) *Provide an additional flagger at every public street intersection and major driveway.*
- Drums (cones) placed across the closed lane shall be located 25' beyond the projected pavement edges of the driveway or cross highway, as shown in Standard Construction Drawings (SCDs MT-97.11 or MT-97.12. For barricades, see SCD MT-101.60.*
- Existing STOP signs shall be relocated as necessary to assure proper location for the traffic conditions.*
- The method of control shall be subject to the approval of the Engineer.*

SHADOW VEHICLE

- 12A. *The shadow vehicle shall be in place and unoccupied whenever workers are in the work area. This vehicle shall be removed from the pavement whenever workers are not in the work area.*
- 12B. *The shadow vehicle shall be equipped with a high-intensity yellow rotating, flashing, oscillating, or strobe light(s).*
- 12C. *The vehicle shall be equipped with a truck-mounted attenuator when called for in the plans.*
- 12D. *Other protective devices may be used in lieu of the shadow vehicle shown when approved by the Engineer.*

CHIP SEAL OPERATIONS

- 13. *For chip seal operations, additional signing shall be incorporated in the advanced warning area.*
  - a) *The LOOSE GRAVEL (W8-7) and FRESH TAR (W21-2) signs shall both be used in advance of the chip seal operation.*
  - b) *Repeat the LOOSE GRAVEL sign with a 35 mph Advisory Speed (W13-1) plaque every half mile per CMS 422.09.*
  - c) *The FRESH TAR and the LOOSE GRAVEL signs shall both be used for signing of side roads intersecting the work area.*

THIS DRAWING REPLACES MT-97.10 DATED 07-19-2013.

STANDARD ROADWAY CONSTRUCTION DRAWING

FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY - STATIONARY OPERATION

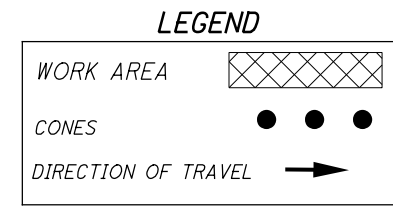
SCD NUMBER  
MT - 97.10

OFFICE OF  
ROADWAY  
ENGINEERING

STATE  
ENGINEER  
Soisson

STATE OF OHIO DEPARTMENT OF  
TRANSPORTATION ADMINISTRATOR  
Reynaldo Stargell

REVISION DATE  
07-18-2014

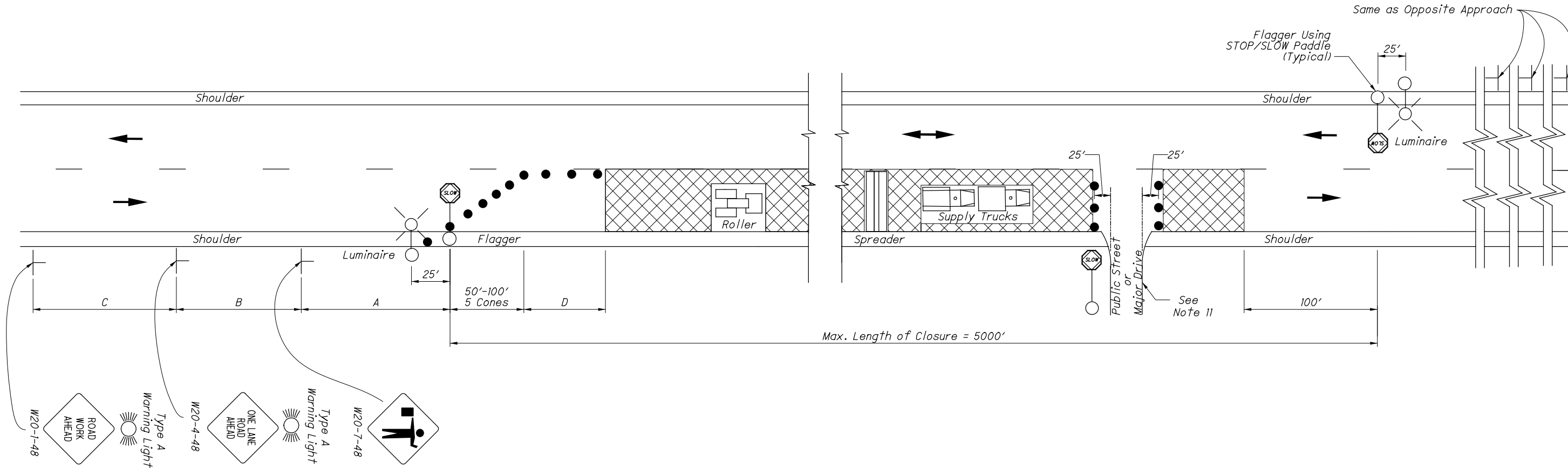


**TABLE I (SIGN SPACING)**

ROAD TYPE	DISTANCE BETWEEN SIGNS (FT)		
	A	B	C
Two Lane ≤ 40 MPH	100	100	100
Two Lane 45-50 MPH	350	350	350
Two Lane 55-60 MPH	500	500	500

**TABLE II**

SPEED LIMIT (MPH)	BUFFER (D) (FT) MIN.
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570



THIS DRAWING REPLACES MT-97.11 DATED 07-18-2014.

STANDARD ROADWAY CONSTRUCTION DRAWING

**FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY FOR PAVING OPERATIONS (NON-FED ONLY)**

SD NUMBER  
**MT-97.11**

**OFFICE OF ROADWAY ENGINEERING**

SESS ENGINEER  
Soisson

STATE OF OHIO DEPARTMENT OF TRANSPORTATION ADMINISTRATOR  
David L. Holstein

REVISION DATE  
01-20-2017

NOTES:

FLAGGERS

- 1. *Flaggers, one for each direction, shall be used to control traffic continuously for as long as a one lane operation is in effect. The flaggers shall be able to communicate with each other at all times.*

LENGTH OF CLOSURE

- 2. *It is required that the length of closure be kept to a minimum at all times, as directed by the Engineer, with a maximum allowable length of 5000'.*

*When the ambient temperature exceeds 80 degrees Fahrenheit the Engineer may increase the maximum allowable length of closure to allow for sufficient cooling of new pavement.*

*The Engineer may shorten the maximum allowable length of closure to relieve excessive traffic backups or to improve traffic operation.*

SIGN LOCATION AND SPACING

- 3A. *The minimum spacing between work zone signs is shown in Table I. Maximum spacing should not be greater than 1.5 times the distances shown in Table I.*
- 3B. *Sign spacing should be adjusted to avoid conflict with existing signs. Minimum spacing to existing signs shall be 200' for speeds of 45 mph or less and a minimum of 400' for speeds of 50 mph or greater.*
- 3C. *The location of the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.*

ADJUSTMENTS FOR SIGHT DISTANCE

- 4. *The location of the flagger station and the advance warning signs should be adjusted to provide for adequate sight distance for the existing vertical and horizontal roadway alignment.*

BASIC SIGNING

- 5A. *ROAD WORK AHEAD (W20-1) signs shall be provided on entrance ramps or roadways entering the work limits.*
- 5B. *END ROAD WORK (G20-2) signs are only required for lane closures of more than 1 day. If is intended that these signs be placed on the mainline, on all exit ramps, and on roadways exiting the work limits.*
- 5C. *Overlapping of signing for adjacent projects should be avoided where the messages could be confusing. Any ROAD WORK AHEAD or END ROAD WORK sign which falls within the limits of another traffic control zone shall be omitted or covered during the period when both projects are active.*

SIGNING DETAILS

- 6A. *The Advisory Speed (W13-1P) plaque shall be used when specified in the plan.*
- 6B. *36" warning signs may be used when the approach speed limit is 40 mph or less.*

FLASHING WARNING LIGHTS

- 7. *Type A flashing warning lights shown on the ROAD WORK AHEAD (W20-1) signs and on the LANE CLOSED AHEAD (W20-5) signs are required whenever a night lane closure is necessary.*

CONES

- 8A. *Cone spacing shall be as follows:*
  - a) *Spacing along the buffer shall be 40' center-to-center.*
  - b) *Spacing along the approach taper shall be 10' center-to-center.*
- 8B. *Cone sizes shall be as follows:*
  - a) *Cones used for daytime traffic control shall have a minimum height of 28".*
  - b) *Cones used for nighttime traffic control shall have a minimum height of 42".*
- 8C. *Provisions shall be made to stabilize the cones to prevent them from blowing over.*
- 8D. *A minimum of two cones shall be used to close the paved shoulder.*

(RESERVED FOR FUTURE USE)

- 9A. *(intentionally blank)*

AREA ILLUMINATION

- 10A. *Adequate area illumination of each flagger station shall be provided at night. Use of portable flood lighting is acceptable.*
- 10B. *To ensure the adequacy of floodlight placement and the elimination of glare, the Contractor and the Engineer shall drive through the worksite each night when the lighting is in place. Light placement and shielding shall be adjusted to the satisfaction of the Engineer.*

INTERSECTION / DRIVEWAY ACCESS

- 11. *Within the length of closure, provision shall be made to control traffic entering from intersecting streets and major drives as necessary to prevent wrong-way movements and to keep vehicles off of new pavement not ready for traffic. The Contractor shall:*
    - a) *Place across the closed lane, either three cones or barricades, and/or*
    - b) *Provide an additional flagger at every public street intersection and major driveway.*
- Cones placed across the closed lane shall be located 25' beyond the projected pavement edges of the driveway or cross highway. For barricades, see Standard Construction Drawing MT-101.60.*

*Existing STOP signs shall be relocated as necessary to assure proper location for the traffic conditions.*

*The method of control shall be subject to the approval of the Engineer.*

CHIP SEAL OPERATION

- 12. *For chip seal operations, additional signing shall be incorporated in accordance with CMS 422.09.*

THIS DRAWING REPLACES MT-97.11 DATED 07-18-2014.

STANDARD ROADWAY CONSTRUCTION DRAWING

FLAGGER CLOSING 1 LANE OF A 2-LANE HIGHWAY FOR PAVING OPERATIONS (NON-FED ONLY)

OFFICE OF ROADWAY ENGINEERING

STATE ENGINEER

David L. Holstein

REVISION DATE

01-20-2017

MT-97.11

2 / 2

**STATE OF OHIO  
DEPARTMENT OF TRANSPORTATION  
SUPPLEMENTAL SPECIFICATION 800  
REVISIONS TO THE 2016 CONSTRUCTION & MATERIAL SPECIFICATIONS**

**DATED 1-18-2019**

**101.02**

On page 6, **Add** the following abbreviation to the list:

DCE        District Construction Engineer

On page 8, **Add** the following abbreviation to the list:

TAP        Traffic Authorized Product

**101.03**

On page 10, **Replace** the definition with the following:

**Contract Documents.** The Contract Documents include the Invitation for Bids, Addenda, Proposal, contract form and required bonds, Specifications, Supplemental Specifications, Special Provisions, general and detailed plans, Plan notes, standard construction drawings identified in the Plans, notice to contractor, Change Orders, Supplemental Agreements, Extra Work Contracts, “Accepted” and “Accepted as Noted” Working Drawings, and any other document designated by the Department as a Contract Document, all of which constitute one instrument.

On page 11, **Add** the following definition after the definition of **Engineer**:

**Engineered Drawings.** A type of Working Drawing that requires the practice of engineering as defined in ORC 4733.01(E). Examples of Engineered Drawings include: Excavation Bracing Plans, Demolition Plans, Erection Plans, Falsework Plans, Cofferdam Plans, Causeway Plans, Jacking and Temporary Support Plans, Plans for Heavy Equipment on Structures, Plans for structures for Maintaining Traffic, and Corrective Work Plans.

On page 13, **Replace** the definition with the following:

**Shop Drawings.** Drawings accepted by the Contractor and submitted to the Department that describe portions of the Work fabricated off site that are incorporated permanently with the project. Department acceptance is not required.

On page 14, **Replace** the definition with the following:

**Working Drawings.** Contractor submitted drawings for work, not otherwise defined in the Bid Documents, and require Department acceptance. Examples of Working Drawings include: Engineered Drawings, installation plans, certified drawings, and any other supplementary plans or similar data that the Contractor is required to submit for acceptance.

**102.01**

On page 15, **Add** the following paragraph after the second paragraph:



The Department will perform contractor performance evaluations for each contractor and subcontractor on every ODOT-let construction project. Evaluations shall be well documented, objective, and performed in a timely manner, in accordance with Supplement 1131. The contractor's average scores for the previous calendar year will be used in the calculation of the contractor's bidding capacity. The contractor has the right to appeal an evaluation.

**104.02.D**

On page 22, **Replace** the first sentence with the following:

The Engineer may increase or decrease quantities and alter the Work as necessary to complete the Project.

**104.02.D**

On page 23, **Replace** item number 3 in the first paragraph with:

3. the total of all such adjustments for all Contract Items is more than \$400.

**104.02.D**

On page 23, **Replace** Table 104.02-2 with the following table:

**TABLE 104.02-2**

<b>% Decrease</b>	<b>Factor</b>	<b>% Decrease</b>	<b>Factor</b>
25	1.08	67	1.51
26 to 27	1.09	68	1.53
28 to 29	1.10	69	1.56
30 to 31	1.11	70	1.58
32 to 33	1.12	71	1.61
34 to 35	1.13	72	1.64
36	1.14	73	1.68
37 to 38	1.15	74	1.71
39	1.16	75	1.75
40 to 41	1.17	76	1.79
42	1.18	77	1.84
43	1.19	78	1.89
44 to 45	1.20	79	1.94
46	1.21	80 and over	2.00
47	1.22		
48	1.23		
49	1.24		
50	1.25		
51	1.26		
52	1.27		
53	1.28		
54	1.29		
55	1.31		
56	1.32		
57	1.33		
58	1.35		
59	1.36		
60	1.38		
61	1.39		
62	1.41		
63	1.43		
64	1.44		
65	1.46		
66	1.49		

#### 104.02.D

On page 24, **Delete** the first paragraph “A quantity...” through the end of TABLE 104.02-3. The last paragraph in the section will remain.

#### 105.02

On page 26, **Replace** the last paragraph of the subsection with the following:

“Accepted” and “Accepted as Noted” Working Drawings are Contract Documents as defined in 101.03. The Department’s acceptance will not relieve the Contractor of responsibility to complete the Work according to the Contract nor relieve a signatory engineer’s responsibility as defined by OAC 4733-23. Include the cost of furnishing Working Drawings in the cost of the Work they cover.

#### 105.16

On page 32, **Delete** the last sentence of the first paragraph beginning with “The cost of work...”

#### 105.16

On page 32, **Add** the following paragraph after the last paragraph of the section:

The cost of work described herein is incidental to the Contract, unless included under another item of work.

#### 106.09

On page 36, **Delete** section E:

On page 36, **Change Section F to Section E:**

**E. Proof of Domestic Origin.** Furnish documentation to the Engineer showing the domestic origin of all steel and iron products covered by this section, before they are incorporated into the Work. Products without a traceable domestic origin will be treated as a non-domestic product.

#### 106.11

On page 37, **Add** the following section:

**106.11 Maritime Transportation.** On federal-aid projects, ensure that project-specific materials or equipment transported by ocean vessel are in compliance with 46 CFR 381 and the Cargo Preference Act. Transport at least 50% of any equipment or materials on privately owned United States-flag commercial vessels, if available.

#### 107.21

On page 49, **Replace** the first paragraph in the section with:

**107.21 Prompt Payment.** In accordance with ORC 4113.61, make payment to each subcontractor and supplier within 10 Calendar Days after receipt of payment from the Department for Work performed or materials delivered or incorporated into the Project, provided that the pay estimate prepared by the Engineer includes Work performed or materials delivered or incorporated into the public improvement by the subcontractor or supplier. Contractors are prohibited from holding retainage from bonded subcontractors. For unbonded subcontractors, promptly release any retainage held, as set forth in any subcontractor or supplier agreement, within 10 days of department's acceptance of the work involving the subcontractor or supplier from whom retainage has been held. For the sole

purpose of establishing a time frame for the release of the subcontractor or supplier retainage, acceptance of subcontractor or supplier work will occur when the subcontractor or supplier has complied with the requirements of 109.12.A and B. No subcontract provision shall permit the Contractor to delay subcontractor's retainage payments until the Project's final payment.

#### **107.22**

On page 49, **Add** the following section:

**107.22 Unmanned Aircraft Systems.** If the project requires or anticipates the use of Unmanned Aircraft Systems within ODOT Right of Way, the Contractor will follow proper risk assessment and federal regulations in accordance with Supplement 1132.

#### **108.02**

On page 50, **Replace** the second sentence in the sixth paragraph with:

At or before the meeting, submit the initial progress schedule to the DCE. Prepare the schedule according to 108.03.

On page 53, **Replace** the fourth paragraph with:

2. Step 2 (District Dispute Resolution Committee). Each District will establish a District Dispute Resolution Committee (DDRC) which will be responsible for hearing and deciding disputes at the Step 2 level. The DDRC will consist of the District Deputy Director, District Construction Engineer and the Capital Program Administrator or designees (other than the project personnel involved in the dispute).

On page 53, **Replace** the fifth paragraph with:

Within seven (7) calendar days of receipt of the Step 1 decision, either abandon the dispute or submit a written request for a Step 2 meeting to the District Construction Engineer (DCE). The DCE will assign the dispute a dispute number. Within fourteen (14) calendar days of submitting the request for a Step 2 meeting, submit three (3) complete copies of the Dispute Documentation to the DCE as follows:

On page 54, **Replace** the sixth paragraph with:

a) Director's Claims Board Hearing. The Director's Claims Board (the "Board") will consist of the Deputy Director of the Division of Construction Management, Deputy Director of Engineering and a District Capital Program Administrator from a district not involved in the claim, or their designees. A representative from the Division of Chief Legal Counsel and Division of Opportunity, Diversity, and Inclusion may be present to observe the hearing. The Director or designee will be responsible for deciding claims.

On page 56, **Add** the following paragraph after the sixth paragraph:

Prior to any ADR meeting, certify the claim in writing and under oath using the following certification:

*“I, (Name and Title of an Officer of the Contractor) certify that this claim is made in good faith, that all supporting data is accurate and complete to the best of my knowledge and belief, and that the claim amount accurately reflects the contract amendment for which (Contractor Company name) believes the Department is liable.”*

On page 56, **Add** the following sentence to the seventh paragraph:

However, interest will not be paid on the amount of any agreed settlement unless specifically itemized and included in the total settlement prior to agreement.

**108.07**

On Page 64, **Replace** Table 108.07-1 with the following:

**TABLE 108.07-1 SCHEDULE OF LIQUIDATED DAMAGES**

Original Contract Amount (Total Amount of the Bid)		Amount of Liquidated Damages to be Deducted for Each Calendar Day of Overrun in Time
From More Than	To and Including	
\$0.00	\$500,000	\$400
\$500,000	\$2,000,000	\$600
\$2,000,000	\$10,000,000	\$900
\$10,000,000	\$50,000,000	\$1,500
Over \$50,000,000		\$3,200

**109.05.C.4**

On Page 74, **Replace** the second paragraph with:

The Department will pay for use of Contractor-owned equipment the Engineer approves for force account Work at established rates. The Department will pay the rates, as modified in 109.05.C.4.b, given in the Equipment Watch Cost Recovery (formerly Rental Rate Blue Book), by EquipmentWatch, a division of Penton Business Media, Inc.

**109.05.D.2.e.**

On page 84, **Add** the following text to the end of the second paragraph:  
**One Clerk may be substituted with One Assistant Superintendent or One Engineer.**

**109.09**

On Page 85, **Add** the following sentence to the end of the first paragraph:

Any pay item deficient in material approval can be withheld for payment on an estimate.

**109.12.B.**

On page 88, **Add** the following sentence after the first sentence in the paragraph:

For project involving multiple public agencies, the Final Inspector will receive and compile punch lists from all agencies that have authority to provide one prior to issuing the Department’s punch list.

**202.03**

On page 93, **Add** the following sentence to the end of the second paragraph:

Remove any existing welded form hangers, welded attachments two inches or longer measured parallel to the long axis of the top flange of steel beams or girders, and welded attachments that interfere with the placement of welded shear connectors.

**202.04**

On page 93, **Replace** the first paragraph with the following:

**Pipe Removal.** Remove and reuse, store, or dispose of pipe, or culvert, including headwalls, as specified in the Contract Documents.

**202.04**

On page 94, **Replace** the first full paragraph with the following:

Seal openings left in walls of manholes or catch basins that are to remain in place.

**203.04**

On page 101, **Replace** the second sentence of the fifth paragraph of 203.04 with the following:

The area is considered to contain hazardous waste or material and must be handled according to the *Construction Administration Manual of Procedures*, Item 202 Removal of Structures and Obstructions, Section- Regulated Waste Requirements, Regulated Wastes Found During Construction.

**205.04.A.**

On page 116, **Replace** the second sentence of the first paragraph with the following:

The percentage is based on a dry density for soil of 115 pounds per cubic foot (1840 kg/m3):

**205.04.A.**

On page 116, **Replace** Table 205.04-1 with the following:

<b>Chemical</b>	<b>Spreading Rate</b>
Cement	5 %
Lime	5 %

**205.04.B.**

On page 116, **Replace** the second sentence of the first paragraph with the following:

If necessary, add water to bring the mixed material to between 2 and 4 percent above optimum moisture content for cement, and to at least 3 percent above optimum moisture content for lime.

**205.07**

On page 117, **Add** the following paragraph after the first paragraph:

The Department will not apply the quantity underrun adjustment factors in Table 104.02-2 to the bid unit prices for Cement and Lime.

**206.05.A.**

On page 118, **Replace** the second sentence of the second paragraph with the following:

The percentage is based on a dry density for soil of 115 pounds per cubic foot (1840 kg/m<sup>3</sup>):

**206.05.A.**

On page 118, **Replace** Table 206.05-1 with the following:

<b>Chemical</b>	<b>Spreading Rate</b>
Cement	5 %
Lime	5 %

**206.05.B.1.**

On page 119, **Replace** the first sentence of the fourth paragraph with the following:  
After the initial mixing, remix the soil and introduce water through the mixer to bring the mixed material to between 2 and 4 percent above optimum moisture.

**206.05.D**

On page 120, **Replace** the first sentence of the first paragraph with the following:

By the end of each day's operation, cover the stabilized work area's surface with curing coat for curing the chemically stabilized subgrade.

**206.05.D**

On page 120, **Replace** the second sentence of the second paragraph with the following:

If the surface starts to dry out, indicated by turning white, or the curing coat is delayed, apply water for temporary curing until the curing coat can be applied.

**206.08**

On page 121, **Add** the following paragraph after the first paragraph:

The Department will not apply the quantity underrun adjustment factors in Table 104.02-2 to the bid unit prices for Cement and Lime.

**209.06**

On page 137, **Add** the following paragraph after the last paragraph:

When preparing the subgrade for a safety edge, grade an area approximately 10 inches (250 mm) wide from the edge of the paved surface to remove vegetation and any high spots. Provide a surface free of vegetation and level with or slightly below the paved surface to be paved.

**255.05**

On page 145, **Replace** the entire section with the following:

**255.05 Placing Dowels and Tiebars.** Drill dowel and tiebar holes using hydraulic, electric, or pneumatic percussion drills without spalling or damaging the existing concrete. Provide drills capable

of independent adjustment of each drill shaft in the horizontal and vertical direction. When drilling dowels, use a device capable of drilling a minimum of three holes at a time. For patches 10 feet (3 m) or greater in length, provide tie bars or wiggle bolts of the size and spaced as shown on the standard construction drawings along the longitudinal joint(s). Blow all drilled holes clean with oil-free compressed air. Maintain holes dry and frost free before grouting the dowels or tiebars. Pneumatically inject grout starting at the rear of the drilled holes and drawing a bead of material towards the front. Inject a sufficient amount of grout to fill all voids around the dowels and tiebars. Use a grout retention disc with a radius slot as shown in the standard drawings to retain the grout within the drilled holes. Place the grout retention disc on the dowels and tiebars at the end to be inserted in the hole. Insert dowels and tiebars in the holes and rotate the dowels and tiebars approximately one full revolution. Ensure a small amount of grout extrudes through the radius slot in the grout retention disc when the dowels and tiebars are installed. Hold dowel bars in proper alignment until the grout has hardened.

#### **255.10**

On page 148, **Replace** the third paragraph with the following:

The Department will not pay for additional work to repair damage caused by pavement sawing, pavement drilling or pavement removal.

#### **302.04**

On page 161, **Replace** the entire subsection with the following:

**302.04 Spreading and Finishing.** Ensure that the compacted depth of any one layer is a minimum of 4 inches (100 mm) and a maximum of 7.75 inches (190 mm). If the plan thickness is 7.0-7.75 inches (178 mm – 190 mm) and District Testing confirms the JMF and mixture production has 95% passing the 1.50 inch (37.5 mm) sieve, the 302 may be placed in two lifts if requested by the Contractor. One lift of plan thickness will be required if top size aggregate dragging occurs. Ensure that the temperature of the mixture when delivered to the paver is a minimum of 250 °F (120 °C). Ensure the temperature of the mixture is sufficient for the roller coverage to be effective in compacting the mixture.

#### **304.03**

On page 162, **Replace** the first paragraph with the following:

**304.03 Before Spreading.** Sample the material stockpile, according to ASTM D75, to determine the initial moisture content to be used for compaction. Create the moisture-density curve according to AASHTO T 99, Method C, to determine the optimum moisture content.. For projects when the total volume of material is less than 1000 cubic yards (765 m<sup>3</sup>), the optimum moisture content may be obtained from a moisture-density curve that was performed on the material within 1 year prior to the date of placement. Submit moisture-density test results to the Engineer.

#### **401.04**

On page 171, **Replace** the fourth full paragraph with the following:

Determine RAS properties and usage as follows. Use no more than **3.0 percent RAS** by dry weight of mix. When using RAP and RAS in combination use no more than **25 percent RAP**. For design assume **12.0 percent** available RAS binder. Determine gradation and specific gravity according to **AASHTO PP 78-17**, Section 5 or subsequent AASHTO applicable standard. Provide the required certification forms in the JMF submittal documenting that the RAS meets **AASHTO MP 23-15(2016)**,



section 4 and that RAS from roofing tearoffs conforms to the EPA's NESHAP, 40 CFR 61 Subpart M, and other applicable agency requirements for asbestos.

#### 401.04

On page 171, **Replace** the last paragraph with the following:

Process and use RAP by one of the following two methods. Note on the JMF submittal RAP page which of Method 1 or Method 2 methods described below apply to the RAP. When using RAS without RAP apply the virgin binder requirements of Table 401.04-2 Method 2. Use PG64-28 virgin binder in all 442 intermediate courses regardless of the percentage of RAP used. If greater than 25 percent RAP is used in a JMF submittal use PG58-28 or PG64-28 virgin binder. If 26-30 percent RAP is used in the JMF submittal, the Contractor may submit a 3000 gram RAP sample along with a blend chart, according to Level 3 Mix Design procedures, to determine the grade of virgin asphalt binder to use. When using both 15 percent or greater RAP and 3 percent RAS in an intermediate or base course use PG58-28 or PG64-28. ODOT may request RAP and/or RAS samples or binder properties at any time.

#### 401.04.A

On page 172, **Replace** the last sentence of the first paragraph with the following:

In addition, for surface course JMF submittals having polymer asphalt binder and RAP, do not submit any blends having 1 through 9 percent RAP.

#### 401.04.A

On page 172, in Table 401.04-1, **Replace** the Comments for 442 Polymer Surface Course with the following:

Polymerized binder is virgin. (For non-polymer virgin binder allow 20% max RAP.)

**Replace** the RAS Usage for 441 Polymer Surface Course with the following: None

**Replace** the Footnote [1] with the following: [1] No more than 3.0% RAS by dry weight of mix

#### 401.04.B

On page 172, **Replace** the last sentence of the first paragraph with the following:

In addition, for surface course JMF submittals having polymer asphalt binder and RAP, do not submit any blends having 1 through 9 percent RAP.

#### 401.04.B

On page 173, in Table 401.04-2, **Replace** the Comments for 442 Polymer Surface Course with the following:

Polymerized binder is virgin. (For non-polymer virgin binder allow 25% max RAP.)

**Replace** the RAS Usage for 441 Polymer Surface Course with the following: None

**Replace** the Footnote [1] with the following: [1] No more than 3.0% RAS by dry weight of mix

#### 401.04.C

On page 173, **Add** the following sentence to the end of the first paragraph:

**C. RAS Processing and Usage.** Include RAS in a JMF submittal according to the Standard RAP/RAS Limits Table 401.04-1 or Extended RAP/RAS Limits Table 401.04-2 unless specified

differently in the applicable mix specification. When using RAS without RAP apply the virgin binder requirements of Table 401.04-2 Method 2.

