

1 PROJECT SPECIAL PROVISIONS

2  
3 KING COUNTY, WA  
4 SOUTH PARK BRIDGE #3179 (STRUCTURE  
5 ID 08433700)  
6 REPLACEMENT

7  
8 VOLUME 3 OF 3

9 APPENDICES

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11 King County CIP 300197

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13  
14 FINAL SUBMITTAL

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26 KING COUNTY DEPARTMENT OF TRANSPORTATION  
27 DECEMBER 22, 2010



**SOUTH PARK BRIDGE NO. 3179**  
(14<sup>th</sup>/16<sup>th</sup> Avenue South over Duwamish Waterway)

Contract No. C00606C11  
Project No. 300197

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**SPECIAL PROVISIONS**  
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# King County

## SPECIAL PROVISIONS

### SOUTH PARK BRIDGE NO. 3179 REPLACEMENT

(14<sup>th</sup>/16<sup>th</sup> Avenue south over Duwamish Waterway)

Contract No. C00606C11

Project No. 300197

Fed. Aid No. TIGERII-BRM-STPUL-1491(002)

## GENERAL REQUIREMENTS

### INTRODUCTION

The following Special Provisions in conjunction with the 2010 *Standard Specifications for Road, Bridge and Municipal Construction*, issued by the Washington State Department of Transportation and the American Public Works Association, Washington State Chapter (Standard Specifications), and the 2007 King County *Road Design and Construction Standards* (KCRDCS), which were adopted by the King County Council, govern this Contract. These Special Provisions supersede the referenced portions of Standard Specifications. Where any provision of Standard Specifications is modified or deleted by these Special Provisions, the unaltered, remaining portions remain in full force and effect.

Copies of the Standard Specifications and KCRDCS are on file in the office of the County Road Engineer, Department of Transportation, Road Services Division, 2nd Floor, 201 South Jackson Street, Seattle, Washington, 98104-3856 where they may be examined

Wherever reference is made in the Standard Specifications to the Secretary of Transportation or Engineer, such reference shall be construed to mean the King County Road Engineer or the County Road Engineer's duly authorized assistants.

Wherever reference is made to the "State Materials Lab" or WSDOT Materials Laboratory" in the Standard Specifications such reference shall be revised to read "King County Materials Lab (Renton, WA.)".

### DESCRIPTION OF WORK

This project provides for the replacement of South Park Bridge over the Duwamish Waterway in King County by constructing a new drawbridge downriver and parallel to the existing South Park Bridge, intersection improvements, roadway, drainage, and utility construction, approach spans and retaining wall construction, riverbank mitigation, incorporation of historic and art elements,

SPECIAL PROVISIONS

**SOUTH PARK BRIDGE NO. 3179**

(14<sup>th</sup>/16<sup>th</sup> Avenue South over Duwamish Waterway)

- 1 illumination, demolition of existing bridge, and other work, all in accordance with the attached
- 2 Plans, these Special Provisions, the Standard Specifications, the KCRDCS, and the
- 3 APWA/WSDOT Standard Plans for Road, Bridge, and Municipal Construction.
- 4

**SPECIAL PROVISIONS**

**SOUTH PARK BRIDGE NO. 3179**

(14<sup>th</sup>/16<sup>th</sup> Avenue South over Duwamish Waterway)

1

2 **APPENDICES**

3 The following appendices are attached and made a part of this Contract:

4 **APPENDIX A:**

5 King County Department of Transportation – Transit Division Standards for Construction  
6 of Transit Passenger Facilities Drawing No. D103 and D111

7 **APPENDIX B:**

8 Applicable City of Seattle Standard Plans

9 **APPENDIX C:**

10 Applicable Seattle City Light Construction Guidelines and Material Standards

11

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**SOUTH PARK BRIDGE NO. 3179**  
(14<sup>th</sup>/16<sup>th</sup> Avenue South over Duwamish Waterway)

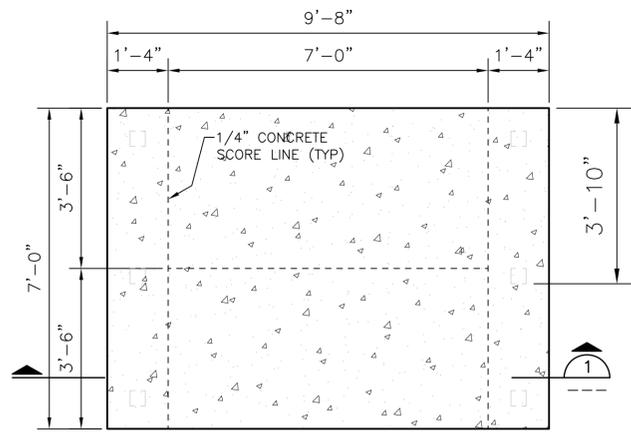
**APPENDIX A**  
to the  
**SPECIAL PROVISIONS**