#### **401.04.C**

On page 174, **Replace** the first paragraph with the following:

**RAP and RAS QC and Management Requirements.** Maintain as part of the QC records the signed certification forms as required in Supplement 1116.

#### **401.04.C**

On page 174, **Replace** the first sentence of the second paragraph with the following:

Ensure RAS is processed to have 100 percent passing the 1/2 inch (12.5 mm) sieve and at least 90 percent passing the No. 4 (4.75 mm) sieve.

#### **401.08**

On page 175, **ADD** the following paragraph after the first paragraph:

At a minimum, take a split sample of asphalt binder whenever the Department requests a sample. Address in the QCP the QC of mix plant asphalt binder samples and subsequent corrective action of binder test failures of any sample (QC or Department). Failure to perform QC of asphalt binder samples is at the Contractor's risk. Any Department binder sample failures will result in penalties per Supplement 1102. These include remove and replace, pay deductions, or other penalties for the asphalt mix represented by the Department's sample.

#### **401.11**

On page 176, **Add** the following sentence to the end of the last paragraph:

Completely discharge the mixture into the spreading equipment and within 90 minutes of loading.

#### **401.15**

On page 181, **Replace** the last paragraph with the following:

When the total project includes more than one continuous lane mile (including bridges) of surface course paving in combination with night paving, and no pay item for anti-segregation equipment, provide anti-segregation equipment according to 401.12, for only the surface course. No additional payment will be made for this anti-segregation equipment.

#### **402.02**

On Page 185 **Replace** the second sentence of the first paragraph with the following:

Calibrate the asphalt binder meter according to Supplement 1101.07 Method A or B. When calibrating the asphalt binder meter according to Method B, daily aggregate and RAP weighbridge validations are required to be performed according to Supplement 1101.06. Document which plants follow Supplement 1101.01 Method B in the Quality Control Program (403.03). If issues persist for Method B calibrations or documentation, the Department will require the plant to follow Method A.

#### **403.03**

On page 188 **Replace** the first sentence of paragraph F with the following:

F. Methods to maintain all worksheets, including all handwritten records, and other test and sample records from all plant(s) and, or project(s) for a minimum of 8 years.

**403.03**

On page 189 **Add** the following sentence at the end of paragraph L.:

Means of handling asphalt binder samples taken at the mix plant including any testing, labeling, and storing of samples.

**403.03**

On page 189 **Add** after the first sentence the following sentence in paragraph N.:

Provide a detailed description of how the FQCS will handle all mat issues including segregation, tenderness, mat tears, debris, holes, etc.

**403.06.C**

On page 192, **Replace** the last sentence of the first paragraph with the following:

The Department will use its VA test result, the Contractor result of the split, as well as the most recent previous day (or night) Contractor quality control and/or subplot test in the comparison for the Department VA testing.

**403.06.C**

On page 192, **Revise** the last full sentence of the paragraph to the following.

The Contractor will test the split of the VA sample with the Monitor witnessing.

**403.06 C.**

On page 193, **Replace** the second paragraph with the following:

For 446 acceptance mixes, MSG VA testing will be performed by District Testing on a minimum of one in every four days of District-sampled Daily samples or samples split with the Contractor at the plant. The Daily sample MSG result will be compared to that days Contractor average of MSG QC test results. The MSG split sample result will be compared with the Contractor split result.

**403.06.C**

On page 193, **Replace** Note [2] of Table 403.06-1, with the following:

[2] District VA mix test deviation from most recent previous day (or night) QC and/or lot test.

**403.06.C**

On page 193, in TABLE 403.06-1, **Replace** the MSG Comparison of 0.025 for 446 with 0.010.

**403.06.C**

On page 193, **Replace** Note [3] of TABLE 403.06-1 with the following:

[3] Deviation of District Daily or Split sample MSG compared to QC MSG daily average.

**403.06.E**

On page 194, **Replace** the first paragraph with the following:

E. Contractor Tests not Verified. If the Department MSG VA test shows the MSG comparison tolerance in Table 403.06-1 is not met, a single Department tested MSG for that day and every prior production day back to when the Department MSG VA last met the tolerance will be used for each 446 Day/Lot density determination. The Contractor may request a review with the Department occasionally for the purpose of determining the cause of a comparison problem. Department decisions upon review are final. If a Contractor is requesting a review of every occurrence of lack of comparison and the Department test is always found correct, the Department may deny that Contractor further reviews. For all other mixes, if the Department VA test does not verify the accompanying Contractor tests within the verification tolerances, then the Monitoring Team will investigate.

#### **403.06.F**

On page 195, **Replace** the first paragraph with the following:

F. Contractor Removal, Restoration. For 446 MSG, for a given Contractor facility, if in a series of 15 or more Contractor/ Department MSG comparison tests (VA, Monitoring tests) the Contractor MSG is lower than the Department MSG by more than 0.002 and occurs a minimum of 65 percent of the time the facility will be removed from Department MSG Verification Acceptance and operate under 403.07. (At a minimum, a report will be issued annually of the Contractor/ Department MSG comparison status of each facility for this determination. This frequency may be increased.)

For all other mixes, if repeated problems with poor comparison of tests are not the District's fault; or poor comparison of Contractor tests to the JMF; or with plant operation, input materials, or any of the other requirements of Department specifications occur in a single project or successive projects, the District will request an opinion from the QCQC before notifying the Contractor of removal from Department VA. The District will immediately notify the Contractor of the removal with a follow up letter from District Testing. Once notified, acceptance of asphalt mixtures is by Unconditional Acceptance. Restoration of the VA procedures may occur on a future project with a District recommendation to the QCQC based on consistent improved plant operation and mix control, a review of the Contractor problems and resolutions, and a review of the QCP by the QCQC.

#### **403.07.A**

On page 195, **Add** the following sentence to the end of the first paragraph:

This requirement does not apply to 446 MSG as outlined below.

#### **403.07.B**

On page 196, **Add** the following paragraph after the first paragraph:

For 446 MSG, the Department will test a single daily MSG for each corresponding 446 Day/Lot density determination from the facility. The facility can be returned to Department MSG VA when the 65 percent criteria (see 403.06 F) is not exceeded in a series of 30 comparison tests.

**421 MICROSURFACING** On page 207, **Replace** the entire Item 421 with the following:

### **ITEM 421 MICROSURFACING**

- 421.01 Description**
- 421.02 Materials**
- 421.03 Proportioning**
- 421.04 Quality Control Program**
- 421.05 Weather Limitations**
- 421.06 Mixing Equipment**
- 421.07 Equipment Calibration**
- 421.08 Spreading Equipment**
- 421.09 Surface Preparation**
- 421.10 Test Strip**
- 421.11 Application**
- 421.12 Quality Control**
- 421.13 Acceptance**
- 421.14 Performance Review**
- 421.15 Method of Measurement**
- 421.16 Basis of Payment**

**421.01 Description.** This work consists of constructing a cold laid polymer modified emulsified asphalt pavement course to fill ruts or provide a leveling and/or surface course for existing pavements. Warrant the microsurfacing for two years.

**421.02 Materials.** Use a polymer modified emulsified asphalt binder (Binder) consisting of the following:

Use a quick-traffic CSS-1hM modified emulsified asphalt (Binder) meeting the requirements in Table 421.02-1. Use only Binder certified according to Supplement 1032. Do not use port addition of the polymer to the emulsified asphalt. Provide to the Engineer certified test data and a statement from the Binder supplier with each load of Binder that the Binder is the same base asphalt binder, polymer, polymer percentage as formulated and used in the mix design. Include the percent residue on the Bill of Lading.

Ensure the Binder meets the following and specification limits will be producible for at least 30 days from sample date:

<b>TABLE 421.02-1</b>	
Tests on emulsion, AASHTO T 59, unless otherwise designated:	CSS-1hM [1]
Viscosity, Saybolt Furol at 77 °F (25 °C) (SFS)	20 to 100
Storage Stability Tests, 24-hr (% difference), max.	1
Particle Charge Test	Positive
Sieve Tests (%) (Distilled Water), max.	0.10
Distillation to 177 °C, Residue % solids, min.[2]	62
Tests on distillation residue:	
Penetration, 25 °C, 100 g, 5 sec (dmm) AASHTO T 49	40 to 90
Ductility, 25 °C, 5 cm/min, (cm), min. AASHTO T 51	40
Solubility in trichloroethylene, (%), min. AASHTO T 44 [3]	97.5
Elastic Recovery, 10 °C, 20 cm (%), min. AASHTO T 301 [4]	50
Softening Point, Ring & Ball (°C), min. AASHTO T 53	60
<p>[1] Pre-blend only: Use a minimum of 3.0% SBR solids based on weight of the asphalt binder. Use Natural SBR latex modifier or synthetic SBR latex modifier conforming to 702.14. Use only one type of latex. Mill or blend the SBR Emulsion into the emulsified solution prior to the emulsification process.</p> <p>[2] See Supplement 1013. For natural latex, use the Oven Evaporation method in AASHTO T 59 in place of distillation and use this residue for further testing.</p> <p>[3] On the base asphalt only. Solubility in N-Propyl Bromide (ASTM D7553) can be used in place of trichloroethylene.</p> <p>[4] Straight molds. Hold at test temperature for 90 minutes. Place in ductilometer and elongate 20 cm at 5 cm/min. Hold for 5 minutes and cut. After 1 hour retract the broken ends to touch and measure the elongation (X) in centimeters to the nearest 0.01 cm. Use the following formula to calculate the elastic recovery: Percent Recovery = <math>((20-X)/20) \times 100</math>. Report results to nearest 0.1%.</p>	

Conform to 703.01 and 703.05 for aggregate, except as follows:

<b>TABLE 421.02-2</b>	
Percent by weight of fractured pieces	100
Sand Equivalence (AASHTO T176)	55 minimum

**Do not use aggregates designated with “SR” or “SRH.”**

Conform to Table 421.02-3 Gradation A for the aggregate for surface courses, Gradation B for the aggregate for rut fill courses, and Gradation A or B for the aggregate for leveling courses. Stockpile tolerance will be based on target gradation stated in the mix design but will not exceed design gradation band for No. 200 sieve.

<b>TABLE 421.02-3</b>				
<b>Sieve Size</b>		<b>Total Percent Passing</b>		<b>Stockpile Tolerance</b>
		<b>A</b>	<b>B</b>	
3/8 inch	(9.50 mm)	100	100	
No. 4	(4.75 mm)	85 to 100	70 to 90	± 5.0%
No. 8	(2.36 mm)	50 to 80	45 to 70	± 5.0%
No. 16	(1.18 mm)	40 to 65	28 to 50	± 5.0%
No. 30	(600 µm)	25 to 45	19 to 34	± 5.0%
No. 50	(300 µm)	13 to 25	12 to 25	± 4.0%
No. 100	(150 µm)	–	7 to 18	± 3.0%
No. 200	(75 µm)	5 to 15	5 to 18	± 2.0%

Screen the aggregate for oversize material prior to use using a 3/8 inch (9.5 mm) screen size. When a blend of aggregates is to be used to meet gradation A or B, proportion the aggregates in a separate stockpile and blend to a uniform consistency prior to screening. Screen the aggregate to complete the blending

process and to remove any oversize material prior to use. If oversize material becomes present in the mixture, screen the aggregate directly into material support units.

For mineral filler, use S-1028 Certified portland cement conforming to ASTM C 150, Type I. Adjustments in the quantity of mineral filler added to the mixture are permitted to improve mixture consistency, mix time, or set time. Do not exceed  $\pm 0.5\%$  from the mix design during placement.

Use water conforming to 499.02. Add water to the mixture to control mixture consistency only and not to control mix time.

Use mix set additives as stated in the mix design to control the mixture's mix and set time. If mix set additives are used during production of mixture, include as part of the mix design. Ensure additives are compatible with the other components of the mix.

**421.03 Proportioning.** Develop a mix design to comply with the mix design criteria and submit to OMM on approved forms, at least two weeks prior to the start of calibration, for preliminary JMF approval. OMM may require additional time prior for preliminary approval to perform tests on lab materials to ensure mix compliance. OMM will notify the Contractor if additional time for testing is required. Final JMF approval will be granted upon successful placement in the field. OMM may require the Contractor to design and submit for a new JMF for lack of mix compliance or lack of field performance.

Submit the mix design and proposed materials to OMM. Include a minimum of 11 pounds (5,000 g) of each aggregate, one quart (1 L) sample of Binder, 3.5 ounces (100 g) of mineral filler, and one pint (0.5 L) of additive, if used, and a complete mix design packet prepared by an AASHTO-accredited laboratory in Pavement Preservation. Prepare the mix design by designing the mixture using the minimum, design, and maximum residual binder content for gradations A or B and present all test data for all tests specified in Table 421.03-1. Determine the residual binder content and present related proportioning of total water (includes moisture in aggregate), mineral filler, and additive with tolerances for each in the final designed mixture. Verify during the mix design the compatibility of the aggregate, Binder, mineral filler, and other additives. Produce the mix design using the same materials that will be used on the project. Approved JMF's expire on December 31<sup>st</sup>.

**A.** Ensure that the mix design:

1. Has aggregate (including blended aggregates) meeting the gradation specified.
2. Has residual asphalt by dry weight of aggregate of 7.0 to 8.5 percent for leveling and surface courses, and 6.5 to 8.0 percent for rut fill courses.
3. Has a mineral filler content of 0.3 to 2.5 percent by dry weight of aggregate and a tolerance of not greater than  $\pm 0.5$  percent of the mix design within the required minimum and maximum.
4. Verify the mix times and wet cohesion requirements based on specific minimum and maximum percent mineral filler, total water, and additive.
5. Has a total water content with a tolerance not greater than  $\pm 1.5$  percent.
6. Has a total non-diluted additive content with a tolerance not greater than  $\pm 0.2$  percent. Verify that the additive dilution rate with water specified in the mix design is consistent with the paving machine being used.
7. Meets the specified properties of the following International Slurry Seal Association (ISSA) tests:

TABLE 421.03-1		
ISSA Test No.	Description	Specification
TB-139	Wet Cohesion	
	30 minutes min. (set time)	12 kg-cm min.
	60 minutes min. (traffic)	20 kg-cm min or near spin
TB-114	Wet Stripping	90 percent min.
TB-100	Wet Track Abrasion Loss	
	1-hour soak 6 day soak	450 g/m <sup>2</sup> max. 650 g/m <sup>2</sup> max.
TB-144	Saturated Abrasion Compatibility	2 g loss max.
TB-113	Mix Time @ 77 °F (25 °C)	Controllable to 120 seconds
	Mix Time @ 104 °F (40 °C)	Controllable to 45 seconds
TB-147	Lateral Displacement (For Leveling and Rut Fill courses only)	5%, max.
TB-109	Excess Asphalt by LWT Sand Adhesion	538 g/m <sup>2</sup> max.

Check the ISSA TB-139 (set time) and ISSA TB-113 (mix time) tests at the highest and lowest temperature expected during construction. For the ISSA TB-113 test at 104 °F (40 °C), preheat all ingredients and containers.

**B.** Report the following in the mix design (all percentages are based on the dry weight of the aggregate):

1. Source and location of each individual material. Provide percentage of each aggregate source if multiple aggregate sources are used.
2. Aggregate gradation, washed and dry (dry for field QC). Provide aggregate gradation of each source and final combined if multiple sources are used.
3. Sand equivalence of the aggregate.
4. Percentage of mineral filler and tolerance.
5. Percentage of total water and tolerance and acceptable pH range.
6. Percentage and Type of mix set additives (if required) and tolerance.
7. Percentage of Binder and residual asphalt content in the mixture.
8. Quantitative effects of moisture content on the unit weight of the aggregate per AASHTO T 19 from 0.0 to 10.0% moisture content.

**421.04 Quality Control Program (QCP).** Create and implement a Quality Control Program (QCP) for each construction season. The QCP will cover processes conducted to provide a microsurface mixture at the project site that is uniform in composition, conforms to the specification requirements and project mix design, and that when placed is free of any defects (lack of mixing, inconsistent texture, inconsistent profile, excessive overlap at joints, streaking, drag marks, roughness, raveling, rutting, holes, and debris, etc.) within the Contractor's control at project completion. Submit a hard copy of the proposed QCP to OMM for review and acceptance. Submit by February 28 or a minimum of five (5) weeks before calibration.

Submit a hard copy and a digital copy (if available) of the QCP acceptance letter and accepted QCP to District Testing a minimum of two weeks prior to calibration. Keep copies of the letter and the QCP with each Contractor's Quality Control Manager and provide a copy of both to the Engineer. Digital copies of the QCP and letter in pdf format are allowed with the following requirements: The file icon must be



appropriately labeled and be on the computer desktop. The QCP must contain page numbering and a Table of Contents inside the front cover locating all sections by page number and out of date QCPs must be removed from the computer desktop.

Failure to comply with the approved QCP may result in work stoppage and adversely affect the Contractor's Prequalification rating.

The QCP is a reflection of a Contractor's sincerity and ability in producing a quality product. Development of this program beyond the minimum requirements specified below is encouraged.

Include in the program:

A. The assignment of quality control responsibilities. Quality control includes all efforts required to achieve a product meeting specifications. List individuals as required below and note their designated responsibilities to meet QCP requirements. Provide a Quality Control Manager who is a company employee who is routinely and usually at the paving site during placement of any microsurfacing. Provide a list designating technician responsibilities and expected actions. Ensure only trained personnel handle and test samples at all times. Define who is responsible at the project site and specific methods for ensuring mixing equipment, haul vehicles, etc. meet requirements.

B. Means for annual training of company and consultant technicians and their supervisors in ethical conduct according to company expectations. Document how and when training is given, what the expectations are, how expectations are communicated, and list all personnel trained. Describe the QC Manager's and technician supervisor's responsibilities and methods in ensuring ethical conduct is maintained throughout the year.

C. Provisions to meet the Department mix specifications including warning bands and action plans for aggregate, binder, and tack coat materials to ensure they meet Department testing.

D. Procedures for extra testing (e.g., job start, responses to poor test results or field mix problems, aggregate stock testing, moistures) and any other testing necessary to control materials not already defined in these Specifications.

E. Methods to maintain all worksheets, including all handwritten records, and other test and sample records from the project for the duration of the contract or five years, whichever is longer. Define the test record process. Define company records retention requirements. Provide copies of all test reports and forms used in the quality control process.

F. Procedures for calibration and documentation for all testing equipment. Procedures for calibration record storage. Procedure to supply documentation records of testing equipment calibration at the request of the engineer.

G. Method of performing mixing equipment calibrations including scales to be used, yield checks, and documentation for each project.

H. Procedure for random sampling to be used at the project and documentation method. Procedures for sample taking, tracking, handling, and documentation method for all samples taken at the project paving site.

I. Procedure for ensuring that every Contractor employee involved in the testing of aggregates and microsurfacing mix and operation of the mixing equipment has read the QCP and has on site access to all applicable Department specifications, proposals, policies, and the current approved JMF.

J. Procedure for ensuring binder Bills of Lading with BOL load number, binder source and grade, and binder percent residue are reviewed against running mix designs and record of review listing the above information be kept with the QC Manager for the duration of the project. Means to meet the handling and storage requirements of the Binder and tack coat suppliers.

K. Means to meet placed mixture uniformity and hauling/trucking requirements.

L. Define the roles and responsibilities of the QC Manager.

M. Signature of the Quality Control Manager and, if different, the person in authority to enforce all operations covered by the QCP as outlined in this subsection.

**421.05 Weather Limitations.** Apply the mixture only when it is not raining, pavement has no standing water, and the existing pavement surface and atmospheric temperature is a minimum of 45 °F (7 °C) and rising and there is no forecast of an atmospheric temperature below 32 °F (0 °C) within 24 hours from the time the mixture is applied. Between September 30 and May 1, do not apply the mixture if the existing pavement surface temperature is less than 50 °F (10 °C).

**421.06 Mixing Equipment.** Produce the mixture in a self-propelled, front feed, continuous loading mixing machine equipped with a conveyer belt aggregate delivery system and an interconnected positive displacement, water jacketed asphalt emulsion gear pump to accurately proportion aggregate and asphalt emulsion or a variable displacement computerized rate control to accurately proportion aggregate and asphalt emulsion. Locate the mineral filler feed so the proper amount of mineral filler is dropped on the aggregate before discharge into the pugmill. Provide a spray bar to completely prewet the aggregate dropping into the pugmill with additive and water before introduction of asphalt emulsion. Ensure that the twin-shaft, multi-blade pugmill is a continuous flow type and minimum of 49 inches (1.25 m) long. Ensure that the blade size and side clearances meet the equipment manufacturer's recommendations. Introduce the emulsion within the first one-third of the mixer length to ensure proper mixing of all materials before exit from the pugmill.

Equip the machine with opposite side driving stations to allow full control of the machine from either side. Equip the mixer with a remote forward speed control at the back mixing platform so the operator controlling the mixture placement can control forward speed and level of mixture in the spreader or rut box. Provide material control devices that are readily accessible and positioned so the amount of each material used can be determined at any time.

Equip the mixing machine with a water pressure system and nozzle type spray bar to provide a water spray ahead of and outside the spreader box when required. Apply water at a rate that will dampen the surface, but will not create free flowing water ahead of the spreader box.

The Contractor may use truck-mounted batch machines with a conveyer belt aggregate delivery system and without the front feed, continuous loading feature on projects of less than 15,500 square yards (13,000 m<sup>2</sup>), on spot repairs, on projects with multiple routes where every route is less than 15,500 square yards (13,000 m<sup>2</sup>), or where specified in the plans.

**421.07 Equipment Calibration.** Before mix production, calibrate the mixing equipment to the approved JMF in the presence of the Engineer according to Supplement 1040. Verify that the project calibration is not affected by any previous calibrations and scale factors by removing or resetting prior to starting a new calibration. Generate documentation for the Engineer, including individual calibrations of each material at various settings. Perform a calibration for each JMF used on the project. Following calibration, do not make any further calibration adjustments to the mixing equipment without the Engineer's approval. The Engineer may require additional calibrations following any equipment break down related to the aggregate delivery belt, asphalt emulsion gear pump, or mixture performance issues.

Submit the approved mix design information and JMF(s) to the Engineer and District Testing at least 48 hours prior to start of calibration.

**421.08 Spreading Equipment.** If a leveling or surface course is specified, apply the mixture by means of a conventional spreader box attached to the mixer.

If a rut fill course is specified, apply the mixture with a 5 to 6 foot (1.5 m to 1.8 m) width V-shaped rut filling spreader box attached to the mixer. Equip the rut filling spreader box with a steel strike-off.

If a leveling course is specified, apply the mixture with a spreader box equipped with a steel or rubber strike-off that is designed to fill wheel path ruts. A secondary strike-off may be used to reduce roughness of the leveling course but will not remove mixture in wheel path ruts or affect desired cross section.

Equip the spreader box with paddles or augers mounted on an adjustable shaft to continually agitate and distribute the materials throughout the box. Ensure that the equipment provides sufficient turbulence to prevent the mix from setting in the rut fill or spreader box or causing excessive side build-up or lumps. To prevent loss of the mixture from the spreader box, attach flexible seals, front and rear, in contact with the road. Operate the spreading equipment in such a manner as to prevent the loss of the mixture on superelevated curves.

For surface courses, attach a secondary strike-off to the spreader and adjust as required to provide a uniform mixture texture.

The Contractor may use burlap drags or other drags, if necessary, to obtain the desired finish. Replace drags having excessive build-up.

**421.09 Surface Preparation.** Before applying the mixture, thoroughly clean the surface.

Remove raised pavement markers according to 621.08, when specified.

Remove all existing pavement markings, except 740.02 (traffic paint), using an abrasion method conforming to 641.10.

Seal visible joints and cracks longer than 2 feet (600 mm) in length and any joint or crack greater than 1/4 inch (6 mm) in width no matter the length using Item 423 TYPE II OR TYPE III SEALANT ONLY. Apply crack sealant material at a width of 2 to 4 inches (50 to 100 mm) and at a thickness of not less than 1/16 inch (2 mm) and not greater than 3/16 inch (5 mm).

Apply a tack coat to the existing pavement surface conforming to ITEM 407 CSS-1H OR 421.02 CSS-1HM, consisting of a minimum of 15% asphalt residue achieved by diluting with water. Apply the tack coat at a rate of 0.06 to 0.12 gallons per square yard (0.25 to 0.45 L/m<sup>2</sup>) that provides uniform coverage

without excess run-off and allow tack to break before releasing to construction traffic. Adjust application rate of tack coat based on surface texture and porosity. Apply the tack coat only to areas that will be covered by the microsurface during the same day. Do not apply tack coat on top of a leveling course prior to placing the surface course.

Protect drainage structures, monument boxes, water valve, etc. during material application.

**421.10 Test Strip.** Construct a continuous 1000-foot (300 m) long by lane width test strip for each approved JMF(s) for the project. The test strip will demonstrate the mix and set time of the material and ability to perform under full traffic. If handwork will be performed on the project, include handwork in the test strip. Construct the test strip at the same time of day or night the full production will be applied. Perform a yield check to ensure the proper spread rate, surface quality requirements and compliance with JMF components are met. Submit results to the Engineer.

The Engineer will evaluate the completed test strip and yield check report after a minimum of 12 hours under traffic, to determine if the mix design and application is acceptable. The Contractor may begin full production after the Engineer accepts the test strip.

If the microsurfacing is being applied between May 1 and October 15, the Department may waive the test strip if the Contractor has constructed a Department accepted test strip during the same time frame with the same materials and JMF(s) and with no documented project performance issues. Provide documentation (Project Number, District, Route, Test Strip Date, Engineer, etc.) and history from the previous test strip(s) and calibration(s) to the Engineer.

**421.11 Application.** Apply the microsurface mixture to the prepared surface in a manner to fill cracks, shallow potholes, and minor surface irregularities and achieve a uniform textured surface without causing streaking, drag marks, skips, lumps or tears. Carry a sufficient amount of material at all times in all parts of the spreader box to ensure complete and uniform coverage. Avoid overloading of the spreader box. Do not allow lumping, balling, or unmixed aggregate in the spreader box.

When specified, place leveling courses to cover the entire pavement area as specified. Place the leveling course in a manner to maintain or improve the ride quality of the existing pavement. Provide a completed leveling course with no drag marks or tears greater than 1/2 inch (13 mm) wide, 1/4 inch (6 mm) deep, or 12 inches (25 mm) in length. Provide a completed leveling course free of flushing, bleeding, or added roughness. The completed leveling course may exhibit minor raveling upon opening to traffic but will not exhibit any continued raveling after the first four hours of traffic.

When specified, apply rut fill courses in widths from 5 to 6 feet (1.5 to 1.8 m) for each wheel path. Apply enough material to fill the wheel paths without excess crowning (overfilling). An excess crown is defined as 1/8 inch (3 mm) after 24 hours of traffic compaction. If rut depth exceeds 1.0 inches (25 mm), apply rut fill course in multiple courses. Provide a smooth, neat seam where two rut fill passes meet. Take care to restore the designed profile of the pavement cross-section. After compaction by traffic, ensure the completed rut fill does not result in deviations in excess of 1/4 inch (6 mm) as measured across each wheel path using a 6 foot (1.8 m) straight edge. Do not place microsurfacing surface course material until wheel path deviations in excess of 1/4 inch (6 mm) are corrected. Place the rut fill course in a manner to maintain or improve the ride quality of the existing pavement. Provide a completed rut fill course with no drag marks or tears greater than 1/2 inch (13 mm) wide, 1/4 inch (6 mm) deep, or 12 inches (25 mm) in length. Provide a completed rut fill course free of flushing, bleeding, or added roughness. The completed rut fill course may exhibit minor raveling upon opening to traffic but will not exhibit any continued raveling after the first four hours of traffic.

If a leveling course and a surface course are specified, apply the microsurface mixture at a minimum of 14 pounds per square yard (7.6 kg/m<sup>2</sup>) of dry aggregate weight for the leveling course and 18 ± 1 pounds per square yard (9.8 ± 0.5 kg/m<sup>2</sup>) of dry aggregate weight for the surface course. Apply the two courses at a minimum combined rate of 32 pounds per square yard (17.4 kg/m<sup>2</sup>) of dry aggregate weight.

If a surface course is specified and it is not placed on a microsurfacing leveling course, apply the microsurface mixture at a rate of 22 ± 0.5 pounds per square yard (11.9 ± 0.3 kg/m<sup>2</sup>) of dry aggregate weight. Apply the mixture in a manner to produce a uniform surface texture across the entire paving pass.

For leveling and surface courses, provide a smooth, feathered, neat seam of 1 to 3 inches (25 to 75 mm) where two passes meet at the pavement centerline and at edge of shoulder. In variable width pavement sections minimize overlap and feather overlapping pass on to the completed surface. Construct overlaps such that cross slope drainage is maintained. Immediately remove excess material from the ends of each run.

Construct surface courses at a width to cover the outside edges of rut fill and leveling courses. Construct seams at or near edge of lane but do not construct seams in wheel paths. Maintain straight edge lines along curbs and shoulders. Do not allow runoff in these areas. Ensure that lines at intersections are straight.

Use squeegees and lutes using similar material as the secondary strike-off to spread the mixture in areas inaccessible to the spreader box and areas requiring hand spreading. The Contractor may adjust the mix set additive to provide a slower setting time if hand spreading is needed. Do not adjust the water content to adjust the setting time. If hand spreading, pour the mixture in a small windrow along one edge of the surface to be covered and spread it uniformly by a hand squeegee or lute. Provide uniform appearance of the entire surface area regardless of the means used to spread material.

Ensure that the microsurfacing cures at a rate that will permit traffic on the pavement within one hour after application without damaging the pavement surface. However, should the Contractor experience a curing condition that does not allow the opening to traffic within one hour, work out an arrangement agreeable to the Engineer before releasing traffic on the pavement.

If the final surface course is not uniform in texture, free of streaks, drag marks, lumps or tears, stop applying the mixture and take steps to correct the problem. Do not resume work until the Engineer is satisfied the problem has been corrected.

#### **421.12 Quality Control.**

**A. General.** Use the methods described in this section to control the quality of the mixture and application, and to measure compliance. If any test results or measures of compliance exceed any of the identified quality control tolerances or specification requirements, stop placement and immediately notify the Engineer and District Testing. Identify the cause of exceeding any of the identified quality control tolerances and document in detail the corrective action necessary to bring the deficiency into compliance. Implement the corrective action and resume work and immediately perform a test or measure to confirm corrective action has resolved the deficiency. If upon resuming work the tolerances are exceeded, stop the work. Present a revised corrective action plan ~~to~~, and obtain the Engineer's approval before resuming work. Upon resuming work, immediately perform a test or measure to confirm corrective action has resolved the deficiency.

The Department can obtain samples of materials at any time. Aggregate samples can be taken from sources, on-hand stockpiles, or from the mixing equipment. Work can be stopped and materials and JMF can be rejected on the basis of poor Department test results. If the Department reports non-compliance on

any material test, the Department will compare results with the Contractors Quality Control Manager. The Engineer will determine if the tests or compliance measurement has been satisfactory corrected.

Prior to starting placement, verify the pH of the water to be used is within the acceptable range on the JMF. Verify again if source of water changes.

Perform a minimum of four yield checks daily with one occurring within the first 1,000 linear feet (300 linear meter) of continuous placement and the last occurring in the last 1,000 linear feet (300 linear meter). Perform at least one yield check for each course applied. For cross-overs, driveways, and any other irregular areas, determine yield checks by a means acceptable to the Engineer. Ensure yield checks are a minimum of 500 linear feet (150 linear meter) for continuous loading mixing machines or one full-loaded truck-mounted machine. Ensure yield checks meet and include documentation of compliance for sections 421.03, 421.05, 421.09, 421.11, and 421.13.

**B. Binder.** Obtain and label a binder sample from supply tanker and diluted tack coat sample from the distributor truck at the direction of the Engineer and give the samples to the Engineer the same day. Provide and sample the Binder and diluted tack coat in one quart (1 L) plastic containers with plastic screw tops. Label and retain one sample per each additional day for the Department. Take more samples when requested by the Engineer.

Visually inspect Binder in supply tanker(s) to ensure uniform material with no separation or contamination. Verify temperature of Binder and tack coat. Monitor and verify proportioning of asphalt emulsion and water into distributor and proper mixing before use or sampling. Perform a minimum of one Binder and tack coat cook-off each production day to determine the residue content of the Binder and tack coat and verify compliance. If residue content is in warning band or out of compliance provide the Engineer with corrective actions prior to using.

Ensure mixing equipment is set at design asphalt emulsion percentage during production. Do not exceed a tolerance of  $\pm 0.3\%$  residual content from the design residual content or the minimum and maximum content in the microsurface mix due to fluctuation in residual content in the Binder. If tolerance is exceeded, stop production. Correct the issue by correcting the Binder residual content by methods allowed by Supplement 1032 certified supplier or adjust the asphalt emulsion percent, if approved by the Engineer. Recalibrate the mixing equipment to the new adjusted asphalt emulsion percent to meet the design residual content of the microsurfacing mix for positive displacement mixing equipment.

**C. Aggregate.** Ensure the aggregate stockpile gradation does not vary by more than the stockpile tolerance in Table 421.02-3 compared to the approved JMF and does not exceed the design gradation band for No. 200 (75  $\mu$ m) sieve. Ensure the percent passing does not change from the high end to the low end of the range for any two consecutive sieves.

Verify the blending and screening of aggregates at the stockpile site and sample the blended and screened aggregate for QC testing.

Stockpile a minimum of 10 percent of the project aggregate or 200 tons (180 metric tons) of aggregate whichever is less at a staging area. Obtain three (3) aggregate samples from the stockpile and perform gradation testing on each sample according to AASHTO R 90, AASHTO R 76, Supplement 1004 (AASHTO T 11 where required), and moisture content per AASHTO T 255. Use dry gradations for determining the No. 200 (75  $\mu$ m) sieve. Determine the percent passing for each sieve size listed in Table 421.02-3. Calculate the average of each sieve for all three tests. Ensure the average value for each sieve is within the requirements of Table 421.02-3. Do not begin production if not in compliance with gradation band and stockpile tolerance.

At a minimum test one sample taken from the stockpile randomly during each production day. Include additional testing when directed to sample and test by the Engineer. The Contractor may perform an additional aggregate test to verify results if first test is not in compliance with stockpile tolerance. Report and track all test results and monitoring trending of the aggregate gradation within the stockpile.

Reject aggregate that does not meet the stockpile tolerance in Table 421.02-3 compared to the approved JMF. Do not exceed the design gradation band for No. 200 sieve.

For data collection by the Department, if requested by the Engineer, obtain a mix sample randomly during the day by dragging a tube sampler across material under the mixer but before the spreader box as it moves forward. Obtain a 10 pound (4,535 gram) minimum mix sample, put in a suitable plastic container, and provide to the Engineer.

**D. Mixture Application.** Ensure the Quality Control Manager and trained technicians perform and use the methods described in this section to control quality and measure compliance.

1. Supervise the mixing machine calibration, test strip application, and verify compliance before production begins.

2. Establish with the mix operator restrictive operating limits for use of total mixture water, additive, and mineral filler subject to weather conditions and course applied.

3. Maintain all calibration records and compare calibration results for each project through construction season.

4. Direct all material input settings required to produce mix design compliance.

5. Verify mixture meets required mix time, set time and mix consistency.

6. Perform an aggregate moisture test at the start of each production day.

7. Communicate and direct any desired adjustments with the Binder supplier (asphalt emulsion) for mix and set time properties.

8. Evaluate roadway for determination of planned application rates and maintain direct communication with Department personnel, application personnel, and Engineer on all compliance issues.

9. Verify and document that all cracks greater than 1/4 inch (6 mm) in width and all cracks longer than two feet (50 mm) have been filled and that the crack sealant is in compliance with thickness requirements.

10. Monitor roadway during application for proper surface cleaning.

11. Monitor application of tack coat for proper coverage and document application rate.

12. Monitor mixture placement for consistency, uniformity of thickness across paving pass, and use of water spray bars.

13. Monitor mixture application rate and finishing methods to ensure uniform surface.

14. Monitor cross section compliance subject to course type specified.

15. Monitor set properties for opening to traffic and durability under traffic.

16. Monitor daily production reports for compliance with mix design tolerances.

17. Maintain each material usage by ticket weight and verify consistency to mixing machine calibrated use.

18. Direct adjustments of material settings and mixture subject to material test results and field performance.

19. Monitor haul trucks, mixing machine, and allied equipment for oil drippings, aggregate spillage and other factors that may affect the adherence or performance of the applied mixture.

**E. Documentation.** Provide the Engineer a daily report no later than the next calendar day (excluding Sundays) with the following:

1. A printout from the mixing machine showing the total pounds of aggregate, emulsion, and cement as well any other materials capable of being printed used for the day as part of the daily production report.
2. Project number, county, and route.
3. Date, air temperature, pavement temperature, and humidity.
4. Binder temperature, percent residue, and pounds per gallon (grams per liter)
5. Production report with course(s) applied, lane(s) completed, location of work, daily summary of each material used, application rate for each course and lane and total area per course.
6. Yield checks on application rate and compliance with application placement requirements (four per day, minimum).
7. Gradation and moisture content (one random sample during the day and any other samples when directed by the Engineer).
8. Total gallons (L) of tack coat used and residual asphalt content.
9. Quality Control Tests and Reports.
10. Contractor representative's signature.

Provide a Bill of Lading for Binder and aggregate as requested or at project completion.

**421.13 Acceptance.** Maintain continuous control of the Binder to dry aggregate proportioning to conform to the approved JMF(s) within a tolerance of  $\pm 1.5$  gallons per ton ( $\pm 6.4$  L/metric ton). Control the spread rate to not less than the specified quantity of aggregate per square yard (square meter) on a dry weight basis.

The Engineer will base acceptance of the binder-to-dry aggregate proportion and spread rate on the Engineer's summary of quantities used each day. The Engineer will approve and accept a day's application of microsurfacing provided:

- A. The Engineer's summary indicates conformance with the above control requirements for proportioning and spread rate and
- B. The course(s) applied are in compliance with the application requirements of this specification and
- C. The pavement cracks are sealed prior to placement of the microsurface and
- D. The Quality Control requirements are met and
- E. The pavement is uniform in composition and texture, free from excessive scratch marks, tears, rippling and other surface irregularities (segregation, raveling, rutting, holes, debris, etc.), longitudinal joints and lane edges coincide with any lane lines and edge lines and transverse joints are uniform, neat and provide a smooth transition.

The spread rate requirement does not apply to rut fill courses if the Contractor filled the wheel paths according to this specification.

**421.14 Performance Review.** Perform remedial actions for any defect exceeding the threshold levels in Table 421.14-1 for a period of two years from the date of substantial work complete as documented on



the Department’s Form C-85. Contact the Department to schedule a final performance review at least 60 days prior to the end performance review period. The Department will review the pavement before the end of the two-year performance review period to determine if remedial action is required. The Department will issue the results in writing to the Contractor upon completion of the performance review.

**Remedial Actions.** Perform Remedial Actions by October 15<sup>th</sup> of the same year as the review. If the Department determines that immediate repairs are necessary, due to a potential hazard to the traveling public, the Department will notify the Contractor and establish a date that all repairs are to be finished.

Provide construction traffic control when performing any work required or allowed by this specification in accordance with current Department policy and the Ohio Manual of Uniform Traffic Control Devices. Obtain Department approval for the time the work will be performed.

Provide approved materials, equipment, and labor to perform Remedial Actions at no additional cost to the Department. Prior to performing a Remedial Action, submit a Remedial Action plan to the DCE for approval. State in the plan when and how the Remedial Action will be performed; what material will be used; and how traffic will be controlled. Warrant Remedial Action work for the remainder of the warranty period.

Use only microsurfacing for permanent repair and resurfacing areas. Perform temporary repairs using material approved by the DCE. Replace temporary repairs with a permanent repair as soon as weather permits.

Replace pavement markings or raised pavement markers (RPM) removed, obliterated, or damaged while performing a Remedial Action with equivalent approved pavement markings or RPM products at no cost to the Department.

The Contractor is not responsible for pavement damage beyond the Contractor’s control (i.e., car fire, oil spill, structural issues etc.).

**TABLE 421.14-1**

<b>Defect Type</b>	<b>Threshold Level <sup>(6)</sup> (allowable distress levels)</b>
Non-uniform texture <sup>(1)</sup>	300 square feet (28 m <sup>2</sup> )
Surface Loss <sup>(2)</sup>	20 square feet (1.8 m <sup>2</sup> )
Raveling <sup>(3)</sup>	300 square feet (28 m <sup>2</sup> )
Rutting <sup>(4)(5)</sup>	0.25 inch (6.5 mm) continuous in any Segment.
<b>Notes:</b>	
(1) Texture inconsistencies in either the transverse and or longitudinal direction.	
(2) Loss of surface by traffic wear, debonding, or delamination.	
(3) “Moderate” level raveling as defined in the Strategic Highway Research Program (SHRP) “Distress Identification Manual for the Long-Term Pavement Performance Project” (SHRP-P-338).	
(4) Measure the wheel path with a 4 foot (1.2 m) straight edge.	
(5) Only applies during the first 120 days of Warranty or after any Warranty work.	
(6) Based on 1000 foot (300 m) lane Segment. The beginning of a Segment is the beginning of any distress type.	

If any 1000 foot (300 meter) lane segment has repairs or defects greater than 5 percent of the area, resurface with a full lane width of microsurfacing meeting the requirements of this specification.

**421.15 Method of Measurement.** The Department will measure Microsurfacing, Surface Course and Microsurfacing, Leveling Course by the number of square yards (square meters), complete and accepted in place. The Department will base the width of the pavement course on the width shown on the plans,

specified in this specification, or directed by the Engineer. The Department will measure the length along the centerline of each roadway or ramp.

The Department will measure the number of raised pavement markers removed.

The Department will measure Microsurfacing, Rut Fill Course by the number of tons (metric tons) of dry aggregate used, complete and accepted in place. The Department will base the weight of the dry aggregate used on the calibrated unit weight as reported from the aggregate delivery belt.

**421.16 Basis of Payment.** The cost of tack coat and Item 423 Crack Sealing is incidental to microsurfacing.

The Department will pay for removal of existing pavement markings according to 421.08 under Items 643, 644, 645, 646, 647, and 648 as specified. The Department will pay for removal of existing raised pavement markers according to Item 621 Raised Pavement Markers Removed.

The Department will pay for the construction of accepted test strips at the individual bid prices for the courses constructed.

The Department will pay for accepted quantities at the contract prices as follows:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
421	Square Yard (Square Meter)	Microsurfacing, Surface Course
421	Square Yard (Square Meter)	Microsurfacing, Leveling Course
421	Ton (Metric Ton)	Microsurfacing, Rut Fill Course

#### **422.06**

On page 218, **Replace** the third and fourth paragraph of section 422.06 with the following:

Remove the raised pavement markers according to 621.08.

#### **422.09**

On page 220, **Replace** the last paragraph with the following:

Before opening to traffic, post the roadway with “Loose Gravel/Fresh Tar” signs and a “35 mph” speed plaque mounted below the sign. Ensure that signs conform to Item 614. Place these signs in the advance warning area and just beyond each intersecting road throughout the length of the activity area. Remove the signs as directed by the Engineer.

#### **422.13**

On page 224, **Replace** the last paragraph of section 422.13 with the following:

The Department will measure the number of raised pavement markers removed.

#### **422.14**

On page 224, **Replace** the third and fourth paragraph of section 422.14 with the following:

The Department will pay for removal of existing raised pavement markers according to Item 621 Raised Pavement Markers Removed.

#### **424.03**

On page 228 **Add** at the end of the third paragraph the following: Do not use RAS.

#### **441.02**

On page 231, **Replace** the fifth and sixth paragraphs with the following:

If the F/A ratio using total asphalt binder content is greater than 1.0 recalculate it using the effective asphalt binder content. Calculate the effective asphalt binder content according to the Asphalt Institute Manual Series No. 2. The value (calculated to the nearest percentage point) of the Fifty to Thirty (F-T) value, is the percent of total aggregate retained between the No. 50 (300  $\mu$ m) and No. 30 (600  $\mu$ m) sieves, minus the percent of total aggregate retained between the No. 30 (600  $\mu$ m) and No. 16 (1.18 mm) sieves.

Use a PG 64-22 asphalt binder for a Type 1 Intermediate course unless RAP and/or RAS used according to 401.04 require a virgin binder grade change. Use a PG 64-22 asphalt binder for a Type 2 intermediate course unless RAP and/or RAS used according to 401.04 require a virgin binder grade change. Use a PG 64-22 asphalt binder and Type 1 surface gradation for asphalt concrete for driveways and under guardrails.

#### **441.05**

On page 234, **Replace** the first paragraph with the following:

**441.05 JMF Field Adjustments.** During the first three days of production the Contractor may adjust the JMF gradation within the below limits without a redesign of the mixture. For projects with less than 3 days of production, give District Testing written notice of any JMF gradation adjustments within 1 workday following the last day of production. Limit adjustments of the JMF to conform to actual production, without a redesign of the mixture, to  $\pm 3$  percent passing each of the 1/2 inch (12.5 mm), No. 4 (4.75 mm), and No. 8 (2.36 mm) sieves and  $\pm 1$  percent passing the No. 200 (75 $\mu$ m) sieve. Do not exceed the limits in Table 441.02-1 and Table 442.02-2 in the adjusted JMF. The adjustment on the 1/2 inch (12.5 mm) sieve applies only to Type 2 mixes. Determine the need for any JMF gradation adjustments in the time specified. Should no adjustments be made, the Department will base acceptance on conformance to the original JMF. After the time period specified, the Department will allow no further adjustment of the JMF.

#### **441.10**

On page 238, **Replace** TABLE 441.10-1, with the following:

**TABLE 441.10-1**

Mix Characteristic	Out of Specification Limits <sup>[5]</sup>
Asphalt Binder Content <sup>[1]</sup>	-0.3% to 0.3%
1/2 inch (12.5 mm) sieve <sup>[1]</sup>	-6.0% to 6.0%
No. 4 (4.75 mm) sieve <sup>[1]</sup>	-5.0% to 5.0%
No. 8 (2.36 mm) sieve <sup>[1]</sup>	-4.0% to 4.0%
No. 200 (75 μm) sieve <sup>[1]</sup>	-2.0% to 2.0%
Air Voids <sup>[2]</sup>	2.5% to 4.5%
Air Voids <sup>[3]</sup>	3.0% to 5.0%
MSG <sup>[4]</sup>	-0.012 to 0.012
[1] deviation from the JMF [2] for Design Air Voids of 3.5% [3] for Design Air Voids of 4.0% [4] deviation from the MTD [5] unless otherwise restricted by mix type specification	

**442.02**

On page 240, **Replace** the first paragraph with the following:

**442.02 Type A Mix Design.** Design the mixture composition for a Type A mix according to [441.02](#) and the most recent Asphalt Institute Manual Series No. 2 (MS-2) for design procedures and material properties except as modified by this subsection. Include in the JMF submittal the standard Department cover and summary page; all printouts from the gyratory compactor (all gyratory points not necessary); and analysis covering the required mix properties. Unless otherwise directed submit one compacted gyratory sample and loose mix for compaction of another sample, in addition to a 5-pound (2000 g) loose sample, for each JMF.

**442.02**

On page 240, **Replace** the symbol ">" with "≥" in the third row of Table 442.02-1.

**442.02**

On page 241, **Replace** the second paragraph, with the following:

The restricted zone does not apply. Use control points according to [MS-2](#), except as specified in Table 442.02-2.

**442.02**

On page 241, **Replace** the TABLE 442.02-2, with the following:

**TABLE 442.02-2 AGGREGATE GRADATION REQUIREMENTS**

Sieve Size		9.5 mm mix	12.5 mm mix	19 mm mix
		Total Percent Passing		
1 1/2 inch	(3.75 mm)	–	–	100
3/4 inch	(19 mm)	–	100	85 to 100
1/2 inch	(12.5 mm)	100	95 to 100	90 max
3/8 inch	(9.5 mm)	90 to 100	96 max	–
No. 4	(4.75 mm)	70 max	52 to 60 <sup>[1]</sup>	–
No. 8	(2.36 mm)	34 to 52	34 to 45	28 to 45
No. 200	(75 μm)	2 to 8	2 to 8	2 to 6

[1] For the No. 4 sieve do not exceed 63 in production.

**442.02**

On page 241, **Replace** (3.75mm) with (37.5 mm) in Table 442.02-2 in the second column under the heading Sieve Size.

**442.02**

On page 241, **Replace** the TABLE 442.02-3, with the following:

**TABLE 442.02-3 VMA CRITERIA**

Mix	VMA (percent minimum)
9.5 mm	15.0
12.5 mm	14.0
19.0 mm	13.0

**442.03**

On page 241, **Replace** the symbol ">" with "≥" in the third row of Table 442.03-1.

**442.05**

On page 242, Add the following paragraph after the first paragraph:

For 12.5mm mixes ensure the percent passing the No. 4 sieve does not exceed 63 in production. If two tests in a row or any two tests in two days (QC and/or 448 subplot) exceed 63 stop production and notify District Testing.

**442.05**

On page 242, **Delete** the last three sentences of the third paragraph. “For 12.5mm mixes ... are made.”

**443.03 A.**

On page 244 **Replace** footnote [5] after Table 443.03-2 with the following:

[5] VCA = Volume of Coarse Aggregate (Calculated for mix and dry rodded conditions according to AASHTO R 46)

**443.03 E.**

On page 245 **Replace** paragraph E with the following:

**E. Reclaimed Asphalt Concrete Pavement and Shingles.** Do not use reclaimed asphalt concrete pavement except as described in D above. Do not use reclaimed asphalt shingles.

**451.04.A**

On page 254, **Replace** the first sentence of the third paragraph with the following:

Finish small areas, irregular areas, and areas that are inaccessible to finishing equipment using other methods as approved by the Engineer.

**451.09.B**

On page 259, **Replace** Table 451.09-1 DOWEL SIZE with the following:

**TABLE 451.09-1 DOWEL SIZE**

Thickness of Pavement	Diameter of Solid Dowel	Tubular Dowel	
		Outside Diameter	Wall Thickness
Less than 8 1/2 inches (215 mm)	1 inch (25 mm)	-	-
8 1/2 to 10 inches (215 to 255 mm)	1 1/4 inches (32 mm)	1 5/16 inches (33 mm), or 1 3/8 inches (35 mm)	0.120 inches (3 mm)
Over 10 inches (255 mm)	1 1/2 inches (38 mm)	1 5/8 inches (41 mm)	0.120 inches (3 mm)

**451.09.B**

On page 259, **Add** the following paragraph immediately after Table 451.09-1 DOWEL SIZE:

Ensure each end of tubular dowel is fitted with a snug fitting plug style insert cap that does not exceed the outside diameter of the tubular dowel, to prohibit any intrusion of concrete or other materials.

**455.03.A.1.a**

On page 277, **Replace** the first sentence with the following:

A lot consists of concrete of the same JMF.

**499.02**

On page 286, **Add** the following to the first paragraph:

Carbonate Micro-Fines .....705.27

**499.03**

On page 286, **Replace** the third sentence of the first paragraph with the following:

The design air for concrete with 1 inch nominal maximum size aggregate is 7 percent.

**499.03**

On page 287, in Table 499.03-1 **Replace** the table columns heading with:

<p><b>Quantities per Cubic Yard</b>  <b>Provide Concrete with 7±2% Air Content</b></p>
--

**499.03**

On page 287, in Table 499.03-1 **Replace** footnote 2 with the following:

[2] Cementitious Content includes cement, pozzolan, and carbonate micro-fines materials, denoted as Cm.

**499.03**

On page 287, **Replace** Table 499.03-2 with the following:

<b>TABLE 499.03-2 POZZOLAN AND CARBONATE MICRO-FINES MATERIALS</b>	
<b>MATERIAL</b>	<b>MAXIMUM CONTENT (%)</b>
Fly Ash	25
GGBFS	30
Micro-Silica	10
Carbonate Micro-Fines <sup>[1]</sup>	20
When using multiple pozzolan and carbonate micro-fines materials, do not exceed the individual maximum contents above for each material. A combination of pozzolan and micro-fines materials may not exceed 50% of the total cementitious content by weight.	
<sup>[1]</sup> Not for use in QC 2 or QC 3 concrete.	

**499.06**

On page 291, **Replace** Table 499.06-1 with the following:

**TABLE 499.06-1 CONCRETE BATCHING TOLERANCES**

Material	Batching Tolerance (%)
Cement	±1.0
Pozzolan	±1.0
Carbonate Micro-Fines	±1.0
Aggregates	±2.0
Water <sup>[1]</sup>	±1.0
Chemical Admixtures	±3.0

<sup>[1]</sup>Measured by weight or volume

**499.07**

On page 292, **Replace** Table 499.07-1 with the following:

<b>TABLE 499.07-1 EVERY BATCH TICKET</b>	
Name of ready-mix batch plant	
Batch plant No.	
Batch plant location	
Serial number of ticket	
Date	
Truck number	
Class of concrete	
JMF Number	
Batch time	
Batch size	yd <sup>3</sup> (m <sup>3</sup> )
Actual weights of cementitious material:	
Cement	lb (kg)
Fly ash	lb (kg)
GGBFS	lb (kg)
Microsilica	lb (kg)
Carbonate Micro-Fines	lb (kg)
Other	lb (kg)
Actual weights of aggregates:	
Coarse	lb (kg)
Intermediate	lb (kg)
Fine	lb (kg)
Other	lb (kg)
Actual weight of water	lb (kg)
Actual volume of admixtures:	
Air-entrainer	fl oz (mL)
Superplasticizer	fl oz (mL)
Water-reducer	fl oz (mL)
Retarder	fl oz (mL)
Other	fl oz (mL)
Aggregate moisture contents:	
Coarse aggregate	%
Intermediate aggregate	%
Fine aggregate	%
Water-cementitious ratio, leaving the plant	



**499.07**

On page 293, **Replace** Table 499.07-2 with the following:

**TABLE 499.07-2 FIRST TICKET EACH DAY, EACH JMF**

Cementitious Materials:	Source:	Grade or Type:
Cement		
Fly ash		
GGBFS		
Microsilica		
Carbonate Micro-Fines		
Other		
Admixtures	Brand:	Type:
Air-entrainer		
Retarder		
Superplasticizer		
Water-reducer		
Other		

**500**

On page 294, **Replace** the title of subsection 501.05 with:

**501.05 Submittal of Engineered Drawings**

**501**

**Add** the following section into the heading:

**501.07 Welded Attachments**

**501.04.A.**

On page 294, **Replace** the first paragraph with the following:

Submit shop drawings to the OMM and the District Office of Planning and Engineering before the start of fabrication on Item 513, UF Level or at least 3 days before the pre-fabrication meeting, per 513.07 or 515.07 as follows:

**501.04.B.**

On Page 295, **Add** the following sentence to the end of the first paragraph:

Shop Drawings are not required for elastomeric bearings.

**501.04.B.**

On page 295, **Revise** the second paragraph to the following:

Submit two copies of the shop drawings to the Engineer and one copy to the District Office of Planning and Engineering with the materials delivered to the project. Do not incorporate material into the work until after submitting the drawings. Department approval of these shop drawings is not required.

#### **501.04.C.**

On page 295, **Revise** the second paragraph to the following:

Shop drawings shall be neatly and accurately drawn on 11 x 17 inch or 22 × 34-inch (280 x 432 mm or 559 × 864 mm) sheets. Submit the shop drawings electronically in pdf format.

On page 296, **Delete** the last paragraph in the subsection, beginning with “After all fabrication...”.

#### **501.05**

On page 296, **Revise** the second paragraph to:

Perform daily inspections to ensure the work governed by the Engineered Drawing is functioning as designed. Report malfunctioning work to the Engineer immediately.

#### **501.05**

On page 296, **Replace** the title of subsection 501.05 with:

**501.05 Submittal of Engineered Drawings.**

#### **501.05.A**

On page 296, **Revise** as follows:

**A. Projects with Railroad Involvement.** Prepare and provide Engineered Drawings listed in this section as follows:

Have competent individuals prepare, check and initial each Engineered Drawing. The preparer and checker shall be different individuals. Provide, on the cover sheet or submittal letter, the first name, last name and initials of each preparer and checker performing work on the Engineered Drawings. Have an Ohio Registered Engineer sign, seal, and date the cover sheet or submittal letter according to ORC 4733 and OAC 4733-35. If multiple preparers or multiple checkers created the drawing, then the cover sheet or submittal letter shall clearly indicate the portions for which each person is responsible.

Submit Engineered Drawings to all involved railway companies at least 50 days before planned construction begins. Obtain acceptance from all involved railroad companies. Furnish the Engineer copies of all correspondence with the railroad, documentation of railroad acceptance and the Engineered Drawings accepted by the railroad.

After all involved railroad companies have accepted the Engineered Drawings, schedule an Engineered Drawing meeting to be held within 14 days of the work. The signatory Engineer responsible for the Engineered Drawing design, the Quality Control Representative (QCR) (if designated), the Superintendent, the Engineer and the Inspector will participate in the meeting in person, via conference call or via video conference. The superintendent or other on-site personnel and the QCR may be the same person. The Engineer will invite the responsible designer of the Plans for assistance and the Railroad Field Representative. The purpose of the meeting shall be to review the drawings; resolve all issues to the Engineer’s satisfaction and ensure all parties are in agreement with the work to commence. At the conclusion of the meeting, the Engineer will provide a written response to the submittal in accordance with C&MS 105.02. Do not begin work until the Engineer’s acceptance has been received.