**King County Department of Transportation – Transit Division**  
**Standards for Construction of Transit Passenger Facilities**

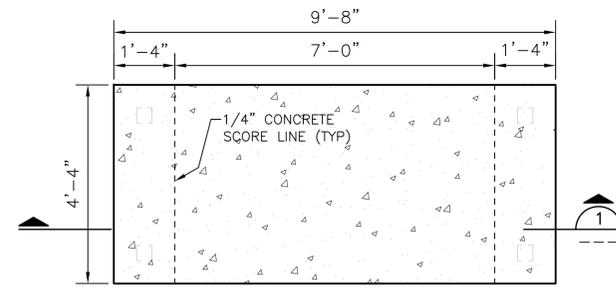
Drawing No. D103 – Footing Plans, Section, Details, Notes, and Schedule

Drawing No. D111 – Internal Solar Bus Shelter Lighting

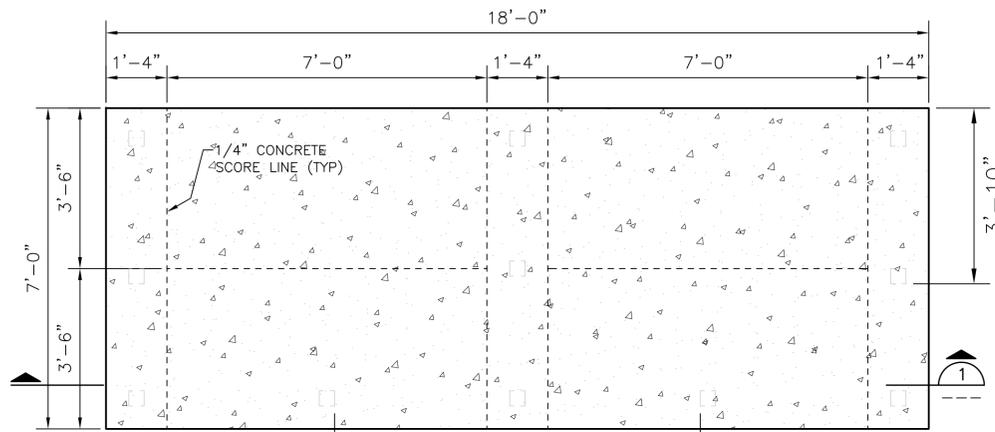




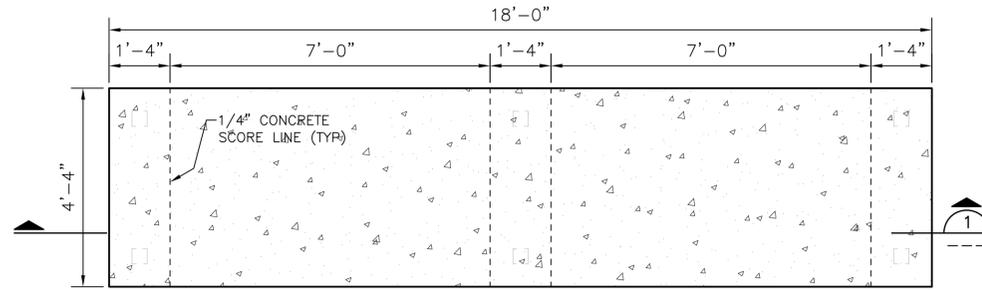
**B11 FOOTING**  
SCALE: 1/2" = 1'-0"



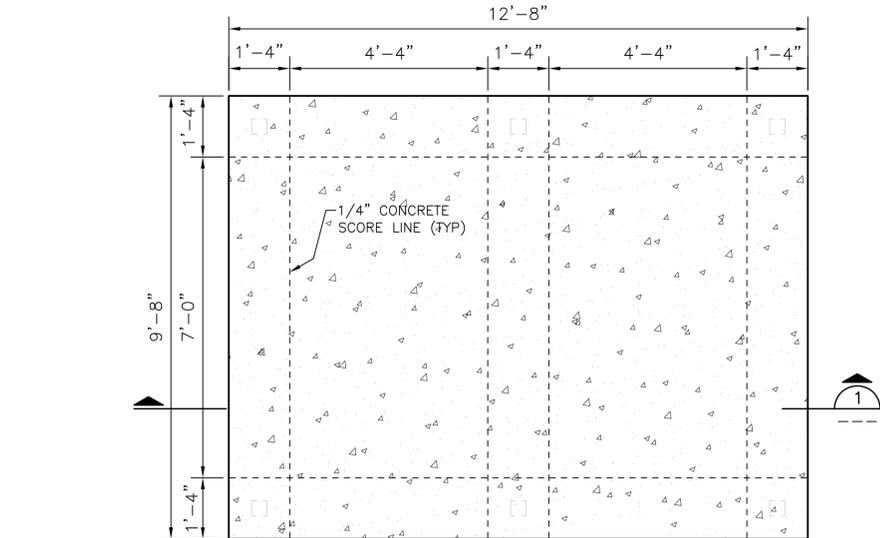
**B21 FOOTING**  
SCALE: 1/2" = 1'-0"