Perform all work in accordance with the ODOT accepted Engineered Drawings. The Signatory Engineer shall be available during the work to confirm that all work and equipment is in accordance with the Engineered Drawings. Alternatively, the Signatory Engineer may designate an on-site Quality Control Representative with the authority to confirm all the work and equipment as authorized is in accordance with the Engineered Drawings. The limits of the QCR’s authority will be determined by the Signatory Engineer and put into writing prior to proceeding with associated work.

The Signatory Engineer or the QCR shall respond in writing to all clarifications of plan conformance requested by the Engineer or Inspector during the progress of the work. The Department will consider a failure to respond to a clarification request as a deviation to the accepted Engineered Drawings.

Immediately cease all operations that deviate from the ODOT accepted Engineered Drawings. If a deviation is necessary, prepare revised Engineered Drawings as noted above and furnish the Engineer a copy of revised Engineered Drawings including documentation of acceptance from all involved railroad companies. Schedule an Engineered Drawing meeting as noted above to be held 24 hours, or less at the discretion of the Engineer, after submitting the revised railroad accepted drawings. At the conclusion of the meeting, the Engineer will provide a written response to the submittal in accordance with C&MS 105.02. Do not begin work until the Engineer's acceptance has been received.

The Department will consider delays resulting from Engineered Drawing deviations as non-excusable in accordance with 108.06.E.

This section applies to Engineered Drawings for the following:

1. Bracing adjacent to the railroad tracks. Perform work according to 501.05.B.1.
2. Demolition of structures over or within 14 feet of railroad tracks. Perform work according to 501.05.B.2.
3. Erection of structural members over or within 14 feet of railroad tracks. Perform work according to 501.05.B.4.

#### **501.05.B**

On page 296, **Revise** as follows:

**B. Projects without Railroad Involvement.** Prepare and provide Engineered Drawings listed in this section as follows:

Have competent individuals prepare, check and initial each Engineered Drawing. The preparer and checker shall be different individuals. Provide, on the cover sheet or submittal letter, the first name, last name and initials of each preparer and checker performing work on the Engineered Drawings. Have an Ohio Registered Engineer prepare, sign, seal and date the cover sheet or submittal letter according to ORC 4733 and OAC 4733-35. If multiple preparers or multiple checkers created the drawing, then the cover sheet or submittal letter shall clearly indicate the portions for which each person is responsible.

Schedule an Engineered Drawing meeting to be held within 14 days of the work. Submit Engineered Drawings to the Engineer at least 7 days prior to the meeting. The signatory Engineer responsible for the design, QCR (if designated), the Superintendent, the Engineer and the Inspector will participate in the meeting in person, via conference call or via video conference. The superintendent or other on-site personnel and the QCR may be the same person. The Engineer will invite the designer of the contract Plans for assistance. The purpose of the meeting shall be to review the drawings; resolve all issues to the Engineer's satisfaction and ensure all parties are in agreement with the work to commence. At the conclusion of the meeting, the Engineer will provide a written response to the submittal in accordance with C&MS 105.02. Do not begin work until the Engineer's acceptance has been received.

Perform all work in accordance with the accepted Engineered Drawings. The Signatory Engineer shall be available during the work to confirm that all work and equipment is in accordance with the Engineered Drawings. Alternatively, the Signatory Engineer may designate an on-site QCR with the

authority to confirm the work and equipment as authorized in accordance with the Engineered Drawings. The limits of the QCR's authority will be determined by the Signatory Engineer and put into writing prior to proceeding with associated work.

The Signatory Engineer or the QCR shall respond in writing to all clarifications of plan conformance requested by the Engineer or Inspector during the progress of the work. The Department will consider a failure to respond to a clarification request as a deviation to the accepted Engineered Drawings.

Immediately cease all operations that deviate from the accepted Engineered Drawings. If a deviation is necessary, prepare revised Engineered Drawings as noted above and furnish the Engineer a copy of revised Engineered Drawings. Schedule an Engineered Drawing meeting as noted above to be held 24 hours, or less at the discretion of the Engineer, after submitting the revised drawings. At the conclusion of the meeting, the Engineer will provide a written response to the submittal in accordance with C&MS 105.02. Do not begin work until the Engineer's acceptance has been received.

The Department will consider delays resulting from Engineered Drawing deviations as non-excusable in accordance with 108.06.E.

This section applies to Engineered Drawings for the following:

1. Cofferdams and Excavation Bracing. If a complete design is not provided in the plans, provide Engineered Drawings for excavations when the edge line of a roadway used to maintain traffic is located within a distance of one-half times the excavation height or for excavations that expose any side of an excavation to a height exceeding eight feet.

The Contractor may construct the design(s) shown on the plans without an Engineered Drawing submittal or prepare an alternate design. Submit Engineered Drawings for all alternate Cofferdam and Excavation Bracing designs. Perform all Work as specified below:

- a. Locate Cofferdams and Excavation Bracing according to the contract, if shown.
- b. Maintain temporary horizontal and vertical clearances according to the contract.
- c. Include the effects of AASHTO live, dead and temporary construction load surcharges as necessary.
- d. Design Cofferdams and Excavation Bracing to support the sides and bottom of an excavation for all phases of work in accordance with the latest *AASHTO Guide Design Specifications for Bridge Temporary Works*, Section 4 and the latest edition of either the AASHTO LRFD Bridge Design Specifications or the AASHTO Standard Specifications for Highway Bridges.

2. Demolition of Bridges or portions of Bridges in which the work endangers the public welfare, or life, health or property. Perform all Work as specified below:

- a. Provide temporary devices or structures necessary to protect traffic during all demolition activities. Provide traffic protection when demolition is located less than 12' horizontally from active traffic on structures of less than 25' vertical clearance. Increase the 12' minimum horizontal distance 1 foot for each 2 feet of additional height greater than 25'.
- b. Never lift the portions of structure being removed over active traffic. Before releasing traffic make the remaining structure stable.
- c. Design traffic protection devices or structures when over live traffic, for a minimum load of 50 pounds per square foot plus the weight of equipment, debris and any other load to be carried. Include any portion of the deck that cantilevers beyond the fascia beams or girders.

- d. In lieu of temporary devices or structures required in “a.” above, provide a vertical barrier. Design the vertical barrier with rigid or flexible materials specifically designed for demolition containment. Extend the enclosure up to the bottom of the deck and down to the ground. Maintain all materials free of tears, cuts and holes.
  - e. Maintain temporary horizontal and vertical clearances according to the contract.
  - f. Locate structural members to be reused before performing any removal operations.
  - g. Do not damage structural members being reused during any removal operation.
  - h. Perform Work so that all members are stable during all operation and loading conditions.
  - i. Provide the method and sequence of the removal operations. Include the type and location of equipment to be used during the demolition.
  - j. Perform Work according to 501.05.B.6.
3. Falsework for cast-in-place concrete slab bridges. Perform all work according to 508 and as specified below:
- a. Provide a camber table to account for the deflection of the falsework loaded with its self weight and the weight of wet concrete. Also include in the table, the specified camber to compensate for slab deflection after the falsework is released.
  - b. Maintain temporary horizontal and vertical clearances according to the contract.
  - c. As a minimum design falsework over waterways for a five year flood or with 75 percent of the effective waterway opening of the proposed structure. The Contractor is responsible for any damages caused by upstream flooding due to insufficient temporary structure size or the accumulation of debris or sediment in the channel.
  - d. Support falsework foundations located within the ten year flood limits on rock, shale or piles driven to a minimum depth of 15 feet, and to sufficient penetration to carry superimposed loads or until refusal on rock.
  - e. The incorporation of structural steel shapes, used as temporary support members, into a finished concrete slab superstructure is prohibited.
  - f. Design falsework in accordance with the latest AASHTO Guide Design Specifications for Bridge Temporary Works, Section 2.
4. Erection of steel or precast concrete structural members as specified below:
- a. Never lift structural members over active traffic. Before releasing traffic make structural members stable.
  - b. Supply any temporary supports or braces necessary to maintain structural stability and prevent lateral movement until completion of all construction activities.

- c. Perform Work according to 501.05.B.6, 513 or 515.
  - d. Do not field weld temporary members to permanent steel members.
  - e. Maintain temporary horizontal and vertical clearances according to the contract.
  - f. Provide drawings with at least the following information:
    - (1) Site Plan of the work area showing permanent support structures (piers and abutments); roads; railroad tracks; waterways; overhead and underground utilities; and other information pertinent to erection.
    - (2) Erection sequence for all members, noting any temporary support conditions, such as holding crane positions, temporary supports, falsework etc. Member reference marks, when reflected on the erection plans, should be the same used on the shop drawings.
    - (3) Primary member delivery location and orientation.
    - (4) Maintenance of Traffic during erection operations.
    - (5) Location of each crane for each primary member pick, showing radius and crane support (barges, mats, etc.).
    - (6) Capacity chart, Counter Weights, Make and Model for each possible lifting equipment configuration and boom length used in the work.
    - (7) Center of gravity locations for primary member.
    - (8) Rigging weights, capacity and arrangement for primary member picks.
    - (9) Lifting weight of primary member picks, including all rigging and pre-attached elements.
    - (10) Details of any temporary lifting devices to be bolted or welded to permanent members, including method and time (shop or field) of attachment; capacity; and method, time, and responsibility for removal.
    - (11) Blocking details for bridge bearings.
    - (12) 24 Hour Contact Phone Number of the Signatory Engineer and QCR (if designated).
5. Jacking and support of existing structures as specified below:
- a. Support the structure on temporary supports and brace as necessary to maintain structural stability and prevent lateral movement until completion of the permanent supports. Do not rely on jacks lifting system alone,(e.g. hydraulic system), to support the structure except during the actual jacking operation. Remove all temporary supports upon completion of the jacking procedure.

- b. Maintain a maximum differential jacking height of 1/4 inch between any adjacent beam lines.
  - c. Maintain a maximum differential jacking height of 1 inch between any adjacent abutments or piers.
  - d. Place jacks and any load plates at least 2 inches from the edges of any concrete substructure seats.
  - e. Do not field weld temporary members to permanent steel members.
  - f. Maintain temporary horizontal and vertical clearances according to the contract.
6. When the total load applied to a structure during construction, (new or structure being rehabilitated), exceeds 75 percent of the legal limit, (The Legal Limit is 80,000 lbs. or percentage thereof if posted), the load effects on the structure shall be analyzed based on the operating level calculated by the Load Factor Rating Method as given in the *AASHTO Manual for Bridge Evaluation*.
7. Structures for maintaining traffic in accordance with Item 502.
- a. For structures located over or within 14 feet of railroad tracks, submit plans in accordance with 501.05.A.
  - b. Perform Work according to 501.05.B.6.

#### **501.05.C**

On page 300, **Revise** the subsection to:

**C. Corrective Work.** Unless otherwise noted, before performing corrective work on structure items, 507,511,513,515,516,517 and 524, prepare a Corrective Work Plan (CWP). Submit three copies of the CWP to the Engineer for acceptance 30 days, or less at the discretion of the Engineer before construction begins. Have an Ohio Registered Engineer prepare, sign, seal and date each CWP. Obtain Department acceptance before beginning corrective work.

Perform all Work in accordance with the accepted CWP. Immediately cease all operations that deviated from the accepted CWP. If a deviation is necessary, furnish the Engineer three copies of a revised CWP. The revised CWP shall be signed, sealed and dated by an Ohio Registered Engineer. Obtain Department acceptance of revised CWP prior to performing corrective work.

Perform all corrective work, including the preparation of the CWP and revisions at no expense to the Department. The Contractor shall reimburse the Department for all CWP review costs of the Designer of Record. The Department will consider delays resulting from all corrective work as non-excusable in accordance with 108.06E.

#### **501.05.D**

On page 300 **Delete** entire subsection.

**501.07**

On page 301, **Add** the following Section:

**501.07 Welded Attachments.** Prepare and provide a detailed request showing weld size, length, type and location for welding permanent or temporary attachments to main structural members not shown or permitted by contract. Submit request to the Office of Structural Engineering at least 20 days before construction begins. Obtain acceptance before performing work. Perform work according to 513.

**503.03**

On page 303, **Replace** the first sentence with:

This item includes the preparation of an Engineered Drawing according to 501.05, and the construction, maintenance, and subsequent removal of all cofferdams and excavation bracing.

**507.04**

On page 313, **Replace** the tenth full paragraph with:

Do not use a follower unless approved by the Office of Geotechnical Engineering. If the Office of Geotechnical Engineering does approve the use of a follower, account for the increased energy loss when determining the required driving criteria.

**507.06**

On Page 314, **Replace** the section in its entirety with the following:

**507.06 Cast-in-Place Reinforced Concrete Piles.** Provide cast-in-place reinforced concrete piles with a plain cylindrical casing conforming to 711.03. Measure the pile diameter to the outside diameter of the casing.

Ensure that the pile casings are watertight after being driven. If furnished, shoes or points shall not project more than 1/4 inch (6 mm) outside the vertical surface of the casing.

The nominal pile wall thickness, t, is the greater of either 0.250 inches (6.66 mm) or the thickness determined using the following formula:

t (inches) =	R (lb)		t (mm) =	R (N)
	900,000			157,606

Where:

R = Ultimate bearing value in pounds (newtons)

For cast-in-place piles containing reinforcing steel, place reinforcing steel as stated in the second and third paragraph of 524.09 and place concrete according to 524.11.

After installation, cover the tops of driven casings until the concrete is placed. Before placing concrete, remove accumulated water or other foreign matter in a driven casing. Place concrete for cast-in-place piles using methods that prevent voids, however, do not vibrate the concrete.

**508.02**

On page 318, **Replace** the eighth paragraph with the following:

Remove falsework only after the concrete conforms to 511.14 and before final acceptance of the structure. Cut off or pull falsework piling. Cut off piles to at least the slope line, riprap line, or stream bed.



### 508.02

On Page 318, **Replace** the 12<sup>th</sup> paragraph in the section with the following:

Do not place bridge railings, concrete barrier, spandrel walls, decks of arches, sidewalks and curbs, or any superimposed concrete to be completed after constructing the main supporting member or the deck until the falsework for the main supporting member has been removed or released.

### 508.02

On page 318, **Replace** the 13<sup>th</sup> paragraph with the following:

For continuous concrete slab or beam superstructures, do not place concrete on a span until the falsework and forms are complete for the adjacent spans. Do not release or remove falsework from a span until the concrete in adjacent spans has been placed a sufficient length of time to meet all requirements for the removal of falsework as set forth in 511.14. Inserts cast into prestressed members for the purposes of falsework support shall be galvanized according to 711.02 and shall be shown in the shop drawings according to 515.06.

### 508.03

On page 318, **Replace** the first paragraph with the following.

**508.03 Forms.** Place all concrete in proper forms. Do not use unprotected sides of the excavation, instead of forms, unless as specified in 503.05 for rock or shale excavation. For dry excavation specified in 503.03, the Contractor may use the sheeting as forms for footings.

### 508.03

On page 319, **Revise** the first paragraph to the following:

Construct substantial, unyielding, and mortar tight forms, designed to produce a finished concrete conforming to the proper dimensions and contours. Make forms for exposed surfaces of approved material requiring a minimum number of joints or of dressed lumber of uniform thickness using form liner approved by the Engineer. Use forms and form liners to reduce the joints showing on the finished surface to a minimum. Arrange joints to coincide with rustication grooves shown on the plans. Properly brace or tie forms together using form ties that do not allow metal within 2 inches (50 mm) of an exposed surface of the finished structure after the forms are removed. For ties in the region of exposed surfaces, use an approved insert. Remove all forms and do not allow material, except reinforcing supports specified in 509.08, to remain in the concrete.

### 508.05

On page 319, **Revise** the last sentence to:

Include the cost for load testing required as per 508.02 in the item for which the falsework support is used.

### 509.04

On page 321, **Replace** the last five sentences with the following:

Install reinforcing steel with the following clearances from the concrete surface:

- A. 2 1/2 inches [-0 inch, +0.5 inch] (65 mm [-0 mm, +13 mm]) to the top of sidewalks.
- B. 3 inches [-0 inch] (75 mm [-0 mm]) at the faces of footings placed against rock or earth.

- C. 1 1/2 inches [-0 inch, +0.25 inch] (38 mm [-0 mm, +6 mm]) to the bottom of a cast-in-place deck slab.
- D. 2 1/2 inches [-0.25 inch, +0.75 inch] (65 mm [-6 mm, +19 mm]) between the reinforcing steel and the top surfaces of cast-in-place concrete deck slabs.
- E. 2 inches [-0 inch, +0.5 inch] (50 mm [-0 mm, +13 mm]) at all other surfaces.

**509.07**

On page 322, **Replace** the second paragraph with:

Mechanical connectors shall be capable of developing 125 percent of the yield strength of the connected bars. For threaded connections, do not reduce the nominal area of the bars shown in the plans without increasing the grade of the reinforcing bar shown in the plans. The total slip of the bar within the splice sleeve of the connector after loading in tension to 30.0 ksi (207 MPa) and relaxing to 3.0 ksi (21 MPa) shall not exceed the following measured displacements between gage points clear of the splice sleeve:

**511.04**

On Page 327, **Remove** the third paragraph and table and **Replace** with the following

When the concrete bid item does not require QC/QA, the Engineer will make at least one set of acceptance test cylinders for each 50 cubic yards (40 m<sup>3</sup>) of concrete.

**511.07**

On page 330, **Revise** TABLE 511.07-1 as follows:

**TABLE 511.07-1  
PLACEMENT TOLERANCES**

Deviation from plumb for exposed surfaces	± 3/4 inch (19 mm)
Vertical alignment (Deviation from a line parallel to the grade line)	± 1/2 inch in 20 feet (13 mm in 6 m) Max. ±1 inch (25 mm)
Longitudinal alignment (Deviation from a line parallel to the centerline or baseline)	±1/2 inch in 20 feet (13 mm in 6 m) Max. ±1 inch (25 mm)
Width dimensions of walls for exposed surfaces	±1/2 inch (13 mm)
Bridge Slab thickness	±1/4 inch (6 mm)
Elevations of beam seats	±1/8 inch (3 mm)
Slope, Vertical Deviation from Plane	±0.2%
Slope, Horizontal Deviation from Plane	±0.4%

**511.07**

On page 330, **Replace** the second paragraph with the following:

When placing superstructure and approach slab concrete assure the ambient air temperature is 85 °F (30 °C) or less and not predicted to go above 85 °F (30 °C) during the concrete placement; and evaporation rates, determined according to Figure 1 in ACI 308, do not exceed 0.1 lbs/ft<sup>2</sup>/hour (0.5 kg/m<sup>2</sup>/hour).

**511.07**

On page 330, **Replace** the fourth paragraph with the following:

Figure 1 does not apply to substructure items and formed parapets. Figure 1 applies to slip-formed parapets and approach slabs.

**511.08**

On page 333, **Revise** TABLE 511.08-1 as follows:

**TABLE 511.08-1  
SLIPFORMED BRIDGE RAILING TOLERANCES**

Reinforcing steel cover	-1/2 inch, +1/2 inch (-13 mm, +13 mm)
Top width dimension	-0, +1/4 inch (+6 mm)
Bottom width dimension	-0, +1/2 inch (+13 mm)
Surface flatness	1/4 inch in 10 feet (6 mm in 3 m)
Vertical alignment (Deviation from a line parallel to the grade line)	1/2 inch in 20 feet (13 mm in 6 m) Max. ±1 inch (25 mm)

**511.08**

On Page 333, **Replace** the 3<sup>rd</sup> paragraph with the following:

After the concrete initially sets, but before any shrinkage cracks develop, saw control joints 1 1/4 inches (32 mm) deep into the perimeter of the parapet. Generally, initial set is within 6 hours of batching of the concrete. Ensure that all control joints are sawed within 24 hours of placement. Saw control joints using an edge guide, fence, or jig to ensure that the joint is straight, true, and aligned on all faces of the parapet. The joint width shall be the width of the saw blade, a nominal 1/4 inch (6 mm). After the concrete curing period specified in Item 511.14 has been reached, before applying construction loads on the deck (excluding personnel, hand operated equipment and manually powered vehicles) and before allowing vehicle traffic in the lane immediately adjacent to median bridge railing, sawcut each control joint at least 4 inches (100 mm) deep around the perimeter of the front face, top and back face of the top portion of parapet, no lower than 12 and ½ inches (313 mm) above the top of the concrete deck slab. Caulk the control joints with a polyurethane or polymeric material conforming to ASTM C 920, Type S.

**511.14**

On page 336, **Delete** footnote [3] in table 511.14-1A

**511.14**

On page 337, **Delete** footnote [3] in table 511.14-1B

**511.14**

On page 337, in the **Revise** the second paragraph to:

If the air temperature surrounding the concrete is maintained between 32 and 50 °F (0 and 10 °C), and if the provisions of 511.12 do not apply, maintain the concrete above 32 °F (0 °C) for 7 days or

until a successful strength test conforming to Table 511.14-1A, except this time shall not be less than 5 days.

#### **511.14**

On page 337 **Replace** the last paragraph with the following:

Do not apply external loads to or perform work on new concrete until workers and construction materials will not damage the concrete or interfere with its curing. Allow at least 36 hours and until the field cured compressive strength cylinders or maturity results reach 85% f'c; or if using flexural beams, the average of two beam tests is greater than 650 psi (4.5 MPa) before loading new concrete.

#### **511.19**

On page 341, **Replace** the title of the section with:

#### **511.19 Joints, Cracks, Scaling and Spalls.**

#### **511.19.E**

On page 342, **Replace E.** with:

**E.** Cracks discovered in the deck of the top and bottom surfaces before opening the deck to traffic, that are 10 mils or 0.010 inches (0.254 mm) or less in width. For deck cracking on the top and bottom surface area, on more than 20% of the surface area, or that is 10 mils or 0.010 inches (0.254 mm) or more in width, or deck scaling that is greater than 0.250 inches (6.25 mm) deep, or on more than 20% of the deck surface area, or deck spalling on more than one area, or an area greater than 32 square yards (26.76 square meters), an investigation will be performed by OMM and proceed according to 108.02 to resolve the issue.

#### **512.03.F**

On page 349, **Replace** the second paragraph with the following:

If the concrete surface had curing compound applied, acid test the surface after blasting to see if the curing compound was removed. Perform the acid test for every 500 square feet (47 square meters). Use a 30%, by weight, solution of hydrochloric acid. Apply 4 to 5 drops to the concrete surface. If foaming/fizzing occurs the curing compound is removed. Rinse the tested location with an ammonia solution to neutralize the concrete area tested (1 cup ammonia to 5 gallons water).

#### **512.03.G.2.f**

On page 350, **Replace** “f.” with the following:

- f. Tint clear non-epoxy sealers with a vanishing dye that will not damage the concrete.

#### **512.03.G.2.g**

On page 351, **Replace** “g.” with the following:

- g. Do not apply sealer if the ambient temperature is below 40 °F (5 °C) or will fall below 32 °F (0 °C) within 12 hours after application.

#### **512.03.G.2.h**

On page 351, **Delete** subsection “h.”

#### 512.04.B

On page 352, **Revise** the second sentence to:

Sweep, abrasive blast, then with the use of a manual or power broom sweep and blow with compressed air so that the surfaces to which the sealer is to be applied is dry and free of dust and dirt.

#### 512.04.C

On page 353, **Revise** the third paragraph to:

Before using the material submit to OMM copies of the manufacturer's certified test data showing that the material complies with the requirements of this specification. The test data shall be developed by an independent approved testing laboratory, and shall include the brand name of the material, name of manufacturer, number of the lot tested and date of manufacture. When the material has been approved by OMM, further testing by the manufacturer will not be required unless the formulation or manufacturing process has been changed, in which case new certified test results will be required. The manufacturer shall certify that the formulation is the same as that for which data has been submitted. The state reserves the right to sample and test delivered lots for compliance.

#### 512.05.F

On page 355, **Revise** the first paragraph to:

Only allow traffic on deck after the treated area does not track. If there is any unreacted material on the surface after application(s), flush with fresh water, as recommended by the manufacturer. Contain all waste according to 107.19.

#### 512.06.C

On page 356, **Revise** the last sentence to:

Broadcast sand over the entire sealed area of the bridge deck by mechanical means to effect a uniform coverage of 1 to 2 pounds per square yards (0.54kg/m<sup>2</sup> to 1.08 kg/m<sup>2</sup>).

#### 512.08.G

On page 359, **Replace G.** in its entirety with the following:

**G. Type 2 Membrane Waterproofing.** This type of waterproofing consists of a rubberized asphalt and peel-and-stick waterproofing membrane 711.25. Follow manufacturer's written recommendations for application of this product, which shall be provided to the project. After installing the primer coat, if required, remove the membrane's release liner and place the adhesive side on the prepared concrete surface. Lay the membrane smooth and free of wrinkles. Lap joints in membranes by at least 1 inch (25 mm). Store membrane materials indoors at temperatures not to exceed 120 °F (49 °C).

For precast concrete three- and four-sided structures, install Type 2 membrane on the exterior vertical and exterior top horizontal surfaces.

#### 513.25.B

On page 377, **Revise** the fifth paragraph to:

If a test section contains unacceptable defects, test 5-foot (1.5 m) segments on both sides of the test section, or, if less than 5-foot (1.5 m) segments are on both sides of the test section, test the full length of the weld. Retest welds requiring repair after repairs are complete.

#### 514.02

On page 381 **Revise** the first sentence of the third paragraph to:

For caulking, use a single pack moisture cured polyurethane based material, which will not shrink, or sag capable of filling voids up to 1 inch (25 mm) wide.

#### 514.04.A

On page 382, **Replace** the second paragraph with the following:

Each quality control specialist must be, at a minimum, either a NACE (National Association of Corrosion Engineers) coating inspector Level 1-certified, or a SSPC (The Society for Protective Coatings) protective coating specialist, or a SSPC protective coating inspector Level 1, or a SSPC bridge coating inspector Level 1, or formally trained or retrained by, at a minimum, a NACE coating inspector Level 1 certified, or a SSPC protective coating specialist, or a SSPC protective coatings inspector Level 1, or a SSPC bridge coating inspector Level 1. The training shall be adequate to ensure that the quality control specialist is able to use all the testing equipment and understands the requirements of this specification. Provide a copy of the NACE or SSPC certification or a copy of the trainer's NACE or SSPC certification and a letter or certificate signed and dated by the trainer to the Office of Construction Administration. Ensure that the NACE or SSPC certification is current or retrain the quality control specialist every five years in accordance with the above requirements.

#### 514.05

On page 385, **Replace** the first paragraph with:

**Testing Equipment.** For the project duration, provide the Engineer or inspectors with the test equipment listed below for the type of work at each work site with ongoing work. With the exception of the recording thermometer, the fabricator shall provide its quality control specialists with the test equipment listed below. The Contractor and fabricator shall maintain all testing equipment in good working order, and provide documentation or certification of calibration from the manufacturer. If the Contractor or Fabricator and the Engineer's inspector are using different test equipment, the Contractor or Fabricator and the Engineer's inspector will perform side-by-side testing and compare results. If the difference between the Department's and Contractor's or Fabricator's tests results, such as blast profile, dry film thickness, temperature, dew point and relative humidity, are greater than 1%, the Contractor or Fabricator and the Engineer will determine the reason for the differences and make necessary adjustments.

#### 514.05.B

On page 386, **Replace B** with:

**B.** One Spring micrometer and extra-coarse replica tape or comparable electronic surface profile gauge for the measurement of abrasive blast profile depth within  $\pm 0.2$  mils on the project at all times.

#### 514.13.D

On page 392, **Replace** the second and third paragraphs with the following:

Collect all debris from blasting operations, equipment, or filters, and all debris that fell to the ground. Store the debris in steel containers/drums with lids that are locked at the end of each workday. Store the debris in these locked drums while in the storage location and when hauled from the storage location to the disposal site. The storage location shall be at the bridge site unless, the Engineer and Contractor agree on an alternate storage location. Secure the storage location by surrounding the site with a 5 foot (1.5 m) high dumpster or a 5 foot (1.5 m) high chain link fence fabric supported by traffic sign drive posts 10 feet (3 m) apart. Drive the traffic signposts into the ground at least 2 feet (0.6 m) deep. Secure the dumpster or fencing with padlocks at the end of each day. The location of centralized cleaning stations for recyclable steel shall also be agreed by the Engineer and the Contractor.

Test and evaluate the debris for disposal. Obtain the services of a testing laboratory to obtain directly from the project site and evaluate a composite representative sample of the abrasive blasting debris for each bridge site. The person taking the sample must be an employee of the testing laboratory.

#### 514.17.A

On page 395, **Revise** the first paragraph to:

**A. General.** Paint all structural steel, scuppers, expansion joints except top surface, steel railing, exposed steel piling, drain troughs, and other areas as shown on the plans. Paint galvanized or metalized surfaces if shown on the plans. Unless otherwise shown on the plans or specified below, apply paint to provide the specified coating thickness by brush and spray methods. Apply primer and intermediate paint per 708.01 and 708.02 to cover all visible steel surfaces. If gaps or crevices remain between adjacent coated steel surfaces after applying the intermediate coat, caulk according to 514.19. If brush and spray are not practical to paint places of difficult access, the Contractor may use daubers, small diameter rollers, or sheepskins.

#### 514.17.E

On page 398, **Revise** the section as follows:

**E. Brush Application.** Apply the paint to produce a smooth coat. To ensure coverage, apply wet stripe coats using brushes, daubers, small diameter rollers or sheepskins to all edges, outside corners, crevices, welds, rivets, bolts, nuts and washers in addition to the spray application of each individual coating. Apply stripe coat of organic zinc primer either before or after spray application of primer. Apply stripe coats of intermediate and finish coats before spray application of the respective coats. Apply additional paint as necessary to produce the required coating thickness.

#### 514.17.G

On page 399 **Replace** the 2<sup>rd</sup> paragraph of the section with the following:

Ensure that the paint manufacturer's printed instructions for the minimum times to handle, recoat and cure the individual coats for specified conditions and thicknesses are followed for each coat of paint before applying the next coat. Comply with the manufacturer's written instructions for the time interval between coats and apply the next coat when an additional coat will not cause detrimental film irregularities, such as lifting, wrinkling, or loss of adhesion of the undercoat. Do not exceed the following time intervals. If the prime coat is organic zinc, the maximum time between the prime and intermediate coats is 30 days. There is no maximum time between the prime and intermediate coats for an inorganic zinc primer. The maximum time interval between intermediate and finish coats is 13 days. These maximum recoat times include adverse weather days and the Engineer will not extend the

times. The recoat windows begin with the initial application of each coating type. Additional applications of the same coat do not reset the recoat windows. If the next type of coating is not applied within the times stated above, remove the coatings and re-blast the steel according to SSPC-SP 10.

#### 514.17.G

On page 399, in Section **G.**, **Replace** bullet 2. with:

2. Perform Adhesion Testing according to ASTM D 4541, Type 4. Meet or exceed 400 psi adhesion between coats or between the paint system and the substrate, or 400 psi cohesion within paint coats.

#### 514.19

On page 400, **Revise** the paragraph to:

After the intermediate coat cures and before applying the finish coat, caulk gaps or crevices up to 1/2 inch (13 mm) wide. Follow the manufacturer's recommendations for curing before applying the finish coat.

#### 515.03

On page 406, **Revise** the first paragraph of this section to:

There are three levels of fabricator qualification. OMM will classify each fabricator at the highest level of fabrication it is qualified to perform.

#### 515.11.A

On page 409, **Add** the following paragraph after the first paragraph:

Immediately prior to final stressing, obtain the temperature correction factor for prestressing strands using a thermometer that has been calibrated against a NIST-traceable thermometer. Define the frequency, location, and thermometer in the Quality Control Plan.

#### 515.13

On page 409, **Replace** the section with the following:

**515.13 Inspection Facilities.** The fabricator shall provide the inspector office accommodations conforming to the following requirements:

- A. Minimum dedicated floor area of 120 square feet (11 m<sup>2</sup>).
- B. Minimum ceiling height of 7 feet (2.1 m).
- C. Adequate working and storage facilities, work space, lighting, electrical outlets, lockable files or cabinets with key.
- D. Heating and cooling capable of maintaining an ambient air temperature between 68 °F (20 °C) and 80 °F (27 °C).
- E. Secure internet access.

#### 515.14

On page 410, **Revise** the first paragraph with the following:



Use metal forms capable of producing members within the tolerances shown on the plans. Forms made of material other than metal may be used for bulkheads and voids and may be used for a single project for prestressed members requiring non-standard forms. Ensure that the surfaces of the forms in contact with the concrete are smooth and the joints between panels are tight. The soffit form shall have a plane surface at right angles to the vertical axis of the members and have the two bottom edges beveled 3/4 inch (19 mm) with a triangular strip built into the forms. Increase the length of the forms for elastic shortening and normal concrete shrinkage, and design the forms to accommodate this movement.

**515.15.D**

On page 411 **Replace** the 5<sup>th</sup> and 6<sup>th</sup> paragraphs of the section with the following Table:

Sample and test the concrete for prestressed concrete members as specified below:

**TEST SPECIMEN REQUIREMENTS**

<b>Cubic Yards per Bed</b>	<b>Sampling Frequency</b>	<b>Number of Cylinders Required</b>
Less than or equal to 30 cubic yards	First and last load per bed	Minimum of 4
30 to 60 cubic yards	First and last load per bed plus one random sample.	Minimum of 6
Greater than 60 cubic yards	First and last load per bed plus 2 random samples.	Minimum of 8

**515.17**

On page 414, **Revise** TABLE BEAM DIMENSIONAL TOLERANCES as follows:

**BEAM DIMENSIONAL TOLERANCES**

<b>Description</b>	<b>Box Beam</b>	<b>I Beam</b>
Length of beam	±1/8" per 10 ft (1 mm/m) max ±3/4" (19 mm)	±1/8" per 10 ft (1 mm/m) max ±1" (25 mm)
Depth of beam	±1/4" (6 mm)	-1/4" (6 mm) +1/2" (13 mm)
Depth of I beam flange including fillets	N/A	±1/4" (6 mm)
Beam (box)/Flange (I) Width	±1/4" (6 mm)	-1/4" (6 mm) +3/8" (10 mm)
Flange Thickness excluding fillets		
a) Top	-0 +1/2" (13 mm)	±1/4" (6 mm)
b) Bottom	-1/8" (3 mm) +1/2" (13 mm)	±1/4" (6 mm)
Width Web	N/A	-1/4" (6 mm) +3/8" (10 mm)
Width beam walls	-1/4" (6 mm) +3/8" (10 mm)	N/A
Width of Void	±1/2" (13 mm)	N/A

Height of Void	±1/2" (13 mm)	N/A
Box Beam Diaphragm spacing	±2" (50 mm)	N/A
Deviation from True Vertical	±1/8" (3 mm)	1/8" per ft (8 mm per m)
Deviation from Skew Angle	±1/2" (13 mm)	±1/2" (13 mm)

**515.17**

On page 414, **Revise** TABLE REINFORCING STEEL TOLERANCES as follows:

**REINFORCING STEEL TOLERANCES**

<b>Description</b>	<b>Box Beam</b>	<b>I Beam</b>
Clear cover	-0	-0
	+1/4" (6 mm)	+1/4" (6 mm)
Splice lengths	-1 1/2" (38 mm)	-1 1/2" (38 mm)
Stirrup spacing in anchorage zone	±1/4" (6 mm)	±1/4" (6 mm)
Stirrup spacing outside anchorage zone	±1" (25 mm)	±1" (25 mm)
Stirrup extension above top flange	-1/2" (13 mm)	0
	+1/4" (6 mm)	+1" (25 mm)
Reinforcement extension beyond beam end	-3/4" (18 mm)	-3/4" (18 mm)
	+0	+0

**515.22**

On page 416, **Revise** the first two paragraphs of the section to:

Payment for prestressed concrete beams include all inserts, sleeves, fittings, reinforcing steel fully or partially encased in the members, threaded rods, embedded inserts, embedded bearing sole plates, temporary bracing, fixed anchor dowels, and all transverse tie rods necessary to complete this work. The Department will consider all costs associated with all structural steel, including bolts, nuts, washers and plate washers for steel intermediate diaphragms, as well as concrete and reinforcing steel for cast-in-place concrete intermediate diaphragms as incidental to the intermediate diaphragms.

The Department will pay for expansion joint end diaphragms, semi-integral diaphragms, pier diaphragms, bearing load plates, bearing pads, and other expansion materials, separately.

**516.07**

On page 419, **Revise** the fifth paragraph to:

Set elastomeric bearing pads directly on the concrete surface. If the beams seats are sealed with an epoxy or non-epoxy sealer prior to setting the bearings, do not apply sealer to the concrete surfaces under the proposed bearing locations. If these locations are sealed, or membrane cured, remove the sealer or membrane cure to the satisfaction of the Engineer before setting the bearings. Perform this removal at no expense to the Department.

**517.02**

On page 421, **Revise** the first sentence to:

Fabricate railing according to Item 513.

**518.05**

On page 424, **Add** the following sentence to the end of the first paragraph:

Place porous backfill in loose lifts not to exceed 12 inches. Run a plate compactor or tamper over the top of each lift for consolidation of approximately 85% of original layer thickness. If placed in loose lifts greater than 12 inches, flood the porous backfill at the appropriate moisture content for consolidation of approximately 85% of original layer thickness.

**519.06**

On page 426, **Revise** the second paragraph to:

Remove the forms within 24 hours after placing the concrete, and finish all exposed surfaces by rubbing to match the surrounding concrete. Apply membrane curing according to 511.14, Method B, immediately after rubbing the surface.

**520**

On Page 427 **Replace** “ITEM 520 PNEUMATICALLY PLACED MORTAR” in its entirety with the following:

**ITEM 520 PNEUMATICALLY PLACED CONCRETE- SHOTCRETE**

- 520.01 Description.**
- 520.02 Materials.**
- 520.03 Shotcrete Mix Design.**
- 520.04 Delivery of Materials.**
- 520.05 Storage of Materials.**
- 520.06 Equipment.**
- 520.07 Submittal Requirements.**
- 520.08 Removal of Concrete.**
- 520.09 Reinforcement.**
- 520.10 Blast Cleaning of Repair Area.**
- 520.11 Preconstruction Testing.**
- 520.12 Shotcrete Placing.**
- 520.13 Curing.**
- 520.14 Inspection and Testing**
- 520.15 Method of Measurement.**
- 520.16 Basis of Payment.**

**520.01 Description.** This work consists of surface preparation, furnishing and placing pneumatically applied concrete for new work, rehabilitation, or repair.

**520.02 Materials.** Furnish materials conforming to:

Reinforcing steel.....	509
Portland cement.....	701.01 through 701.05, 701.09
Micro-silica.....	701.10

Fly ash.....	701.13
Fine aggregate.....	703.02, 703.03
Air-entraining admixture.....	705.10
Chemical admixture for concrete.....	705.12
Welded steel wire fabric. ....	709.10 or 709.12
Swedged anchor bolts.....	711.10

Use water for concrete mixing free from sewage, oil, acid, strong alkalis, vegetable matter, clay, and loam. Potable water is satisfactory for use in concrete. Non-potable water will meet the requirements of ASTM C1602. Water from a reclaiming system will contain no more than 0.06% chlorides. Test the non-potable and reclaiming system water prior to the start of shotcrete production. Provide certified test data to the Engineer, at least 21 days prior to shotcrete production.

**520.03 Shotcrete Mix Design.** Only use mix designs accepted by the Department and issued a JMF number.

**A.** Provide a Shotcrete job mix conforming to the following:

1. **Compressive strength.** Provide a compressive strength, at a minimum, of 2,000 psi at 3 days, and 4,000 psi at 7 days, or as per plan requirements.
2. **Air Entraining.** provide a mix with an air content between 7 to 10 percent measured at the truck prior to shotcrete placement in accordance with ASTM C231.
3. **Corrosion Inhibitor grease.** Use corrosion inhibitor (grease) conforming to the following:
  - 3.1.1. Drop point 300 °F (149 °C) minimum by ASTM D-566.
  - 3.1.2. Flash point 300 °F (149 °C) minimum by ASTM D-92.
  - 3.1.3. Water content 0.1% maximum by ASTM D-95.
  - 3.1.4. Rust test – Rust Grade 7 or better after 720 hours, aggressive conditions: Rust Grade 7 or better after 1000 hours by ASTM B-117 and ASTM D-610.
  - 3.1.5. Water soluble ions.
 

Chlorides	10 ppm maximum	by ASTM D-512
Nitrates	10 ppm maximum	by ASTM D-3867
Sulfates	10 ppm maximum	by APHA 427D (15th ED)
  - 3.1.6. Oil separation – 0.5% by weight maximum at 160 degrees F (71 degrees C) by FIMS 719B, Method 321.2.
  - 3.1.7. Soak test – 5% Salt Fog at 100 °F (38 °C), 5 mils (0.13 mm) (Q Panel Type S), immerse panels in 50% salt solution and expose to 5% Salt Fog – no emulsification after 720 hours by ASTM B117 Modified.

**B.** Provide prepackaged shotcrete materials in accordance with ASTM C1480 from a single manufacturer. The minimum compressive strength for shotcrete is 2,000 psi at 3 days and minimum of 4,000 psi at 7 days. Follow the manufacturer’s recommendations for storing the material on site, do not allow the prepackaged materials to become wet prior to use. Submit certified test data to the Engineer

for approval prior to use that and meets the requirement of Table 520.03.B-1:

**TABLE 520.03.B-1, SHOTCRETE CONCRETE PROPERTIES**

<b>Hardened Properties</b>	<b>Test Method</b>	<b>Requirement</b>
Slant Shear Bond Strength @ 24 hours	ASTM C 882 Modified <sup>(1)</sup>	1200 psi, min.
Drying Shrinkage @ 28 days	ASTM C 157 Modified <sup>(2)</sup>	0.08%, max.
Rapid Chloride Permeability @ 28 days	ASTM C 1202 <sup>(3)</sup> / AASHTO T 277 <sup>(3)</sup>	750 coulombs, max.
Volume of Permeable Voids @ 7 days	ASTM C 642 <sup>(3)</sup>	10%, max.
Freeze-Thaw Resistance @ 300 cycles	ASTM C 666, Procedure A	95% RDM, min.
Flexural Strength @ 24 hours	ASTM C 348	650 psi, min.
Compressive Strength @ 3 days	ASTM C 109	2000 psi, min.

(1) No epoxy bonding agent used.

(2) ICRI Guideline No. 03733, "A Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces", 1"x1"x10" prism, air cured

(3) Either Rapid Chloride Permeability or Volume of Permeable Voids can be used.

**520.04 Delivery of Materials.** Deliver all materials in their original containers bearing the manufacturer's label, specifying date of manufacturing, batch number, trade name, and quantity. Each shipment will be accompanied by a Safety Data Sheet (SDS).

**520.05 Storage of Materials.** Stock and store any material necessary to perform the work to prevent damage by the elements. Keep the storage space clean and dry per Manufacturer's recommendations.

**520.06 Equipment.** Provide shotcrete equipment capable of delivering the premixed material accurately, uniformly and continuously through the delivery hose.

**A. Mixing:**

Provide dry-mix shotcrete using a rotary type or pressure vessel gun with a continuous-type predampener, capable of thoroughly mixing the shotcrete mixes in sufficient quantity to maintain shotcreting continuity and a moisture range of 3 to 5% prior to discharging into the gun. Operate all equipment in accordance with the manufacturers specifications.

Provide wet-mix shotcrete using a positive displacement pump (swing tube). Concrete for wet-mix shotcrete placement may be supplied by an approved concrete batch plant and delivered by truck concrete mixers. Supply plant batched concrete and delivery equipment meeting the requirements of ASTM C94. Where the concrete mixture is prepared on-site, use mixing equipment with a calibrated water meter capable of mixing prepackaged shotcrete material. Supply concrete mixes used in shotcrete placement having a w/cm ratio between 0.32-0.45. The maximum 90-minute limit will be implemented for wet-mix shotcrete after the addition of water to the mixture. Use of hydration control admixtures (HCA) may be used to extend the 90 minutes as approved in the job mix approval prior to use.

**B. Air Pressure:**

**Dry-Mix Process.** Use a compressor or blower capable of delivering a sufficient volume of oil-free air at the pressure shown in Table 520.06.B-1. Maintain steady pressure throughout the placing process.

Use a water pump with the size and capacity to deliver water to the nozzle with a pressure at least 15 psi more than the required air pressure.

The values shown in the Table 520.06.B-1 are based on a hose length of 150 feet with the nozzle less than 25 feet above the delivery equipment. Increase operating pressure approximately 5 psi for each additional 50 feet of hose and approximately 5 psi for each 25 feet the nozzle is raised.

**Table 520.06.B-1, Compressor Capacities**

Compressor Capacity, CFM	Hose Diameter, in.	Maximum Size of Nozzle Tip, in.	Operating Air Pressure Available, psi
250	1	3/4	40
315	1-1/4	1	45
365	1-1/2	1-1/4	55
500	1-5/8	1-1/2	65
600	1-3/4	1-5/8	75
750	2	1-3/4	85

**Wet-Mix Process.** Use a compressor or blower capable of delivering a sufficient volume of oil-free air to operate the pump at a line pressure between 100 psi and 300 psi. Use delivery hoses between 1-1/2 inches and 3 inches in diameter. Use mixing equipment capable of thoroughly mixing the materials in sufficient quantity to maintain continuous placement.

**520.07 Submittal Requirements.** Submit to the Engineer for review at least two weeks before beginning the work.

**A.** Evidence the contractor has successfully executed no less than five projects with similar size and scope over the last five years. The information provided is to include a statement of the type of work, and contact information for Engineer or Owner who have knowledge of the execution of the work and present condition of the work.

**B.** Documentation and owner references, verifying the qualifications of the nozzle men. Personnel designated as nozzle men on the job are required to document a minimum of one year of experience in the application of shotcrete on a comparable project and hold a current certificate for ACI Shotcrete Nozzleman, either dry-mix process or wet-mix process, as corresponds to the process indicated. Certifications for all nozzle men to be utilized on the job.

**C.** Documentation the supervisor has experience supervising more than one comparable project including written documentation and owner references, verifying the qualifications.

**D.** JMF information and a list of materials and quantities. Include list of Admixture literature used. Indicate the admixture type and the manufacturer's recommendations for mixing the admixtures with JMF.

**E.** Methods and materials used for Depth control quality measures.

**520.08 Removal of Concrete.** In areas to be repaired, remove all loose, soft, honeycombed, and disintegrated concrete, plus a minimum of 1/4 inch (6 mm) to a maximum of 1 inch (25 mm) depth of sound concrete. Remove additional concrete as necessary to permit the placement of the minimum specified shotcrete thickness of not less than 1 1/2 inches (38 mm), except on top horizontal surfaces of not less than 3/4 inch (19 mm). Once initial removals are made, undercut all exposed reinforcing bars. Undercutting will expose the full circumference of the exposed reinforcing bar. Provide a clearance of 3/4 inch (19mm) between the exposed reinforcing bar and the surrounding concrete.

Remove all heavy corrosion and scale from the reinforcing bars with wire brush or abrasive blasting. A minor amount or tightly adhered rust may be left in place.

Saw cut edge locations to a minimum of 1/2 inch (13mm). Maintain an edge location depth of not less than the specified minimum depth for all repair areas.

Only use pneumatic, hand tools, or hydrodemolition equipment to obtain results satisfactory to the Engineer in the removal of concrete and in preparing and shaping the areas to be repaired.

If working around reinforcing steel, avoid loosening the steel, or shattering the concrete around it, beyond the repair area.

**520.09 Reinforcement.** For existing reinforcing bar that have been cut or having lost 20% or greater section loss, splice in supplement reinforcing bar of equal bar size. Use mechanical rebar slicing system for supplemental reinforcing bars.

Place deformed wire fabric in all vertical surface areas where the thickness of the shotcrete patch is greater than 1 1/2 inches (38 mm) or bottom side of horizontal surfaces. Repairs areas on the top of horizontal surfaces do not require deformed wire fabric. Reinforce patches with deformed wire fabric meeting either 2 x 2 inches (50 x 50 mm) with wire size number D 0.9, or 3 x 3 inches (75 x 75 mm) with wire size number D 1.4. Cover the entire area of the repair with deformed wire fabric, place the wire fabric no closer than 1/2 in (13 mm) to the prepared surface and not less than 1 in (25 mm) from the finished surface. Overlap adjacent sheets of deformed wire fabric by 6 inches (150 mm), and securely tie them together. Carefully pre-bend fabric before installation to fit around corners and into re-entrant angles. Rolled wire fabric is prohibited. Wire fabric held in place by elastic force (spring-loaded) or by friction is prohibited.

The deformed wire fabric can be tied to the existing reinforcing bars if there is a 3/4-inch (19 mm) clearance around the bar. The maximum anchor spacing for the deformed wire fabric is 18 inches (46 cm) on center, in all horizontal for vertical surfaces and 12 inches (30 cm) in all horizontal for bottom vertical surfaces, overhead. A minimum of 3 anchors are required for each repair area. Unless specified on plans use 3/8 inch (10 mm) swedged anchor bolts. Embed anchors to manufactures recommendation to develop full capacity of swedge bolt. Use swedge bolt and nut to secure wire fabric.

**520.10 Blast Cleaning of Repair Area.** After performing 520.08 and 520.09, blast clean all surfaces to which shotcrete is to bond between 24 and 72 hours prior to placing of the shotcrete. All surfaces to which the concrete is to bond include exposed reinforcing steel, existing concrete, and the work face of any previously placed material. Blast clean all surfaces using high-pressure water blasting with or without abrasives in the water, abrasive blasting with containment, or vacuum abrasive blasting. High-pressure water washing requirements can be defined as a minimum pressure of 3500 psi (24 MPa) and flow of 5.0 gal/min (79 L/min). Maintain a standoff distance (the distance between the nozzle and the surface being cleaned) to a maximum of 12 in.

Bring the prepared substrate to saturated surface dry (SSD) with water meeting 520.02, ensure that all prepared substrate maintain a SSD prior to and during the shotcrete placement. The Engineer will

approve the preparation and condition of all surfaces immediately before the application of the shotcrete.

**520.11 Preconstruction Testing.** Before the start of placing any shotcrete, perform a preconstruction test to verify the operation of the equipment, to confirm the application crew's capability, and to ensure the pneumatically placed shotcrete will be of acceptable quality.

Fabricate mockup panels no less than 3 foot (0.9 m) square and 4 inches (100 mm) deep. Install reinforcement in the mockup panel that matches the largest size and tightest spacing found for the reinforcement in the bridge. Mount the box in the same orientation as the project sections being modeled. Apply the shotcrete using the same personnel, equipment, materials and procedures that will be used on the project, until the box is full.

Cores are to be taken as specified by Engineer and evaluated by an AASHTO Accredited laboratory for acceptable strength following ASTM C1140.

Have each nozzleman proposed to perform this work fabricate a satisfactory mockup panel before allowing that nozzleman to apply shotcrete to the structure.

**520.12 Shotcrete Placing.** Place the shotcrete when the ambient temperature is between 50 °F and 90 °F. Do not place concrete against a surface containing frost, ice, or standing water. If placing shotcrete when the atmospheric temperature is 32 °F (0 °C) or less, or if weather forecasts predict these temperatures during the curing period, follow the requirements of 511.12. Protect the work from environmental conditions until final curing has been applied.

Apply the concrete using pneumatic equipment that sprays the mix onto the prepared surface at a velocity of less than 100 feet per second for construction of portions of structures, repairing concrete structures, or encasement of structural steel members. Minimize rebound and produce a compacted dense homogenous mass.

Place dry mixed shotcrete by equipment with the proper amount of water applied at the mixing nozzle for the correct placement consistency. Place wet-mix shotcrete by a positive displacement swing tube pump with the correct air flow at the nozzle for proper material velocity and placement consistency. Use shooting strips or guide wires to ensure square corners, straight lines, and a plane surface of shotcrete, except as otherwise permitted by the plans or approved by the Engineer. Place shooting strips to keep the trapping of rebound at a minimum. At the end of each day's work, or similar stopping periods requiring construction joints, cut the work on a 45° angle through the full depth of the section, roughen the surface by stiff broom, racking or scoring for good surface bond when placing subsequent shotcrete layers. In shooting all surfaces, ensure that the stream of flowing material from the nozzle impinges as nearly as possible at right angles to the surface being covered, and hold the nozzle 2 to 4 feet (0.6 to 1.2 m) from the working surface.

Finish shotcrete repairs flush with the original masonry surface, except as noted for areas of exposed reinforcing steel. On vertical and overhead surfaces, the layer thickness is to be established and demonstrated during the preconstruction testing phase of the project. Mock panel will demonstrate shotcrete mix will neither sag nor decrease the bond of the preceding coat. If a successive coat is applied on shotcrete that has set for more than 2 hours, clean and dampen the shotcrete surface as required in 520.05 for the prepared surface.

After shotcrete has been placed to the desired thickness, cut off all high spots with a sharp trowel, or screed them to a true plane as determined by shooting strips or by the original masonry surface, or as directed. If using screeds, apply them lightly to all surfaces so as not to disturb the shotcrete for an appreciable depth, and work them in an upward direction when applied on vertical surfaces. Unless



otherwise directed, give the finished shotcrete surface a flash coat about 1/8 inch (3 mm) thick. Take special care to obtain a texture demonstrated and approved by the Engineer during preconstruction testing on all exposed surfaces.

Shotcrete rebounded outside of the formwork is prohibited from being worked back into the surface and is not to be salvaged and included in later batches. Rebounded shotcrete is the responsibility of the Contractor for removal and disposal.

**520.13 Curing.** Cover the pneumatically placed shotcrete patches with burlap or cotton mats and keep them wet for 7 days after placing. If it is not practical to use mats, keep the surface wet by sprinkling for the same length of time. If the Engineer determines that the above curing procedures are impractical because of the inaccessibility of isolated repair areas, the Contractor may cure the final shotcrete surface according to 511.14, Method B, using twice the manufacturer's recommended coating rate for formed concrete surfaces (equal to a white sheet of typing paper) at the time of application. Protect all shotcrete against cold weather according to 511.12.

Do not use curing compounds on any surfaces against which additional shotcrete or other cementitious finishing materials are to be bonded unless positive measures, such as prepare surface per 520.09 Preparation of Repair Area, are taken to completely remove curing compounds prior to application of such additional materials.

**520.14 Inspection and Testing.** After curing and before final acceptance, sound all patched areas. Remove and replace all unsound or cracked areas. In addition to sounding all patches, the Department will base acceptance of the shotcrete on compressive strength tests on cores taken from test panels. Provide cores for compressive testing not less than 3 inches in diameter. Test panels are required be shot daily by each nozzleman. Follow ASTM C1140 for panel size and coring, and compressive strength testing by ASTM C1604. If the cores fail the strength tests, then take samples from the sections shot that day. Test the cores at an AASHTO Accredited laboratory for compressive strength.

The Engineer will waive coring on small quantities or overhead patches if it is determined by sounding and visual inspection that the patches are sound.

Remove, replace, re-inspect, and re-test all defective patches, as determined by sounding, visible cracks, or unacceptable cores. Fill core holes according to 519.

Maintain the in-place inspection access equipment employed during the original work activities or provide alternate inspection equipment such as platform lifts, bucket trucks, snooper trucks, or equivalent as approved by the Engineer for testing.

**520.15 Method of Measurement.** The Department will measure Pneumatically Placed Shotcrete by the number of square feet (square meters). The Department will measure the area of exposed surfaces of all completed, tested, and approved patches, irrespective of depth or thickness of the patch. If a patch includes corners or edges of such members as beams, columns, or curbs, the Department will include all the exposed surfaces; if a patch extends completely through a member or a slab, the Department will include both exposed surfaces.

The Contractor is responsible for all test panels, coring repair of core holes, independent laboratory testing of the cores, replacement of rejected areas, and all previously mentioned work under Pneumatically Placed Shotcrete for payment.

**520.16 Basis of Payment.** The Department will not pay for additional reinforcement to replace that damaged by the Contractor's operations.

The Department will not pay for removing, replacing, and re-inspecting of defective patched shotcrete as determined by sounding, visible cracks, or unacceptable cores.

The Department will pay for accepted quantities at the contract price as follows:

Item	Unit	Description
520	Square Foot (Square Meter)	Pneumatically Placed Concrete Shotcrete

**522.03**

On page 432, **Revise** the last sentence of this section to:  
Backfill according to the requirements for Item 611.

**523.02**

On page 433, **Replace** the first paragraph of the section with the following:

**523.02 General.** Perform dynamic tests on **a minimum of** two successfully tested piles. A successfully tested pile is one that provides adequate data to provide pile driving criteria as described in 523.04. Perform signal matching analysis of the dynamic test data on at least one of the two test piles. Perform the test according to ASTM D 4945 to determine driving requirements to achieve the required ultimate bearing values for the piles to be installed in the structure.

**526.05**

On page 443, **Replace** the section with the following:

**526.05 Finishing and Curing.** Mechanically screed, at a vibration frequency of 1500 to 5000 pulses per minute, the concrete surface to the proper elevation in one complete pass with a minimum of hand finishing. Cure approach slabs according to 511.14.A. Seal joints and cracks according to 511.19. If the approach slab is to serve as a base for an asphalt concrete wearing course, texture the approach slab according to Item 305. If the approach slab is to serve as a wearing surface, test the surface according to 451.13, and diamond groove the surface according to 511.17.