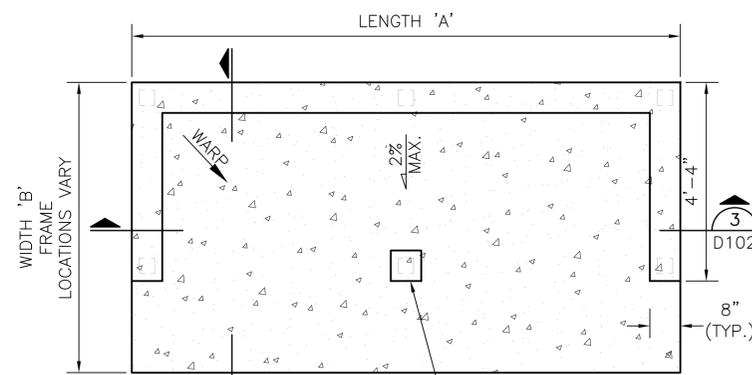
**B12 FOOTING**  
SCALE: 1/2" = 1'-0"



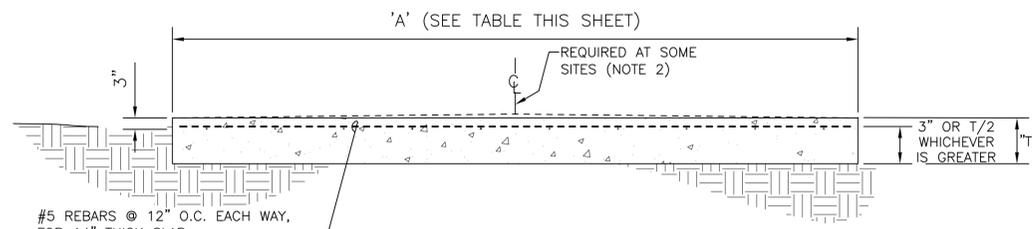
**B22 FOOTING**  
SCALE: 1/2" = 1'-0"



**B13 FOOTING**  
SCALE: 1/2" = 1'-0"



**B30 FOOTING**  
SCALE: 1/2" = 1'-0"

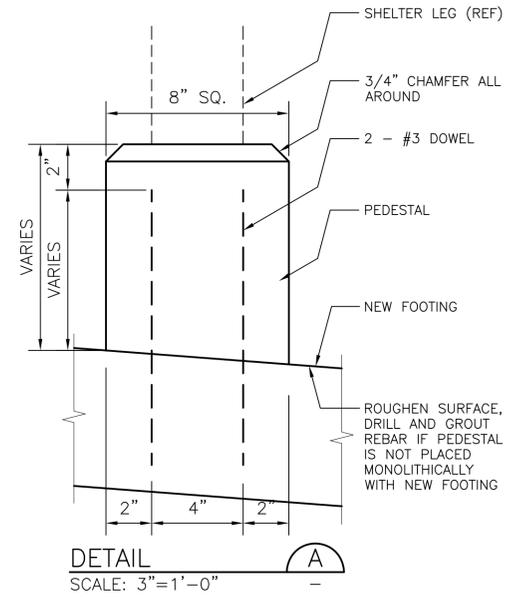


**LONGITUDINAL SECTION**  
SCALE: 1/2" = 1'-0"

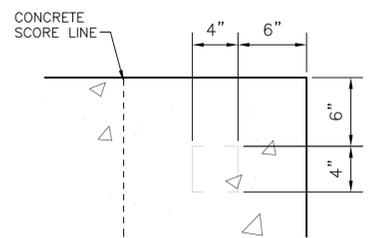
FOOTING DIMENSIONS				
FOOTING TYPE	SHELTER FRAME TYPE	LENGTH 'A'	WIDTH 'B'	SLAB THICKNESS 'T'
B11	PER PLAN	9'-8"	7'-0"	7 1/2"
B12	PER PLAN	18'-0"	7'-0"	7 1/2"
B13	PER PLAN	12'-8"	9'-8"	7 1/2"
B21	PER PLAN	9'-8"	4'-4"	14"
B22	PER PLAN	18'-0"	4'-4"	14"
B31	F11	9'-0"	6'-4"	7 1/2"
B31	F21	9'-0"	4'-4"	14"
B31	F31 OR F51	9'-0"	4'-4"	14"
B32	F12	17'-4"	6'-4"	7 1/2"
B32	F13	12'-0"	9'-0"	7 1/2"
B32	F14	17'-4"	6'-4"	7 1/2"
B32	F22 OR F52	17'-4"	4'-4"	14"
B32	F32	17'-4"	4'-4"	14"