Open approach slabs to traffic according to Table 511.14-1A or Table 511.14-1B.

**601.02**

On page 445, **Replace** the last paragraph with the following:

Ensure tied concrete block mats and articulating concrete block revetment systems are held together by galvanized steel wire, HDPE mesh, or stainless steel wire.

**601.04.A**

On page 445, **Replace** the name of section A. with the following:

**A. Type A – Provide Flat Stones or Broken Concrete**

**601.04.A**

On page 445, **Delete** the following paragraph from the end of section A.:

Approved manufacturers are on file with the Office of Materials Management. For approval, manufacturers will submit product information to the Office of Hydraulic Engineering.

**601.04.B**

On page 445, **Replace** the name of section **B.** with the following:

**B. Type B – Provide Articulating Concrete Block Revetment System**

**601.04.B**

On page 445, **Replace** the first sentence of the section with the following:

Ensure articulating concrete block revetment conform to 712.13.

**601.04.C**

On page 445, **Replace** the name of section **C.** with the following:

**C. Type C – Construct Concrete Riprap Using Cloth or Burlap Bags**

**601.04.D**

On page 446, **Replace** the name of section **D.** with the following:

**D. Type D – Construct a 6-inch (150 mm) Reinforced Concrete Slab**

**601.11**

On page 448, **Delete** the last paragraph of the section:

~~Approved manufacturers are on file with the laboratory. For approval, manufacturers will submit product information to the Office of Hydraulic Engineering.~~

**601.12**

On page 448, **Delete** the last two sentences of the section:

~~Tied Concrete Block Mats are approved by the Office of Hydraulics Engineering. Furnish products according to the Departments Qualified Products List (QPL).~~

**601.13**

On page 448, **Delete** the last two sentences of the section:

~~Articulating Concrete Block Revetment Systems are approved by the Office of Hydraulic Engineering. Furnish products according to the Departments Qualified Products List (QPL).~~

**601.15**

On page 449, under the Unit listed for Articulating Concrete Block Revetment System, Type\_\_\_\_, **Replace** the Cubic Yard (Cubic Meter) measurement with Square Yard (Square Meter).

**602.03.D**

On page 450, **Replace** the first paragraph with the following:

**D.** Precast structures for half height headwalls are for circular conduits up to a maximum of 78 inches (1980mm) and elliptical and pipe arch conduits up to a maximum 78 inches (1980 mm) round equivalent. The shop drawings are kept on file at the certified precast facility per Supplemental 1073. Construct elliptical and pipe arch half height headwalls from templates of the actual conduit being supplied to the project to ensure the opening is outside diameter plus one inch. Ensure the precast structures and their shop drawings conform to the following additional requirements:

**602.02 Materials**

On page 450, **Replace** the second line with the following:

Concrete, Class QC1.....499 and 511

**602.03.E.**

On pages 451, **Replace** the entire section with the following:

**E.** Pre-cast structures for wingwalls and headwalls for use with Items 706.05, 706.051, 706.052 and 706.053. Pre-cast wingwalls and headwalls do not include the wall footing or cutoff wall. The cutoff wall is the portion of the footing that extends below the footing beyond the expected scour depth, or to a scour-resistant material. Provide pre-cast wingwall and headwalls as alternatives when allowed by the Contract Documents. Provide the pre-cast wingwalls and headwalls using the following criteria:

1. Select fabricators that are prequalified and evaluated by the Office of Materials Management (OMM) according to Supplement 1073 and listed by the Department before the Contract Letting Date.

2. Provide pre-cast headwalls and wingwalls that have the same height and length dimensions as shown in the Plans.

3. The footing and cutoff wall shall be cast-in-place concrete conforming to the dimensions shown in the Plans. No deviation of the cutoff wall is allowed. Minor deviations of the footing to allow placement of the pre-cast sections shall be in accordance with 602.03.E.7.d.ii.

4. All reinforcing steel shall be epoxy coated according to 509.

5. Do not use an adhesive anchor loaded under sustained tension force. Wall anchorage dowels for shear applications shall be epoxy coated reinforcement, 509.02 and 709.00. Install dowels according to 510 using non-shrink, non-metallic grout.

6. Design pre-cast wingwalls and headwalls in accordance with the most current edition of the AASHTO LRFD Bridge Design Specifications available on the date of the Department’s Award of Contract. Provide design calculations to the Engineer with the submittal of the Engineered Drawings.

7. Provide Engineered Drawings for each culvert location in accordance with 501.05 with the following exception: Schedule the Engineering Drawing meeting to be held 30 days or less after submitting the pre-cast drawings to the Engineer and District Office of Planning and Engineering. Engineered Drawings shall be on 11” x 17” sheets in pdf (portable document format). The Engineered Drawings for the pre-cast wingwalls and headwalls shall include the following information:

a. Plan view of conduit and wingwalls showing:

i. North arrow

ii. Centerline of construction, centerline of conduit, intersecting station and skew angle, direction of flow, centerline of waterway, angle of waterway centerline to wingwall/headway exterior face

iii. Length and width of conduit with respect to centerline of construction

iv. Length and deflection angle of each wingwall and location of each pre-cast wingwall segment.

b. General notes addressing:

i. Design data for delivered materials.

ii. Design specifications.

iii. Installation plan detailing the sequence of construction and placement of all backfill materials.

iv. All additional applicable construction and material specifications required to fabricate, ship, construct and backfill the pre-cast wingwalls and headwalls. Provide references to the ODOT C&MS where applicable.

c. Estimated quantities for items in the Plans other than wingwalls and headwalls that deviate from the Plan quantity. This may be omitted if no deviations exist. The Department will process these quantity adjustments according to 104.02.

d. Footing and wingwall/headwall plan showing:

i. North arrow.

ii. All dimensions and angles necessary to properly locate and define the footings. If any dimension of the wingwall and headwall footing deviates from the cast-in-place design provided in the Plans, identify, locate, design and detail all wingwall footing reinforcing steel including the reinforcement that extends into the footing supporting the conduit.

iii. Location of all section views.

iv. Footing elevations and locations.

v. Reinforcing steel layout for deviations noted in 602.03.E.7.d.ii above.

e. Wingwall/headwall elevation showing:

i. All dimensions and elevations necessary to properly construct the pre-cast wingwall/headwall segments.

ii. Locations of pre-cast segment-to-footing connections/bearing details.

iii. Locations of conduit-to-wingwall/headwall connections

f. Footing and wall cross-sections showing:

i. All dimensions and details necessary to properly construct the footings and pre-cast wingwall and headwall components.

ii. Reinforcing steel layout for deviations noted in 602.03.E.7.d.ii.

iii. Slope protection (if necessary)

iv. Ground line, excavation limits and backfill locations

v. Pre-cast segment-to-footing connection/bearing details

g. Wall drainage details if different than the cast-in-place design provided in the Contract.

h. Miscellaneous details necessary to properly construct the footings, wingwalls and headwalls.

i. Reinforcing steel list showing bar marks, quantities, weights, dimensions and bending diagrams for deviations noted in 602.03.E.7.d.ii.

8. Upon Department acceptance of the Engineered Drawings, provide Shop Drawings as specified in the requirements below and the Contractor's written acceptance letter to the Engineer, OMM and the District Office of Planning and Engineering at least 7 Days before fabrication begins. Have competent individuals prepare and check the Shop Drawings. The preparer(s) and checker(s) shall initial each sheet and shall be different individuals. Provide, on the cover sheet or submittal letter, the first name, last name and initials of each preparer and checker performing work on the Shop Drawings. Have an Ohio Registered Engineer sign, seal and date the shop drawing cover sheet or submittal letter according to ORC 4733 and OAC 4733-35 confirming that the Shop Drawings meet the intent of the contract. If multiple preparers or multiple checkers created the drawing, then the cover sheet or submittal letter shall clearly indicated the portions for which each person is responsible. Have all questions and comments addressed before submitting the Shop Drawings.

The Contractor's written acceptance letter shall document acceptance of the Shop Drawings including confirmation of field verification, as required, and descriptions of issues resolved between the Contractor, the fabricator, or the Department. Department acceptance is not required.

By accepting these Shop Drawings, the Contractor represents to the Department that all dimensions and elevations of existing conditions shown on the plans have been field measured and verified, and that these Shop Drawings comply with all the materials requirements, construction requirements, contract requirements, and performance criteria. The Contractor further represents that these drawings have been coordinated and verified with the details of the work to be performed by other fabricators and entities on the project. The Department will not make any allowance for additional cost or delays to the Contractor for incorrect fabrication as a result of failure to coordinate or perform this acceptance.

If the Department requests changes to these Shop Drawings, or the Contractor makes changes in addition to those expressly requested, revise the Shop Drawings and submit a new cover sheet, signed, sealed and dated by an Ohio Registered Engineer with suitable revision marks to identify the changes.

Shop Drawing requirements:

- a. Provide a separate Shop Drawing for each culvert location.
- b. Provide Shop Drawings on 11" x 17" sheets in pdf (portable document format).
- c. Show:
  - i. All dimensions.
  - ii. Inlet and outlet.
  - iii. North arrow.
  - iv. Roadway centerline stationing.
  - v. All construction phases.
  - vi. Pre-cast piece labels
  - vii. Holes for conduits, framed with diagonal reinforcing on both faces.
  - viii. Reinforcing Lap lengths
  - ix. Material strengths

- x. Weep holes locations
- xi. Lifting device locations.

d. Label:

- i. Project Number
- ii. Project Identification Number (PID)
- iii. County Route Section of the structure
- iv. Stream Name as show on plans
- v. Structure File Number (SFN) or Culvert File Number (CFN) as shown on the plans
- vi. Fabrication facility where units are to be cast

9. Galvanize all connection hardware according to 711.02.

10. Fabricate pre-cast concrete wingwalls and headwalls to the dimensions listed in the Shop Drawings using the construction tolerances listed in Table 602.03-1:

**Table 602.03-1**

<b>Description</b>	<b>Tolerance</b>
Wall height (vertical dimension)	± 1-in
Wall length (horizontal dimension)	± 1-in
Wall thickness (horizontal dimension perpendicular to wall face)	± 1/8-in
Squareness (difference between two diagonals)	± 1/4-in
Reinforcing steel cover (2-in nominal)	± 1/2-in
Position of reinforcing steel	± 1/8-in
Surface defect (size of surface defect measured over a length of 5-ft)	
Smooth formed finish	± 1/8-in
Textured finish	± 5/16-in
Weep hole locations	± 1-in

11. Provide non-corrosive lifting devices.

12. Fill all openings including all lifting holes voids with non-shrink mortar conforming to 705.22.

13. The Department will consider delivered pre-cast material as defective with any of the items listed below. The Department will consider Corrective Work in accordance with 501.05.C.

- a. Cracks greater than 0.007-in.
- b. Honeycombs or open texture.
- c. Damage from shipping and handling.
- d. Pre-cast components outside of the tolerances provided in Table 602.03-1.
- e. Evidence of non-conformance with material requirements.

14. Construct walls to the following tolerances:

**Table 602.03-2**

<b>Description</b>	<b>Tolerance</b>
Top elevation deviation from Engineered Drawing	± 1-in
Bottom elevation deviation from Engineered Drawing	± 1/8-in
Maximum deviation from plumb	± 1/2-in
Joint width between adjacent wall panels	± 3/8-in
Maximum offset in alignment of matching panel faces	± 3/8-in

**606.02**

On Page 459, **Add** the following paragraph after the last paragraph in the section:

MGS barrier may be constructed using round wooden posts of 6’ length until March 2019. After that date, round wooden posts shall be 69” in length. Prior to March 2019, posts may be trimmed or may extend above the blockout.

**606.04**

On page 459, **Replace** the sixth paragraph with the following:

Repair galvanized surfaces that have been abraded such that the base metal is exposed, including threaded portions of all fittings and fasteners, and cut ends of bolts as specified by ASTM A 780 except the Department will not allow aerosol spray applications of paints containing zinc dust.

**610.02**

On page 471, **Revise** the Title of the section and the first sentence as follows:

**610.02 Approval by the Department.** Submit to the Department for acceptance, 30 days before the work is to begin, shop drawings of the units to be furnished.

**610.04.A**

On page 472, after 4<sup>th</sup> paragraph, **Add** the sentence:

All openings to be filled with nonshrink mortar per 705.22 including all lifting device voids

**611.02.A**

On page 475, **Add** the following material:

Glass-fiber-reinforced polymer mortar pipe.....707.75

**611.02.A**

On page 475, **Replace** the references “707.05 or 707.07” with the following:

707.05 Type B or 707.07 Type B

**611.02.A**

On page 475, **Add** the following materials after “Corrugated steel box culverts”:

Polymer Precoated, Galvanized Steel Conduits with precoated galvanized smooth interior liner.....707.18

Aluminum coated Steel Conduits with precoated galvanized smooth steel interior liner.....707.19

Galvanized Coated Steel Conduits with precoated galvanized smooth steel interior liner...707.20

**611.02.B**



On page 475, **Delete** the following material:

~~Mortar lined corrugated steel pipe.....707.11~~

**611.02.B**

On page 475, in section 611.02 B., **Add** the following materials after “Bituminous lined corrugated steel pipe”:

Polymer Precoated, Galvanized Steel Conduits with precoated galvanized smooth interior liner.....707.18

Aluminum coated Steel Conduits with precoated galvanized smooth steel interior liner.....707.19

Galvanized Coated Steel Conduits with precoated galvanized smooth steel interior liner...707.20

**611.02.B**

On page 476, **Add** the following material:

Glass-fiber-reinforced polymer mortar pipe.....707.75

**611.02.B**

On page 475, **Remove** the following material:

ABS sewer pipe.....707.52

**611.02.C**

On page 476, **Add** the following material:

Glass-fiber-reinforced polymer mortar pipe.....707.75

**611.02.C**

On page 476, **Remove** the following material:

ABS sewer pipe.....707.52

**611.02.C**

On page 476, **Delete** the following material:

~~Mortar lined corrugated steel pipe.....707.11~~

**611.02.C**

On page 476, **Add** the following materials after “Bituminous lined corrugated steel pipe”:

Polymer Precoated, Galvanized Steel Conduits with precoated galvanized smooth interior liner.....707.18

Aluminum coated Steel Conduits with precoated galvanized smooth steel interior liner.....707.19

Galvanized Coated Steel Conduits with precoated galvanized smooth steel interior liner...707.20

**611.02.E**

On page 477, **Remove** the following material:

ABS sewer pipe.....707.52

**611.02.H**

On page 478, **Replace** the entire section with the following:

- H. For bedding and backfill, furnish materials conforming to:  
Bedding.....613, 703.11

Structural Backfill.....613, 703.11

Final Backfill:

Granular Structural Backfill.....703.11

Natural Soils .....703.16.A[1]

Granular Embankment Materials.....703.16.B[1]

Granular Embankment Material Types A, B, C and D.....

.....703.16.C[1]

Coarse aggregate..... Table 703.01-1

Fine aggregate.....703.02.A, 703.03, or 703.05.A

304.....703.17.A

410, 411, and 617.....703.18.A[1]

Low Strength Mortar Backfill (LSM).....613

[1] Use any type of material defined as suitable materials for embankment construction except for steel slag, PCS and RAP.

#### 611.02.I

On page 478, **Replace** “Class QC5, QC Misc” with “Class QC 1”.

#### 611.02.J

On page 478, **Replace** “Class QC1” with “Class QC5, QC Misc”.

#### 611.03

On page 479, in the definition for Bedding Material, **Delete** the following sentences:

~~It is placed or shaped to fit the bell and spigot and typically placed or shaped to fit the conduit.  
The bedding material may also extend up and around the sides of the conduit or drainage structure.~~

#### 611.03

On pages 479, **Add** the following after the definition for “Conduit”:

**Conduit Rise.** The distance of the greatest vertical opening of the conduit. For round conduits, the conduit rise equals the conduit diameter.

#### 611.03

On page 479, in the definition for **Plastic Conduit**, **Delete** the following reference:

~~707.31~~

#### 611.03

On page 480, in the definition for **Structural Backfill**, **Add** the following sentence at the end of the paragraph:

For drainage structures, material used to fill the trench from the top of Bedding Material to subgrade in pavement or topsoil in vegetated areas.

#### 611.04.A

On page 480, in the first sentence of the first paragraph, **Delete** the following reference:

~~706.13~~

#### **611.04.B**

On page 482, **Add** the following to the end of the first full paragraph:

Ensure the conduit structural design is performed in accordance to AASHTO LRFD Bridge Design Specifications. Have an Ohio Registered Engineer sign and seal the calculations.

#### **611.06**

On page 484, **Add** the following sentences to the end of the second paragraph:

Conduit Manufactures may approve materials listed in 611.02 for Final Backfill for use as Bedding and Structural Backfill for Type F conduits on slopes 3:1 or greater. Conduit Manufacturers may approve materials listed in 611.02 for Final Backfill for use as Structural Backfill for conduit Types D and E and drainage structures not located in pavement. Identify the use of Final Backfill materials proposed for Bedding and Structural Backfill in the Installation Plan and cross-section details.

#### **611.08**

On pages 486, **Add** the following paragraph after the third paragraph:

Provide a concrete masonry collar per SCD D.M.-1.1 when joining conduits of different materials.

#### **611.11**

On page 490, **Replace** the third paragraph with the following:

Reinforce the paving with 2 x 2-W0.9 x W0.9 galvanized welded wire fabric or epoxy coated reinforcing steel meeting the material requirements of 509.02. Provide galvanized wire fabric or epoxy coated reinforcing steel with a width 4 inches (100 mm) less than the finished paving. Provide support beneath the mesh where necessary using galvanized support chairs or #4 epoxy coated reinforcing steel. Securely fasten the mesh to the conduit near each edge and at the center of the mesh at points not more than 4 feet (1.2 m) apart along the flow line of the culvert. Securely fasten the epoxy coated reinforcing steel to the conduit at each end and along the length of the steel not more than 4 feet (1.2 m) apart. Repair any damage to the galvanizing or other coating material caused by placement or by tack welding. Use wire brushing and zinc rich paint to make the repairs.

#### **611.12**

On page 491, **Replace** the last sentence of the second full paragraph with the following:

Furnish the video recording in a digital, reproducible format on one of the following media types: Portable hard drive, flash drive or as determined appropriate by the Engineer. Provide the video files with a naming format consistent with the Installation Plan references or as determine acceptable by the Engineer.

**611.12.B.**

On pages 493, **Replace** Table 611.12.B with the following:

**Table 611.12.B**

<b>Conduit Type</b>	<b>Measurement Equipment</b>	<b>Type of Measurement</b>
Rigid conduit and 707.11, mortar lined corrugated steel pipe, 748.06, steel casing pipe	Crawler mounted camera according to 902.01 with crack measuring capabilities according to 902.02 C	Joint gaps Crack widths
Plastic conduit, 707.12, corrugated steel spiral rib conduit, 707.24, corrugated aluminum spiral rib conduit, 748.01, ductile iron pipe, and Circular corrugated metal conduit not listed below	Crawler mounted camera with laser profiler according to 902.02 A, B, and C or Mandrel according to 902.03 and Crawler mounted camera according to 902.01 with crack measuring capabilities according to 902.02 C	Joint gaps Crack widths Deflection
The following types of corrugated metal conduit: 707.04, precoated, galvanized steel culverts 707.05 and 707.07, bituminous coated corrugated steel pipe with paved invert, 707.13 and 707.14, bituminous lined corrugated steel pipe	Crawler mounted camera with laser profiler according to 902.02 A, B, and C	Joint gaps Crack widths Deflection

**611.13**

On pages 494, **Replace** Table 611.13 with the following:

**TABLE 611.13**

Metal Conduit	<p>Evaluate if infiltration is observed.          Evaluate all racking, buckling or denting.          Evaluate all vertical sags or misalignments exceeding 0.1 ft.          Repair vertical sags or misalignments of 0.25 ft and greater.          Evaluate the overall vertical alignment of the conduit recorded in CA-P-1.          Evaluate if the joint gap exceeds the Manufacturer's tolerance*.          Repair or replace conduit if the joint gap exceeds the Manufacturers tolerance*.          Repair all damage to coatings.          Repair or replace conduit if the Performance Inspection per 611.12 indicates a deflection &gt; 7.5%.          Replace conduit if the Performance Inspection per 611.12 indicates a deflection &gt; 12%</p>
Rigid Conduit	<p>Evaluate if infiltration is observed.          Evaluate if joint gap exceeds the Manufacture's tolerance*.          Evaluate all vertical sags or misalignments exceeding 0.1 ft.          Repair vertical sags or misalignments of 0.25 ft and greater.          Evaluate the overall vertical alignment of the conduit recorded in CA-P-1.          Repair or replace conduit if the joint gap exceeds the Manufacturers tolerance*.          Repair or replace conduit if cracks &gt; 0.10 inch.          Repair or replace conduit if spalls or slabbing are observed.</p>
Plastic Conduit	<p>Evaluate if infiltration is observed.          Evaluate all racking, bulging or buckling.          Evaluate if joint gap exceeds the Manufacturers tolerance*.          Evaluate all vertical sags or misalignments exceeding 0.1 ft.          Repair vertical sags or misalignments of 0.25 ft and greater.          Evaluate the overall vertical alignment of the conduit recorded in CA-P-1.          Evaluate all cracks.          Repair or replace conduit if the joint gap exceeds the Manufacturer's tolerance*.          Repair or replace conduit if Performance Inspection per 611.12 indicates a deflection &gt; 7.5%.          Replace conduit if the Performance Inspection per 611.12 indicates a deflection &gt; 12%</p>

\* Note: The tolerance is defined as the maximum joint gap listed in the Installation Plan.

**614.03**

On page 501, **Add** the following paragraphs after the first paragraph:

Ensure all individuals contracted by, secured by, directed by or employed by the contractor whom are involved in the development, design, implementation, operation, inspection and enforcement of work zone related transportation management and traffic control have been trained appropriate to the job decisions each individual is required to make. Repeat training in intervals of no more than 5 years to reflect changing practices.

Designate a trained person at the project level that has the primary responsibility and sufficient authority for implementing and maintaining the Transportation Management Plan (TMP) and other safety and mobility aspects of the project. For information and requirements regarding TMPs and related components see ODOT Traffic Management in Work Zones Policy (21-008(P)) and Standard Procedure (123-001(SP)). Maintain a 24-hr contact for the designated trained person and provide this contact information to the Engineer at the preconstruction conference. The designated trained person shall be present on site for, and involved with, each temporary traffic control set up/take down and each phase change. For projects with a Worksite Traffic Supervisor (WTS) the designated trained person shall be the WTS.

**614.03**

On Page 501, **Replace** the second paragraph with the following:

Furnish cones, drums, portable sign supports, Type 3 barricades, portable changeable message signs, arrow boards, and impact attenuators that are pre-qualified according to the Department's Approved List.

#### **614.03**

On Page 502, **Replace** the second paragraph with the following:

Furnish orange drums with reboundable reflective sheeting complying with the requirements of 730.191 and in conformance with the OMUTCD. Drums of colors other than orange shall not be permitted on the project. Ensure that owner identification markings on construction drums are no more than 1 inch (25 mm) in character height and are located at least 2 inches (50 mm) below the reflectorized bands or on the top or bottom horizontal surfaces of the drum. Ballast the drums according to the manufacturer's recommendations.

#### **614.03**

On Page 502, **Add** the following sentence after the first sentence of the third paragraph:

Traffic cones of colors other than highly visible orange shall not be permitted on the project.

#### **614.03**

On Page 502, **Add** the following paragraph after the fourth paragraph:

Furnish object markers that are a minimum size of 6 x 12 inches and that consists of reflective sheeting adhered to an aluminum or plastic plate.

#### **614.03**

On Page 503, **Delete** the third paragraph:

Furnish object markers that are a minimum size of 6 x 12 inches and that consists of reflective sheeting adhered to an aluminum or plastic plate.

#### **614.035**

On Page 503, **Replace** the subsection title and first sentence with the following:

**Storage of Equipment, Vehicle and Material on Highway Rights of Way.**

#### **614.04.A**

On Page 504, **Replace** the paragraph with the following:

**A.** Erect a NO EDGE LINES sign in advance of any section of roadway lacking OMUTCD standard edge line markings. Ensure these signs are in place before opening the roadway to traffic. Erect these signs on each entrance ramp, 25 to 200 feet beyond the far shoulder or curb line of intersecting through roads to warn entering or turning traffic of the conditions, and at least once every 2 miles (3 km) along the roadway. Remove these signs when they no longer apply.

#### **614.10**

On page 506, **Add** the following sentence to the end of the second paragraph:

Covering of one or more permanent or temporary vehicle or pedestrian signal head(s) shall be according to 632.25, except payment shall be included in Item 614 Maintaining Traffic.

**614.11.A**

On page 506, **Replace** the section with the following:

**A. Acceptability and Expected Duration.** The Engineer will evaluate the markings according to the performance parameters contained in Supplement 1047, Appendices C, D and E. Repair or replace the markings when the numerical rating is six or lower for Daytime Color (Appendix C), or a composite rating of 6 or lower for Night Visibility (Appendix D), or five or lower for Durability (Appendix E). Repair or replace unsatisfactory markings immediately and at no additional cost to the Department, if the markings were in place for 120 calendar days or less. The Department will compensate under the applicable contract pay item for work zone pavement marking for the ordered replacement of worn markings after 120 calendar days under traffic.

**614.11.B.1**

On page 507, **Replace** TABLE 614.11-1 and TABLE 614.11-1M with the following

**TABLE 614.11-1**

Type of Pavement Marking	Line Width (inch)				
	4	6	8	12	24
	Gallon per Mile of Line				
Solid Line	22	33	44	66	132
10-foot Dashed Line	5.5	8.25	--	--	--
4-foot Dashed Line	2.2	3.3	--	--	--
Dotted Line	7.3	10.95	--	--	--
Arrows, Symbols, and Words	1.4 gallons per 100 square feet				
Glass Beads: 740.09, Type A	15 pounds per 100 square feet				

**TABLE 614.11-1M**

Type of Pavement Marking	Line Width (mm)				
	100	150	200	300	600
	Liter per Kilometer of Line				
Solid Line	52	78	105	157	314
3.0 m Dashed Line	13	19.5	--	--	--
1.2 m Dashed Line	5.2	7.8	--	--	--
Dotted Line	17.3	25.95	--	--	--
Arrows, Symbols, and Words	0.6 liters per square meter				
Glass Beads: 740.09, Type A	7.3 kg per square meter				

**614.11.B.2**

On page 507, **Replace** TABLE 614.11-2 with the following:

**TABLE 614.11-2**

Type of Pavement Marking	Line Width (inch)				
	4	6	8	12	24
	Gallon per Mile of Line				
Solid Line	12	18	24	36	72
10-foot Dashed Line	3	4.5	--	--	--
Dotted Line	4	6	--	--	--
Arrows, Symbols, and Words	0.75 gallons per 100 square feet				
Glass Beads: 740.09, Type A	7.5 pounds per 100 square feet				

**614.11.B.2**

On page 508, **Replace** TABLE 614.11-2M with the following:

**TABLE 614.11-2M**

Type of Pavement Marking	Line Width (mm)				
	100	150	200	300	600
	Liter per Kilometer of Line				
Solid Line	28	42	56	84	168
3.0 m Dashed Line	7	10.5	--	--	--
Dotted Line	9.4	14.1	--	--	--
Arrows, Symbols, and Words	0.3 liters per square meter				
Glass Beads: 740.09, Type A	3.7 kg per square meter				

**614.11.F.1.a**

On page 508, **Replace “a.”** with the following:

- a. Edge Lines.** Class I edge lines shall match existing edge line in width, 4 or 6 inches (100 or 150 mm).

**614.11.F.1.b**

On page 508, **Replace “b.”** with the following:

- b. Lane Lines.** Class I lane lines shall match existing lane line in width, 4 or 6 inches (100 or 150 mm).

**614.11.F.1.c**

On page 508, **Replace “c.”** with the following:

- c. Channelizing Lines.** Class I channelizing lines shall match existing channelizing line in width, 8 or 12 inches (200 or 300 mm).

**614.11.F.2.b**

On page 509, **Replace “b.”** with the following

- b. Lane Lines.** Class II lane lines shall be white and shall match existing lane lines in width, 4 or 6 inches (100 or 150 mm), by a minimum of 4 feet (1.2 m) long dashes spaced at a maximum of 40 feet (12.0 m) intervals. Class II Lane Line Markings must be marked with Class I or Class III Markings or final markings within 14 calendar days according to 614.11. H. 3.

**614.11.F.2.c**

On page 509, **Replace “c.”** with the following

- c. Gore Markings.** Class II gore markings are continuous, white 24-inch (600 mm) wide lines in a chevron crosshatched pattern placed within the theoretical gore of an exit ramp or diverging roadways. Class II Gore Markings must be marked with Class I or Class III Markings or final markings within 14 calendar days according to 614.11.H.3.

**614.11.F.3**

On page 509, **Replace** the section with the following:



**3. Class III Markings (Full Pattern, Low Rate).** Use Class III Markings on surface courses that are expected to receive thermoplastic, spray thermoplastic or epoxy final markings within 30 days. Class III Markings use a lower application rate which reduces the surface preparation needed prior to application of thermoplastic, spray thermoplastic or epoxy final markings. If Class III Markings have been applied and weather conditions are expected to prevent thermoplastic, spray thermoplastic or epoxy final markings application for 30 days or more, re-apply Class III Markings (if thermoplastic, spray thermoplastic or epoxy final markings application is expected to occur within 30 days) or apply Class I Markings as necessary to carry the project through the season or over the winter.

Apply Class III work zone markings to the standard dimensions as defined in Item 641 except as follows:

- a. Edge Lines.** Class III edge lines shall match existing edge line in width, 4 or 6 inches (100 or 150 mm).
- b. Lane Lines.** Class III lane lines shall match existing lane line in width, 4 or 6 inches (100 or 150 mm).
- c. Channelizing Lines.** Class III channelizing lines shall match the existing channelizing line in width, 8 or 12 inches (200 or 300 mm).

**614.11.G.1.a**

On page 509, **Replace** the section with the following:

**a. Removal Methods.** Remove the markings so that less than 5% of the line remains visible. Repair damage to the pavement that results in the removal of more than 1/8 inch of pavement thickness.

Use sand, shot, or water blasting to remove markings on all asphalt or concrete pavement surfaces.

Use only sand, shot, or water blasting for removal of all pavement markings in preparation for placing Item 422 Chip Seal or Item 421 Microsurfacing.

A grinder may only be used to remove markings on temporary pavement or pavement that will be covered or removed prior to project completion (e.g., intermediate asphalt course). When a grinder drum is mounted to a skid steer loader, the drum must be able to accommodate a minimum of 150 teeth.

**614.16**

On page 517, **Revise** the section as follows:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
614	Lump Sum	Maintaining Traffic
614	Lump Sum	Detour Signing
614	Each	Replacement Drum
614	Each	Replacement Sign
614	Each	Object Marker, ___ - Way
614	Each, Mile, Foot (Kilometer, Meter)	Work Zone Pavement Markings
614	Each	Work Zone Raised Pavement Marker
614	Sign Month	Portable Changeable Message Sign

614	Each	Work Zone Speed Limit Sign
614	Each	Work Zone Marking Sign
614	Hour	Law Enforcement Officer with Patrol Car
614	Each	Barrier Reflector
614	Each	Work Zone Crossover Lighting System
614	Each	Work Zone Impact Attenuator
614	Mile (Kilometer)	Work Zone Lane Line, Class ____, ____*, ____**
614	Mile (Kilometer)	Work Zone Center Line, Class ____, ____**
614	Foot (Meter)	Work Zone Channelizing Line, Class ____, ____*, ____**
614	Mile (Kilometer)	Work Zone Edgeline, Class ____, ____*, ____**
614	Foot (Meter)	Work Zone Gore Marking, Class II, ____**
614	Foot (Meter)	Work Zone Stop Line, Class I, ____**
614	Foot (Meter)	Work Zone Arrow, Class I, ____**
614	Foot (Meter)	Work Zone Crosswalk Line, Class I, ____**
614	Foot (Meter)	Work Zone Dotted Line, Class I, ____**
614	Cubic Yard (Cubic Meter)	Asphalt Concrete for Maintaining Traffic

\* Width of marking (4” or 6” for Lane Lines and Edgelines; 8” or 12” for Channelizing Lines).

\*\* Type material (642 paint; 740.06, Type I or Type II; or left blank to allow any of the three.)

**615.05**

On page 518, **Add** the following paragraph after the third paragraph:

Provide aggregate shoulders, when specified, conforming to Item 411 with a minimum thickness of 6 inches.

**615.09**

On page 520, **Replace** the first paragraph with the following:

**Method of Measurement.** The Department will measure the quantity of Pavement by the number of square yards (square meters) of pavement surface (including paved and aggregate shoulders) placed, maintained, and removed as directed, measured complete in place.

**617.04**

On page 522, **Add** the following sentence after the second sentence in the paragraph:

Do not cut a safety edge installed as part of the Work.

**618**

On page 523, **Revise** the Item heading to: **RUMBLE STRIPS.**

**618.03**

On page 584, **Replace** the second and third sentences with the following:

The Department will measure lengths along the inside edge of the shoulder, edge line or center line, from the center of the first depression in a segment to the center of the last depression in that segment. If Rumble Strips are provided on more than one shoulder or edge line, the Department will measure

lengths separately for each shoulder or edge line segment and add the individual lengths together to obtain the total length for the shoulder or the edge line.

#### 618.04

On page 584, **Replace** the pay items with the following:

618	Feet (Meter),	Rumble Strips, Shoulder (Asphalt Concrete)
618	Mile (Kilometer),	Rumble Strips, Shoulder (Asphalt Concrete)
618	Feet (Meter),	Rumble Strips, Shoulder (Concrete)
618	Mile (Kilometer),	Rumble Strips, Shoulder (Concrete)
618	Feet (Meter),	Rumble Stripes, Edge line (Asphalt)
618	Mile (Kilometer),	Rumble Stripes, Edge line (Asphalt)
618	Feet (Meter),	Rumble Stripes, Edge line (Concrete)
618	Mile (Kilometer),	Rumble Stripes, Edge line (Concrete)
618	Feet (Meter),	Rumble Stripes, Center line (Asphalt)
618	Mile (Kilometer),	Rumble Stripes, Center line (Asphalt)
618	Feet (Meter),	Rumble Stripes, Center line (Concrete)
618	Mile (Kilometer),	Rumble Stripes, Center line (Concrete)

#### 621.03.E

On page 529, **Delete** “or on line” in the first sentence of the second paragraph.

#### 625

On page 539, **Replace** the heading with the following:

##### 625.06 Shop Drawings

#### 625.06

On page 540, **Replace** the heading with the following:

##### 625.06 Shop Drawings

#### 625.12

On page 543, **Add** the following paragraph after the third paragraph:

Use watertight hubs for all conduit penetrations of outdoor electrical enclosures. Do not make such penetrations using locknuts onto threaded conduit ends.

#### 625.13

On page 544, **Replace** the second sentence in the third paragraph with the following:

Backfill the trench in layers not more than 6 inches (150 mm) in loose depth and compact each layer with a mechanical tamper or other approved method as directed by the Engineer.

#### 625.13

On page 544, **Add** the following to the end of the 4<sup>th</sup> sentence in the third paragraph:

“or in chemically stabilized subgrade”.

#### 625.14

On page 545, in the second full paragraph **Replace** "5 percent" with "20 percent".

### 625.15

On Page 545, **Add** the following paragraphs after the third paragraph:

Construct the lighting electrical system to provide selective coordination of overcurrent devices per NEC 240.12(1). Overload indications per NEC 240.12(2) are allowed but not required as part of a standard ODOT lighting control system. Provide to the Engineer:

- A) individual catalog sheets and device time-current curves and/or tables and
- B) combined graphical overlays that document acceptable installed overcurrent device coordination.

Provide this documentation for all installed overcurrent devices, including the service disconnect fuses, the lighting control center branch circuit breakers, and tower circuit breakers/ pole fuses (if present). Tabular data, if used, shall include the following time points as a minimum: 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 10, 100, and 300 seconds and additional points as needed to clearly show the overcurrent device operating characteristics. Include minimum melt time and maximum clearing time for fuses; include minimum and maximum clearing time for circuit breakers. Provide documentation of the utility-installed transformer ANSI fuse link type (e.g., K or T) and fuse rating (if available). Provide documentation of the utility-installed power service size (in kVA).

Provide to the Engineer a compiled list or catalog sheets showing the Short-Circuit Current Rating (SCCR) of all fuses and fuse holders, circuit breakers, switches and contactors, pursuant of the requirements in NEC Article 110.10.

### 625.15

On page 546, **Add** the following paragraph to the end of the section:

Install a padlock per 631.06 on all external actuators. Coordinate with power company on installation of a second padlock conforming to their specifications. Install a dual padlock bar.

### 626.04

On page 554, **Replace** the third paragraph with the following paragraphs:

Install guardrail blockout reflectors on top of the blockout or on the side of the blockout away from traffic. Install guardrail blockout reflectors on the top or side of the blockout nearest the edge of pavement. Install the guardrail blockout reflector so that the reflective surface is above the guardrail.

For guardrail blockout reflectors that are installed on top of the blockout, angle the reflective face approximately 5 degrees towards the nearest travel lane.

### 626.04

On Page 554, **Delete** the eighth paragraph in its entirety.

**626.04**

On page 554, **Add** the following after the ninth paragraph:  
 Use one-way and bi-directional barrier reflectors in accordance with the following guidelines:

BARRIER REFLECTORS COLOR & DIRECTION	One-Way Reflector		Bi-Directional Reflector	
	Left Edge	Right Edge	Left Edge	Right Edge
Two-Lane, Two-Way			NA	W/W
Interchange Ramp			Y/R**	W/R
Multilane Undivided			NA	W/W
Multilane Divided				
Multilane Divided with median barrier*		W	Y/Y	
Multilane Divided without median barrier	NA	W		

\* concrete wall, guardrail or cable rail

\*\* if median concrete wall is present

**626.04**

On page 555, **Replace** the Mounting Location table with the following:

Mounting Location	
<b>Concrete barrier, retaining walls, bridge rail or bridge parapets</b>	
Type 1	Barrier Reflector
<b>Guardrail</b>	
Type 2	Corrosion Resistant Metal Guardrail Blockout Reflector
Type 3	Acrylic or Polycarbonate Plastic Guardrail Blockout Reflector
Type 4	Spring Loaded Guardrail Blockout Reflector
Type 5	L-Type Guardrail Blockout Reflector

**626.06**

On page 555, **Replace** the entire section with the following:

**626.06 Basis of Payment.** The Department will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
626	Each	Barrier Reflector, Type _____, (One-Way or Bi-Directional)

**630**

On page 555, **Replace** the heading with the following:

## 630.03 Shop Drawings

### 630.03

On page 556, **Replace** the section with the following:

**630.03 Shop Drawings.** Furnish shop drawings according to 625.06. Submit sign support shop drawings that cover all design types such as ground mounted, rigid overhead, span wire mounted, and overpass structure mounted supports. On the drawings, show overall height, sign clearance above foundation, span length, sign locations, sign overall heights and widths, and glare shield height and location, if applicable.

### 630.04

On page 557, **Replace** the second paragraph with the following:

Use sign designs according to the OMUTCD and the Sign Designs and Markings Manual. For projects sold before July 14, 2016 use Clearview font or the Standard Alphabets for Traffic Control Devices for positive contrast legends on freeway and expressway guide signs and on all other guide signs when permitted in the Sign Designs and Markings Manual. For projects sold on or after July 14, 2016, use the Standard Alphabets for Traffic Control Devices for positive contrast legends on all guide signs. Do not revise overall sign sizes from what is shown in the plans. The edge space between the border and the text may be adjusted from what is normally used to achieve the sign widths shown. Do not use Clearview font for projects sold on or after July 14, 2016. For negative contrast legends, use the Standard Alphabets for Traffic Control Devices. Use capital legends and upper/lower case legends in accordance with the Sign Designs and Markings Manual. When either is permitted in the Sign Designs and Markings Manual, use upper/lower case legends.

### 631.02

On page 567, **Replace** the second paragraph with the following:

Furnish shop drawings according to 625.06

### 632

On page 572, **Replace** the heading with the following:

#### **632.04 Shop Drawings**

### 632.04

On page 573, **Replace** the section with the following:

**632.04 Shop Drawings.** Furnish shop drawings according to 625.06

### 632.09

On page 575, **Replace** the section with the following:

**632.09 Pedestrian Pushbutton.** Properly orient and install pushbuttons on poles or pedestals. Service pushbuttons mounted on steel poles by wiring inside the poles. Furnish 3/4-inch (19 mm) diameter holes through the back of the housing and the pole wall, install a rubber grommet, and route wiring through until no external wiring is visible. Plug any unused conduit attachment holes. Attach the housing by machine or self-tapping screws in the housing back wall. Service pushbutton mounted on wooden poles through conduit. Furnish flat sheet pedestrian pushbutton signs in accordance with 630.04.

### 632.25

On page 580, **Revise** the punctuation in the first paragraph as follows:

Cover vehicular signal heads if erected at intersections where traffic is maintained before energizing the signals. Cover pedestrian signal heads when specified in the plans. Use a sturdy opaque covering material specifically made for use with traffic signals, and ensure that the color of the cover is different than the signal head, tan or beige, so that it is clear to drivers and pedestrians the heads are covered, not dark. Use a method of covering and cover attachment and materials as approved by the Engineer. Covers are to be free of text, pictures, or any type of advertising. Maintain covers, and remove them when directed by the Engineer.

### 632.29

On page 583, **Add** the following to the end of the fourth paragraph:

For combination strain poles, the luminaire bracket arm will be a separate item. For combination signal supports, the luminaire bracket arm will be a separate item.

### 633

On page 585, **Replace** the heading with the following:

#### 633.04 Shop Drawings

### 633.04

On page 586, **Replace** the section with the following:

**632.04 Shop Drawings.** Furnish shop drawings according to 625.06

### 633.08

On Page 588, **Replace** the first sentence in the sixth paragraph with the following:

Provide a riser with each ground mounted cabinet unless it is a NEMA Size 7 cabinet.

### 633.14

On Page 589, **Replace** the section with the following:

**633.14 Centrally Controlled Arterial Traffic Signal System.** Install this construction item on signal systems with a minimum of fifty (50) networked signalized intersections in jurisdictions who employ dedicated engineering and/or traffic signal operations staff. Install, test, and operate the station, consisting of computer equipment, communications equipment, and central control software, in one or more locations in the maintaining agency's facilities as shown in the plans. The maintaining agency shall furnish communications at these stations.

### 633.19

On page 590, **Replace** the fourth sentence of the third paragraph with the following:

The Department will measure Cabinet, Type \_\_\_\_, Furnish Only by the number of each complete prewired cabinet, and will include pole mounting hardware, riser and anchor bolts, but will exclude installation, controller unit, and detector units.

### 633.19

On page 591, **Replace**, the first paragraph with the following:

The Department will measure Centrally Controlled Arterial Traffic Signal System by the number of each location shown on the plans, and will include all equipment, testing, and software.

**633.20**

On page 591, **Add** the following item to the pay item table:

633        Each    Centrally Controlled Arterial Traffic Signal System

On page 591, **Delete** the following item from the pay item table,

633        Each    Remote Monitoring Station

**638.02**

On page 593, in section **638.02 Materials, Pipe, joints and fittings**, **Add** the following material:

Glass-fiber-reinforced polymer mortar pipe and fittings.....748.04

**641.02**

On page 603, **Delete** the second paragraph in its entirety.

**641.02**

On page 603, **Replace** the third paragraph with the following:

Any materials delivered without a TE-24 when applicable and applied without Laboratory preapproval shall be removed. Laboratory tested materials not meeting specifications shall be removed from the project site.

**641.02**

On page 603, **Replace** in the fourth paragraph the following:

MSDS with SDS

**641.08.A**

On page 606, **Replace** the paragraph with the following:

**A. Edge Lines.** Place edge lines as continuous stripes using the width specified. Locate the center of the stripe 6 inches (150 mm) from the edge of pavement. Ensure that the right edge line is applied to the left of the right edge of pavement. Ensure that the left edge line is applied to the right of the left edge of pavement.

**642.02**

On page 609, **Add** the following to the end of the first sentence of the first paragraph after equipment: "in accordance with supplement 1089."

**643.02**

On page 611, **Add** the following to the end of the first sentence of the second paragraph after equipment: "in accordance with supplement 1089."

**643.04**

On page 612, **Delete** the first sentence of the third paragraph.

**644.02**

On page 614, **Add** the following to the end of the first sentence of the second paragraph after equipment: "in accordance with supplement 1089."



**646.02**

On page 619, **Add** the following to the end of the first sentence of the second paragraph after equipment: “in accordance with supplement 1089.”

**647.01**

On page 624, **Add** the following to the first sentence of the first paragraph after 740.08: “, 740.09 “

**647.02**

On page 624, **Add** the following sentence after the second sentence:  
Glass beads, Type E .....740.09

**648.02**

On page 626, Add the following to the end of the first sentence of the second paragraph after equipment: “in accordance with supplement 1089.”

**648.05**

On page 628, **Replace** the fifth complete paragraph with the following:  
If the deficiency of spray thermoplastic marking material or glass beads is 20 percent or more, the Department will consider the work unsatisfactory. In addition, the Engineer will consider as unsatisfactory materials applied outside the temperature or application requirements in 648.05 without written approval of the Engineer. Replace or reapply spray thermoplastic markings and glass beads in all sections determined to be unsatisfactory as determined by the Engineer.

**659.07**

On page 640, **Replace** the second to last sentence of the last paragraph with the following:  
Sow seeds within 15 months of the testing date.

**659.09**

On page 642, in TABLE 659.09-1 GRASS AND WILDFLOWER SEED MIXES, **Add** the following in the Class 2 Roadside Mixture seed mix section:

2	Roadside Mixture		
	Kentucky Bluegrass ( <i>Poa pratensis</i> )	1.5	7.32
	Kentucky 31 Fescue ( <i>Festuca arundinacea</i> var. KY 31 or Fawn Tall Fescue)	2	9.76
	Perennial Ryegrass ( <i>Lolium perenne</i> )	1.5	7.32

**659.09**

On page 644, in TABLE 659.09-1, **Delete** the following seed type in the Class 7 seed mix for Temporary Erosion Control Mixture:

~~Fawn Tall Fescue (Festuca arundinacea) 3.0 lb/1000 ft<sup>2</sup> and 14.64 kg/1000 m<sup>2</sup>~~

#### 670.06

On page 659, **Add** the following sentence directly after the heading "**Basis of Payment**":

The Department will pay for surface preparation, topsoil, lime, fertilizer, seeding and mulching of areas covered by the mats/sodding under Item 659.

#### 700.00

On page 686, in TABLE "Minimum Requirements for Sampling Materials", Section 731.10, **Replace** "QPL" with "TAP" in the third column.

On page 686, in TABLE "Minimum Requirements for Sampling Materials", Section 732.04C, **Replace** "QPL" with "TAP" in the third column.

On page 686, in TABLE "Minimum Requirements for Sampling Materials", Section 732.07A, **Replace** "QPL" with "TAP" in the third column.

On page 686, in TABLE "Minimum Requirements for Sampling Materials", Section 732.07B, **Replace** "QPL" with "TAP" in the third column.

On page 688, in TABLE "Minimum Requirements for Sampling Materials", Section 732.08, **Replace** "QPL" with "TAP" in the third column.

On page 688, in TABLE "Minimum Requirements for Sampling Materials", Section 733.03A, **Replace** "QPL" with "TAP" in the third column.

On page 688, in TABLE "Minimum Requirements for Sampling Materials", Section 733.03B, **Replace** "QPL" with "TAP" in the third column.

On page 688, in TABLE "Minimum Requirements for Sampling Materials", Section 733.03C, **Replace** "QPL" with "TAP" in the third column.

On page 688, in TABLE "Minimum Requirements for Sampling Materials", Section 733.03E, **Replace** "QPL" with "TAP" in the third column.

On page 688, in TABLE "Minimum Requirements for Sampling Materials", Section 733.09, **Replace** "QPL" with "TAP" in the third column.

On page 688, in TABLE "Minimum Requirements for Sampling Materials", Section 733.09C, **Replace** "QPL" with "TAP" in the third column.

#### 702.01

On page 692, **Replace** the first sentence with the following:

General. According to AASHTO M 320-10 Table 1 and Supplement 1105 except as follows.

#### 702.01

On page 693, before the first full sentence **Add** the following:

Do not use paraffin wax, organic wax, or like materials.

#### 702.01

On page 693, in subsection 5.3, **Replace** the last sentence with the following:

Limit approved previously used materials to 5.0 percent by PG Binder weight maximum and provide a written certification to OMM stating the exact percent used, the source, and any brand or

trade names. Approved previously used materials are only allowed to be used to produce PG 58-28 and PG 64-28 and suppliers must get recertified per Supplement 1032 for these PG grades.

**702.01**

On page 694, **Replace** Table 702.01-1 with the following:

**Table 702.01-1**

**Material Requirements for PG Modified Binder**

Test / Requirement	SBR Polymer		Pre Blended Binder				Note
Final PG Binder Grade	70-22M (a, b)	64-28 (b)	64-28 (a)	70-22M (a,k)	76-22M (a,k)	88-22M (a,l,m)	c
Actual Pass Temperatures	Report						i
RTFO Mass Change, percent max	0.75						d
Phase Angle, max	78		78	74			d
Elastic Recovery, min			65	75	90		e, d
Toughness, in. lb	125	105					f, d
Tenacity, in lb.	70	80					f, d
Elongation, in. min	20	20					f, d
Ductility, in. min	28	28					j, d
Separation, F max	10						g, d
Homogeneity	None Visible						h, d

- a. Pre-blended Binder. Use a base neat asphalt binder that is a -22 grade for 70-22M and 76-22M. Use a base neat asphalt binder that is a -28 grade for 64-28. 64-28 can be neat, PPA modified or modified with SB, SBS or Elvaloy. 64-28 PPA only modified does not have to meet the phase angle or elastic recovery requirements. Ensure SB, SBS or Elvaloy modified 64-28 meets all requirements listed.
- b. Post-blended Binder made from neat Supplement 1032 certified or preapproved standard PG Binder grade and SBR solids amount equal to or above 3.5 percent by weight of total binder to achieve the PG Binder grade. Ensure all listed properties are met.
- c. Without Direct Tension, graded with actual pass temperatures
- d. PG Modified Binder
- e. AASHTO T301, 10cm @ 77 °F (25 °C), hold 5 min. before cutting, on RTFO material for SB, SBS, and Elvaloy. Note elongation after one hour to the nearest 0.01 cm and report elastic recovery to nearest 0.1%.
- f. ASTM D 5801, 50cm/min @ 77 °F (25 °C)
- g. Condition samples according to ASTM D 7173. Conduct softening point difference of top and bottom of tube per AASHTO T53. Compatibility of polymer and neat binder is sole responsibility of supplier. Formulate PG Modified Binder to retain dispersion for 3 days minimum.

- h. Heat a minimum 400 gram sample at 350 °F (177 °C) for 2.5-3 hours. Pour entire sample over a hot No. 50 (300 µm) sieve at 340 °F (171 °C). Look for retained polymer lumps.
- i. Actual high and low temperature achieved by PG Modified Binder beyond required grade, but will not grade out to the next standard PG Binder grade for low temperature.
- j. AASHTO T51, @ 39 °F (4 °C), 1 cm/min
- k. SB, SBS, Elvaloy or Supplemental Specification 887 GTR
- l. SB, SBS, Elvaloy
- m. The requirements of 3.0 Pa\*s maximum for the rotational viscosity for 88-22M may be waived at the discretion of the Department if the supplier warrants that the asphalt binder can be adequately pumped, mixed, and compacted at or below the temperature requirements in Table 702.00-1. Do not exceed 10.0 Pa\*s rotational viscosity using the #27 spindle at time of shipment.

**702.08**

On page 697, **Replace** the last paragraph with the following:

Provide Certified Test Data to the Engineer for each shipment of material.

**702.12**

On page 697, **Replace** entire section with the following:

**702.12 Non-Tracking Asphalt Emulsion.** Provide certified non-tracking asphalt emulsion material meeting Table 702.12-1 as well as per Supplement 1128 and Supplement 1032. Emulsion will comply with all specification requirements for at least 30 days after sample date.

**TABLE 702.12-1**

Tests on emulsion, AASHTO T 59, unless otherwise designated:	
Viscosity, Saybolt Furol at 77 °F (25 °C) (SFS)	20 to 100
Storage Stability Tests, 24-hr (% difference), max.	1.0
Settlement tests, 5-day (% difference), max.	5.0
Sieve Tests (%) (Distilled Water), max. <sup>(a)</sup>	0.30
Distillation, Residue % solids, min.	50
Oil distillate, %, max.	3

(a) Products may use residual by evaporation to perform residual and may use the material to perform residual tests but must be submitted during approval process in S-1128. Will be required to perform residual by distillation to obtain oil distillate %.

**703.02.A.3**

On page 705, **Replace** the table with the following:

	Maximum
Loss, sodium sulfate soundness test	10 %
Aggregations of soil, silt, etc. by weight	0.5 %

**703.02.B.2**

On page 706, **Replace** the first table with the following:

Percent of wear, Los Angeles test, maximum (CCS or washed gravel)	40 %
Unit weight, compacted, minimum (slag)	70 lb/ft <sup>3</sup> (1120 kg/m <sup>3</sup> )
Loss, sodium sulfate soundness test, maximum:	12%

### 703.11.B.1.

On page 712, **Replace** the sentence with the following:

Furnish Type 2 structural backfill that meet the gradations of 703.05.A. Standard Gradation, 703.02.A, or one of the well graded gradations below:

### 703.17

On page 717, **Replace** the first paragraph with the following:

**703.17 Aggregate Materials for 304.** Furnish aggregate that is CCS, crushed gravel, crushed ACBFS, or steel slag.

### 705.03

On page 723, **Replace** the entire section with the following:

**705.03 Preformed Fillers.** Furnish preformed fillers according to either AASHTO M 153 or AASHTO M 213, with the following modification:

5.7 For materials manufactured as described in 4.1.1 and 4.1.2, ensure that the producer certifies to the Engineer that the asphalt content is at least 35 percent by weight of the filler.

Or furnish semi-rigid closed-cell polypropylene foam preformed fillers according to ASTM D 8139.

Furnish materials according to the Department's (QPL).

### 705.24.A

On page 730, **Revise** the subsection as follows:

**A. Scaling Resistance** - Treated concrete, abraded by sufficient wire brushing to break any film remaining on the surface after drying, will pass ASTM C 672, Scaling Resistance test with a rating of 2- "Slight to Moderate Scaling" after 50 cycles (non-air entrained concrete) as compared to a rating of 5- "Severe Scaling" on untreated concrete.

### 705.27

On page 691, **Add** the following:

**705.27 Carbonate Micro-Fines for use in Portland Cement Concrete.** Provide carbonate micro-fines (CMF) according to Supplement 1016 and ASTM C1797, except modify Type C according to the properties shown in Table 705.27-1 below:

**TABLE 705.27-1 CHEMICAL AND PHYSICAL REQUIREMENTS**

Parameter	Type C
MgCO <sub>3</sub> , %	≥43
Sum of CaCO <sub>3</sub> + Mg CO <sub>3</sub> , % by mass	≥ 98

Methylene blue value (mg/g)	≤ 3
Particle size distribution,	minimum % passing
850 μm (No. 20) sieve	100
300 μm (No. 50) sieve	80-100
150 μm (No. 100) sieve	
75 μm (No. 200) sieve	10-90
45 μm (No. 325) sieve	5-70

**706.05**

On page 746, **Add** the section after section 6.2.2:

6.2.4.9 Provide Carbonate Micro-Fines according to 705.27 and Table 499.03-2.

**706.051**

On page 748, **Add** the section after section 6.2.2:

6.2.4.9 Provide Carbonate Micro-Fines according to 705.27 and Table 499.03-2.

**706.051**

On page 749, **Replace** section 9.1 with the following:

9.1 Ensure that the aggregate, cement, and water are manufactured in conformance with 499.06, and 499.07.

Ensure that the temperature requirements of 511.08 and 511.15 are met.

Ensure that the proportion of cementitious and carbonate micro-fines material is not less than 564 pounds per cubic yard (335 kg/m<sup>3</sup>) of concrete.

If used, add the corrosion inhibitor as an aqueous solution. Consider the water in the solution as mixing water for the purpose of determining the w/c ratio of concrete.

**706.051**

On page 750, **Delete** section 10.3.3.2.

**706.052**

On page 752, **Add** the following after section 6.2.2:

6.2.4.9 Provide carbonate micro-fines according to 705.27 and Table 499.03-2.

**706.052**

On page 753, **Replace** section 9.1 with the following:

9.1 Ensure that the aggregate, cement, and water are manufactured according to 499.06, and 499.07.

Ensure that the temperature requirements of 511.08 and 511.15 are met.

Ensure that the proportion of cementitious and carbonate micro-fines material is not less than 564 pounds per cubic yard (335 kg/m<sup>3</sup>) of concrete.

If used, add the corrosion inhibitor as an aqueous solution. Consider the water in the solution as mixing water for the purpose of determining the water-cement ratio of concrete.

**706.052**

On page 754, **Delete** section 9.2.3.

**706.052**

On page 754, **Delete** section 10.3.3.2.

**706.053**

On page 756, **Replace** section 6.2.2 with the following:

6.2.2 Provide fly ash conforming to 701.13.

**706.053**

On page 756, **Add** the following after the section 6.2.2:

6.2.4.9 Provide carbonate micro-fines according to 701.14 and Table 499.03-2.

**706.053**

On page 757 Replace section 9.1 with the following:

9.1 Ensure that the aggregate, cement, and water are manufactured according to 499.06, and 499.07.

Ensure that the temperature requirements of 511.08 and 511.15 are met.

Ensure that the proportion of cementitious and carbonate micro-fines material is not less than 564 pounds per cubic yard (335 kg/m<sup>3</sup>) of concrete.

If used, add the corrosion inhibitor as an aqueous solution. Consider the water in the solution as mixing water for the purpose of determining the water-cement ratio of concrete.

**706.053**

On page 758, **Delete** section 9.2.3.

**706.13**

On page 762, **Replace** the last paragraph with the following:

Ensure structures that have a span of 10 feet or greater and are located under the traveled way, including the treated shoulder width, are designed in accordance with the AASHTO LRFD Bridge Design Specifications. Have competent individuals prepare and check the shop drawings. Provide a cover sheet containing the preparer(s) and checker(s): First Name, Last Name, Initials and Content Responsibility. Preparer(s) and checker(s) shall initial each sheet for their content responsibility. The preparer(s) and checker(s) shall not be the same individual. Have an Ohio Registered Engineer review, approve, sign, seal and date the shop drawing cover sheet or submittal letter according to ORC 4733 and OAC 4733-35.

**707.11**

On page 767, **Delete** the entire section.

**707.52**

On page 778, **Delete** section **707.52. ABS Sewer Pipe.**

**707.62**

On page 778, **Replace** the term “storm sewer pipe” with the term “drainage pipe”.

**707.62**

On page 778, **Replace** “ASTM F 2736” with the “ASTM F 3219”.

**707.65**

On page 778, **Replace** “ASTM F 2736” with the “ASTM F 3219”.

**707.75**

On page 778, **Add** the following new section after section **707.70 Welded and Seamless Steel Pipe.:**

**707.75 Glass-Fiber-Reinforced Polymer Mortar Pipe.** Provide Glass-fiber-reinforced polymer mortar pipe and fittings for non-pressure applications according to ASTM D 3262 and for pressure applications according to ASTM D 3754 with the following modifications:

- 4.1 Provide a minimum pipe stiffness of 18 psi.
- 7.2 Furnish certified test data as defined in 101.03 to the Engineer.

**708.02.B.1**

On page 780, **Revise** the Pot life section of the Physical Requirements table as follows:

<p><b>Pot life.</b> Follow the paint manufacturers recommendations for applying the coating within the pot life specified with no evidence of gellation. The coating will be in a free-flowing condition and easily sprayed.</p>
--

**708.02.C.1.d**

On page 780, **Revise** the Pot life section as follows:

d. Pot life. Follow the paint manufacturers recommendations for applying the coating within the pot life specified with no evidence of gellation. The coating will be in a free-flowing condition and easily sprayed.

**708.02.C.1.e**

On page 781, **Revise** the Curing time section as follows:

- e. Curing time.
  - (1) Set-to-touch, ASTM D 1640. 4 hours, maximum at 77 °F (25 °C).
  - (2) Dry-to-recoat, ASTM D 1640. 24 hours, maximum at 77 °F (25 °C).

**708.02.D.1.d**



On page 781, **Revise** the Pot life section as follows:

d. Pot life. Follow the paint manufacturers recommendations for applying the coating within the pot life specified with no evidence of gellation. The coating will be in a free-flowing condition and easily sprayed.

#### **708.02.D**

On page 782, in the second paragraph, **Revise** the second paragraph as follows:

Prepare three panels for each of the specified tests according to ASTM D 609, except provide a minimum thickness of 1/8 inch (3 mm) and use ASTM A 36/A 36M hot rolled steel. Blast clean the surface to equal, as nearly as is practical, the standard Sa 2 1/2 of ASTM D 2200 (Steel Structures Painting Council SSPC-SP10 meets this requirement). Ensure that the surface has a nominal height of profile of 1 to 3.5 mils (25 to 88  $\mu\text{m}$ ) verified by using appropriate replica tape. Coat and cure the panels according to the manufacturer's printed instructions. Provide a dry film coating thickness for the system to be tested as follows:

#### **709.07**

On page 784, **Add** the new section 709.07 as follows:

**709.07 Electric- Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.** Provide grade 60 carbon steel round tubing with a minimum 60 ksi (414 MPa) yield strength according to ASTM A 513/A 513M, with the following modifications:

14.1 Galvanize both the interior and exterior of the tubing with a minimum thickness of 0.30 oz/ft<sup>2</sup> (91.5 g/m<sup>2</sup>) zinc. If welded tubing is used, re-metallize the outside weld with zinc.

Furnish certified material according to Supplement 1068.

#### **710.01**

On page 786, **Replace** the section in its entirety with the following:

**710.01 Barbed Wire.** Furnish barbed wire according to ASTM A 121 Type A or Type Z, Class 3 Galvanizing, with the following modifications:

6.3.1 Ensure that the weight of zinc coating for various gages of wire composing the strands and barbs are not less than 0.80 ounces per square foot (244 g/m<sup>2</sup>) of surface.

7.1 Furnish No. 12 1/2, 13 1/2 or 15 1/2 steel wire gage barbed wire. Ensure that the barbs are four point round steel wire spaced 5 inches (130 mm) center-to-center.

9.1 Select one sample, according to Section 9.2, from each 50 spools or fraction thereof.

9.4 Does not apply.

11.1 Perform inspection at the project site.

Furnish certified material according to Supplement 1067.

#### **711.02**

On page 793, **Replace** the second paragraph with the following:

Coat ASTM F3125 fasteners according to 711.09. Furnish all other bolts, nuts, washers, and similar threaded fasteners that are galvanized according to ASTM A 153 or ASTM F F2329. These items may be mechanically zinc coated according to ASTM B 695, Class 50.

### 711.03

On page 793, **Replace** the section with the following:

**711.03 Steel for Piling.** Furnish steel for H-piling conforming to ASTM A 572 Grade 50 / A 572M Grade 345. Furnish steel for sheet piling according to ASTM A 328/A 328M. Furnish steel for cast-in-place reinforced concrete piles conforming to ASTM A 252, Grade 2 or 3.

### 711.09

On page 795, **Replace** the section in its entirety with the following:

**711.09 High-Strength Steel Bolts, Nuts, and Washers.** Furnish high-strength steel bolts, nuts, and washers according to ASTM F3125 Grade A325 (A325M) with the following modification:

If necessary for approval, obtain samples from material delivered to the project site or at other locations designated by the Laboratory.

Furnish bolts for steel use in bare unpainted applications according to ASTM F3125 Grade A325 (A325M), Type 3.

Use zinc coated bolts to fasten steel that has received an inorganic zinc prime coat according to 514.

Furnish high-strength steel bolts, nuts, and washers that also meet the requirements of Supplement 1080.

Provide samples to the Laboratory for acceptance.

### 711.10

On page 795, **Replace** the first sentence with the following:

**711.10 Machine Bolts.** Furnish bolts according to ASTM F1554 with the following modification:

### 712.02

On pages 801, **Delete** the second sentence of the section:

~~Furnish materials according to the Department's QPL.~~

### 712.03

On page 801, **Replace** the second paragraph of the section with the following:

4 Total Chlorides (NaCl, CaCl<sub>2</sub>, and MgCl<sub>2</sub> as NaCl based on dry weight) not less than 95 percent.

**712.04.B.**

On page 801, **Replace** the second paragraph with following:

4.2.1. *Particle size of Quick Lime* – Quick lime shall all pass the 3/8-inch (9.5 mm) sieve and at least 90 percent shall pass the No. 4 (4.74 mm) sieve.

**712.06.A**

On page 802, **Replace** the last two sentences in the section with:

Ensure that the treatment of structural timber, lumber, piling, posts, and braces conform to the current AWPA standards or AASHTO M-133, and this subsection.

**712.06.B**

On page 802, **Replace** the section with:

**B. Materials.** Furnish timber preservatives according to AASHTO M 133 and current AWPA standards.

**712.06.H**

On page 802, **Add** the following section after section **G**

**H. Sawn Wood Sign Posts.** A sawn wood post must adhere to AASHTO M 168: Wood Products standards, and be the allowable grade and species for the sizes shown in the following table:

Nominal post size <sup>a</sup>	Allowable grade and species
4 by 4 inches	No. 1 structural light framing Douglas fir, free of heart center
	No. 1 structural light framing Hem-Fir, free of heart center
	No. 1 structural light framing Southern Yellow pine
4 by 6 inches	No. 2 structural joists and planks Douglas fir, free of heart center
	No. 1 structural joists and planks Hem-Fir, free of heart center
	No. 1 structural joists and planks Southern Yellow pine
Greater than 4 by 6 inches	No. 1 posts and timbers, also known as No. 1 structural Douglas fir, free of heart center
	Select structural Hem-Fir, free of heart center
	No. 1 timbers Southern Yellow pine

<sup>a</sup>Sizes shown are nominal dressed sizes

The sweep must not exceed .08 foot in 10 feet.

Sawn wood sign posts must be graded per the following:

Southern Pine Inspection Bureau (SPIB) Standard Grading Rules

Western Wood Products Association (WWPA) Standard Grading Rules

West Coast Lumber Inspection Bureau (WCLIB) Standard Grading Rules

Posts must be treated per current AASHTO M 133: Preservatives and Pressure Treatment Processes for Timber standards.

Douglas fir and Hem-Fir posts must be incised prior to treatment.

Inspection shall be in accordance with AWPA M2.

Quality control shall be in accordance with AWPA M3.

Care of the posts shall be in accordance with AWPA M4.

**720.01**

On page 809, In the third paragraph **Replace** “730.192 or 730.192” with “730.192 or 730.193”.

**721.03**

On page 809, **Replace** the section in its entirety with the following:

**721.03 Casting Adhesive.** Furnish casting adhesives that conform to Supplement 1062.07 - Raised Pavement Marker Casting Adhesive Acceptance Procedure.  
Only furnish material listed on the Department's QPL.

**725.08.A.**

On page 812, **Add** the following sentence to the end of the first paragraph,

Equip the pull box with a stainless steel electrical grounding stud, 1/4-20 UNC thread, with 1/2-inch minimum stickout, located in the lower third of an interior wall.

**725.11.B**

On Page 814, **Delete** the following from the specification:

Furnish metal halide lamps that are first line, high quality lamps having heat resistant clear glass envelopes with a quartz arc tube interior with horizontal initial lumens and approximate hours of life not less than the values shown in TABLE 725.11-3.

**TABLE 725.11-3**

<b>ANSI</b>	<b>WATTS</b>	<b>Horizontal Lumens Initial</b>	<b>Economic Life Hours</b>
M57	175	14,000	4,000
M58	250	18,000	4,000
M59	400	32,000	10,000
M47	1,000	95,000	7,500

Furnish metal halide lamps that produce a minimum of 65 percent of the initial lumen output at the end of economic life.

Furnish low pressure sodium lamps that are first line, high quality lamps having heat resistant clear glass envelopes with a quartz arc tube interior with horizontal initial lumens and approximate hours of life not less than the values shown in TABLE 725.11-4.

**TABLE 725.11-4**

<b>WATTS</b>	<b>Lumens Initial</b>	<b>Economic Life Hours</b>
35	4,000	16,000
55	8,000	16,000
90	13,500	16,000
135	22,500	16,000
180	33,000	16,000

**725.11.F**

On page 817, **Replace** the third complete paragraph with the following:

For mounting on concrete, use adhesive-grip anchors designed to be set into a drilled hole half-filled with material meeting 705.20, with a minimum hole depth of 1-3/4 inches.

**725.16**

On Page 819, **Replace** the first paragraph with the following:

Ensure that each ground rod is one piece, at least  $\frac{3}{4}$  inch in diameter and 10 feet in length with a driving point on the lower end. If other than circular cross section, assure the periphery of the rod is 4.7 inches or more. Ensure that the rod is of solid construction and is 100% stainless steel and UL listed. 1 inch by 10 feet galvanized rods may be installed through 12/31/2018. After that date, only ground rods meeting the material specifications above will be accepted.

#### **725.19.F**

On page 820, **Replace** the first and second paragraphs with the following:

**F. Switchgear Enclosure.** Ensure that components are mounted on a removable back panel of 14 gage or heavier stainless steel rather than directly on the back wall of the enclosure and that the back panel mountings do not penetrate the walls of the enclosure. Provide a welded grounding stud on the enclosure interior.

Ensure that a neutral terminal bar of adequate ampere rating and with holes in number and of size to terminate each conductor separately is provided in each enclosure where neutral conductors are to be terminated. Ensure that an equipment grounding conductor terminal bar of adequate ampere rating and with holes in number and of size to terminate each conductor separately is provided in each enclosure where grounding conductors are to be terminated. When there is no code or utility company prohibition, a combination neutral and equipment grounding conductor bar may be furnished. Attach the grounding electrode conductor to the grounding stud. Provide a bonding jumper from the equipment grounding bar to the grounding stud.

#### **725.19.H**

On page 821, **Replace** the first paragraph with the following:

**H. Customer Service Pole.** Furnish a wood pole that complies with Supplement 1072. Ensure that the pole and any cross arms or pole key is Southern Pine or Western Red Cedar, full length, pressure treated in compliance with specifications of the American Wood Protection Association or AASHTO M-133. Ensure that the pole is 35 feet (10.5 m) minimum in length and Class 4 or heavier and conforming to ANSI 05.1 Specifications and Dimensions for wood poles. Ensure that the pole is reasonably straight without pronounced sweep or short crooks.

#### **725.19.I**

On page 821, **Add** the following section after section H:

**I. Circuit Breakers.** Ensure that circuit breaker assemblies for lighting control circuits are 100% rated for continuous (over 3 hours) operation by the manufacturer and labeled so, with a pre-defined minimum enclosure size, and housed in an enclosure sufficient to achieve the 100% rating.

#### **725.21.A**

On page 824, in the third full paragraph after the words “aluminum door”, **Add** the following:  
, bolted, or (if specified)

#### **725.21.B.9**

On page 828, **Delete** the phrase: “at least 2 inches (50mm) beyond the threads.”

**726.01**

On page 828, **Replace** the entire section with the following:

**726.01 Barrier Reflectors.** Furnish concrete barrier, retaining wall, bridge parapet, bridge rail or guardrail blackout reflector body housings of the following Type:

**Type 1, Barrier Reflector.** Furnish concrete barrier, retaining wall, bridge parapet, or bridge rail reflector body housings that are made of acrylic or polycarbonate plastic. Ensure that the minimum reflective surface area of the reflector is 7 square inches (4400 mm<sup>2</sup>).

Furnish white reflectors that reflect the following minimum candela of light at the indicated observation angles for each 1 foot-candle (10.76 lx) of incident light at the indicated entrance angles. Furnish amber reflectors that reflect at least 60 percent of these values.

**MINIMUM SPECIFIC INTENSITY, CD/10.76 LX**

Entrance angle	Observation Angle	
	0.2°	2.0°
-4°	62	0.25
15°	52	0.18

The entrance angle is measured in the horizontal plane between the direction of incident light and normal to the face of the reflector. The observation angle is measured in the vertical plane between the observer’s line of sight and the direction of light incident to the reflector face.

**Type 2, Barrier Reflector.** Furnish corrosion resistant metal guardrail blackout reflectors that are a minimum size of 4.5 × 10 × 0.125 inches (112.5 × 250 × 3.1 mm) with 1/4" (6 mm) predrilled mounting holes. One or both sides shall be covered with a minimum 4.5 × 5 inches (112.5 × 125 mm) of Type G, H or J reflective sheeting.

**Type 3, Barrier Reflector.** Furnish acrylic or polycarbonate plastic guardrail blackout reflector housings with 1/4" (6 mm) predrilled mounting holes. Products shall be structurally reinforced to withstand the force of thrown plowed snow. New products will be tested by the Department for a minimum of one winter season before approval. One or both sides shall be covered with a minimum 4.5 × 5 inches (112.5 × 125 mm) of Type G, H or J reflective sheeting.

**Type 4, Barrier Reflector.** Furnish spring loaded guardrail blackout reflector (reflector plate, holding arm and holding plate) made of plastic with UV protection.

The reflector plate shall have a minimum size of 5.33 x 6.33 x 0.150 inches. One or both sides of the reflector plate shall be covered with a minimum 5.0 x 6.0 inches of Type G, H or J reflective sheeting.

The total height of the Spring Loaded Guardrail Blockout Reflector shall be 26.00 inches, which includes the reflector plate, holding arm and holding plate.

The holding plate shall have 2 predrilled holes for 5/11x 1 1/14 inch long leg screw.

The spring shall be made of 0.135 phos-music wire conform to ASTM-A228-07 standard specification requirements.

**Type 5, Barrier Reflector.** Furnish L-type guardrail blackout reflector 6.50"x11.38" (reflective and mounting plate) made of durable, flexible high density polyethylene (HDPE) plastic with UV protection.

The reflective plate shall have a minimum size of 6.50"x4.25" inches. One or both side of the reflective plate shall be covered with a minimum of 26.0 square inches Type G, H or J reflective sheeting.

The mounting plate shall have two (2) 1/2" (12.7 mm) predrilled mounting holes.

Furnish materials according to the Department's QPL.

#### **730.01**

On page 829, **Replace** the section with the following:

**730.01 Steel Tube and Pipe.** Furnish steel tube and pipe according to ASTM\_A\_53, Grade B, ASTM A 500 Grade B, or ASTM A 501, except provide tubing for truss and end frame diagonals according to 711.01.

#### **730.017**

On page 830, **Replace** the section with the following:

**730.017 Wooden Box Beams.** Furnish wooden box beams fabricated from 1/10 or 1/8 inch (2.54 or 3.18 mm) thick laminated veneers with the grain oriented parallel to the length of the finished beam and the veneers glued together in a continuous process with lap or scarf joints connecting successive veneers in each layer staggered throughout the thickness of the beam. A 45 degree miter shall be used for the corner joints. The adhesive used shall be a phenol-formaldehyde which conforms to ASTM D 2559. The beams shall be pressure treated with a preservative meeting AWWA Standard U1, Commodity Specification F: Composite Materials.

#### **730.19**

On page 832, **Replace** the first paragraph of 730.19 with the following:

Furnish Type G reflective sheeting of microprismatic construction according to Supplement 1049, and according to ASTM D 4956, Type IV, including supplemental requirement S1. Do not furnish material of glass bead construction.

#### **731.06**

On page 834, **Replace** the second paragraph with the following:

Ensure that the manufacturer of LED beacons is listed on the Department's TAP for LED signal lamps.

#### **731.07**

On page 835, **Replace** the first paragraph with the following:

Ensure that the manufacturer of LED beacons is listed on the Department's TAP for LED signal lamps.

#### **731.08**

On page 835, **Add** the following sentence to the end of the first paragraph,

Conduit must be labelled clearly as Sunlight Resistant, meeting the requirements of NEC Art. 300 and 350.

#### **731.10**

On page 835, **Replace** the second paragraph with the following:

Furnish materials according to the Department's TAP.

#### **732.04**

On page 840, **Replace** the fourth paragraph with the following:

Furnish materials according to the Department's TAP.

**732.06**

On page 842, **Replace** the second Paragraph with the following:

Ensure that the design of the pushbutton and its associated contacts and housing are sturdy and resistant to mechanical shocks and abuse. Ensure that a concentrated force of 50 pounds (225 N) applied to the button or any exposed portion does not damage the unit or misadjusts the contacts. Furnish a housing with a curved back surface for mounting on poles of various diameters. Integrate the curved surface with the housing or supply an adapter with a flat back type housing. Attach the cover assembly to the housing by stainless steel machine screws, resulting in a weatherproof and shockproof assembly. Furnish a hole threaded for a 1/2-inch (13 mm) pipe in the housing for conduit attachment purposes. Furnish housing with manufacturer applied external surfaces of yellow Color 13655, FEDERAL STANDARD 595 , unless specified otherwise in the Plans.

**732.06**

On page 842, **Remove** the fourth Paragraph in its entirety.

**732.07**

On page 843, **Replace** the last sentence of the section with the following:

~~Furnish materials according to the Department's TAP.~~

**732.07.A.**

On page 843, **Add** the following paragraph after the third paragraph,

Furnish materials according to the Department's TAP List.

**732.07.B.**

On page 843, **Replace** the third paragraph with the following,

Furnish materials according to the Department's TAP List.

**732.07.C**

On page 843, **Add** the following section after section B:

**C. Type 33x.** In addition to the requirements of Caltrans TEES, furnish detector unit with an LED or LCD display indication of call strength ( $\Delta L/L$  or equivalent). This display shall be a bar graph or numerical display with at least eight (8) discrete levels indicated.

Furnish loop detector sensors according to the Department's TAP List.

**732.08**

On page 843, **Replace** the third paragraph with the following:

Furnish materials according to the Department's TAP.

**732.11**

On page 844, **Replace** the sixth paragraph with the following:

Use steel anchor bolts conforming to ASTM F1554, Grade 105 and galvanized according to 711.02. Ensure that ends have a steel plate as shown on the plans.

**732.19**

On page 848, **Revise** Table 732.19-1 CABLE AND WIRE as follows:



Cable or Wire	Number of Conductors	Wire Gage	Specification or type	Conductor Type	Notes
Signal Cable	As specified	As specified	<a href="#">IMSA 19-1</a> <a href="#">IMSA 20-1</a>	Copper, color coded, stranded	
Interconnect cable	As specified	As specified	<a href="#">IMSA 19-1</a> <a href="#">IMSA 20-1</a>	Copper, color coded, stranded	
	Twisted pairs as specified	As specified	RUS PE-39 <a href="#">IMSA 19-2</a> <a href="#">IMSA 20-2</a>	Copper, color coded, solid	
Interconnect cable, integral, messenger type	As specified	As specified	<a href="#">IMSA 19-3</a> <a href="#">IMSA 20-3</a>	Copper, color coded, stranded	
	Twisted pairs as specified	As specified	<a href="#">IMSA 19-4</a> <a href="#">IMSA 20-4</a>	Copper, color coded, solid	[2]
Loop detector wire	Single conductor	14 AWG	<a href="#">IMSA 51-5</a>	Copper, stranded	
Loop detector lead-in cable	Two conductor	14 AWG	<a href="#">IMSA 50-2</a>	Copper, twisted pair, stranded, shielded	
Power cable	Two conductor	As specified	UL: RHH/RHW/ USE or HHW, cross linked polyethylene with an insulation thickness of 0.045 inch (1.14 mm) (min.)	Copper, stranded	[3]
Service cable	Two conductor (duplex)	As specified		Aluminum,[1] twisted, stranded	
Ground Wire	Single conductor		UL: RHH/RHW/USE or XHHW, cross linked polyethylene	Copper, stranded	[4]
Loop detector leadin cable, direct burial	As specified	12 or 14 AWG, or as specified	<a href="#">IMSA 19-6</a> <a href="#">IMSA 20-6</a>	Copper, stranded	
Loop detector leadin cable, Integral messenger type	As specified	12 or 14 AWG, or as specified	<a href="#">IMSA 19-4</a> <a href="#">IMSA 20-4</a>	Copper, stranded	

**732.21**

On page 847, in the first paragraph, second sentence, **Delete** the phrase “(or circuit breaker)”

**732.22**

On page 847, **Replace** the 10<sup>th</sup> sentence with the following  
 Reflective sheeting shall be Type J, ASTM D4956 Type XI.

**733.02.C**

Page 851 **Replace** the second paragraph with the following  
Furnish materials according to the Department's TAP.

**733.02.D**

Page 851 **Replace** the second paragraph with the following  
Furnish materials according to the Department's TAP.

**733.03.A.1**

Page 855 **Replace** the ninth paragraph with the following  
Furnish materials according to the Department's TAP.

**733.03.A.2**

Page 861 **Replace** the second paragraph with the following  
Furnish TS-1 cabinets according to the Department's TAP.

**733.03.B**

Page 863 **Replace** the first paragraph with the following  
Furnish TS-2 cabinet according to the Department's TAP.

**733.03.C.4.a**

Page 864 **Replace** the last sentence of the section with the following  
Furnish loop detector sensors according to the Department's TAP.

**733.03.D.4.a**

On page 874, **Add** the following sentence after the second sentence:  
Furnish materials according to the Department's TAP List.

**733.03.E.1**

On page 875, **Replace** the second sentence with the following:  
Ensure that the manufacturer of these Model 336L cabinets is listed on the TAP List.

**733.03.E.4**

On page 875, **Add** the following sentence after the first sentence:  
Furnish materials according to the Department's TAP List.

**733.03.E**

Page 875 **Replace** the last sentence of the section with the following  
Furnish 336L cabinet materials according to the Department's TAP.

**733.09**

Page 882 **Replace** the last sentence of the section with the following  
Furnish materials according to the Department’s TAP.

**733.10**

On page 882, **Add** the following section after the last paragraph on the page:  
**733.10 Centrally Controlled Arterial Traffic Signal System.** Furnish materials according to the Department’s Traffic Authorized Products (TAP) List.

**740.02**

On page 883, **Replace** the fifth paragraph with the following:  
Ensure that Type 1 and Type 1A conforms to the following requirements:

**740.05**

On page 887, **Delete** the following sentence from the sixth paragraph:  
Use Materials certified according to Supplement 1089.

**740.08**

On page 889, **Replace** the section in its entirety with the following:

**740.08 Heat-Fused Preformed Thermoplastic Pavement Marking Material.** Furnish heat-fused preformed thermoplastic pavement marking materials conforming to the following Type A and Type B:

<b>Material Type</b>	<b>Thickness</b>	<b>Pre-heat</b>	<b>Post-heat</b>
Type A90	90 mil (2.29 mm)	Yes	Yes
Type B90	90 mil (2.29 mm)	No	Yes
Type A125	125 mil (3.18 mm)	Yes	Yes
Type B125	125 mil (3.18 mm)	No	Yes

Furnish heat-fused preformed thermoplastic pavement marking materials conforming to AASHTO M249 with the following the following requirements:

**A. Pigments.** Furnish white material with sufficient titanium dioxide pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected. Furnish yellow material with sufficient pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected. The yellow pigments must be organic and must be heavy-metal free.

**B. Heating indicators.** Furnish the material with the top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. The closing of these indents during application, shall act as a visual cue that the material has reached a molten state allowing for satisfactory adhesion and proper bead embedment, and as a post-application visual cue that the application procedures have been followed.

**C. Skid Resistance.** Furnish the material with properly applied and embedded surface beads, must provide a minimum resistance value of 45 BPN when tested according to ASTM E 303.

**D. Environmental Resistance.** Furnish the material that must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

Ensure that the material contains reflective glass beads, 740.09 Type E. Prequalify materials according to Supplement 1047. Furnish materials according to the Department's Approved List.

#### **740.09.D**

On page 890, **Replace** the third paragraph with the following:

Ensure that the glass beads have the following gradation when tested according to Supplement 1008.

#### **740.09.E**

On page 891, **Add** the following new section after section 740.09.D. Type D.:

**E. Type E.** Furnish heat-fused preformed plastic pavement marking materials that contain a minimum of thirty percent (30%) intermixed graded glass beads by weight and factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. ( $\pm 10\%$ ) per 10 sq. ft.

Furnish factory applied coated surface beads with the following specifications:

- 1) Minimum 80% rounds
- 2) Minimum refractive index of 1.50

Furnish intermixed graded glass beads and factory applied coated surface beads that conform to Type 1 and/or Type 3 AASHTO M247 as recommended by the manufacturer.

Use materials certified according to Supplement 1089.

#### **748.04**

On page 893, **Add** the following new section after section **748.03 Polyethylene (PE) Service Branches and Fittings.:**

**748.04 Glass-Fiber-Reinforced Polymer Mortar Pipe (RPMP), Joints, and Fittings.** Furnish RPMP conforming to ASTM D 3517 or AWWA C 950. Design of underground and above ground glass-fiber-reinforced polymer mortar pipe and fittings shall meet design requirements of AWWA M 45: Fiberglass Pipe Design Manual.

Furnish double-bell push-on type fiberglass joints conforming to ASTM D 4161 and with a rubber gasket conforming to ASTM F 477. Furnish restrained joints and fittings conforming to ASTM D 3517 or AWWA C 950.

Provide a minimum pipe stiffness of 18 psi.

Furnish certified test data as defined in 101.03 to the Engineer.