**NOTES:**

- "□" INDICATES AREAS FOR FUTURE SHELTER LEGS. AVOID PLACING REINFORCEMENT IN THESE AREAS.
- FOR SITES WITH SLOPES LESS THAN 0.5% IN 'A' DIMENSION, INCREASE DIMENSION AT MIDDLE OF FOOTING BY 1" TO ASSURE PROPER DRAINAGE OF SURFACE WATER.
- WHEN USING B-32 FOOTING WITH DOUBLE FRAMES, SUPPORT FRONT MIDDLE LEG OR LEGS OF FRAME AS REQUIRED TO PROVIDE THE SAME TOP ELEVATION AS THE PERIMETER WALL.



**DETAIL A**  
SCALE: 3" = 1'-0"



**TYPICAL LEG DETAIL @ CORNER**  
SCALE: 1 1/2" = 1'-0"

TYPICAL CONDITION FOR ALL EXCEPT B30, B31, AND B32 SERIES FOOTING

ONE INCH AT FULL SIZE, IF NOT ONE INCH SCALE ACCORDINGLY

**NOT FOR CONSTRUCTION**

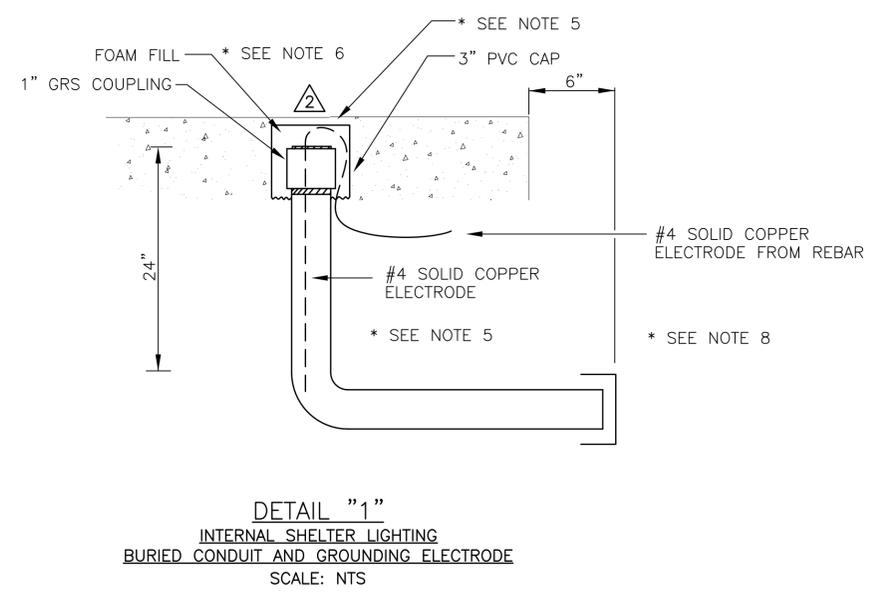
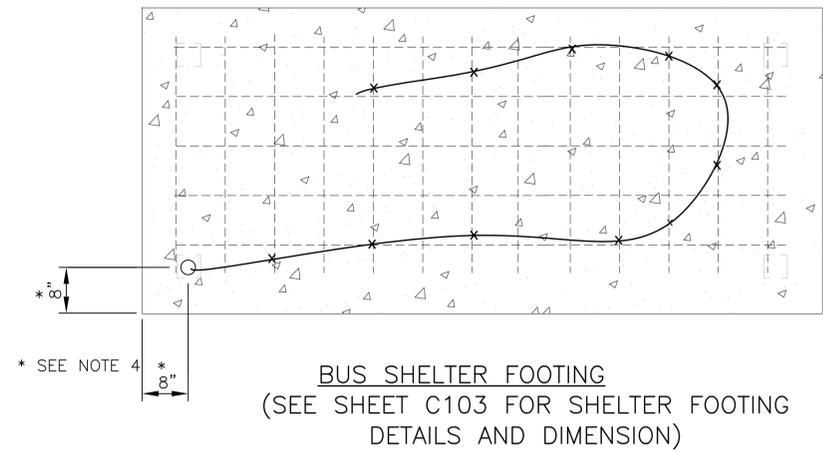
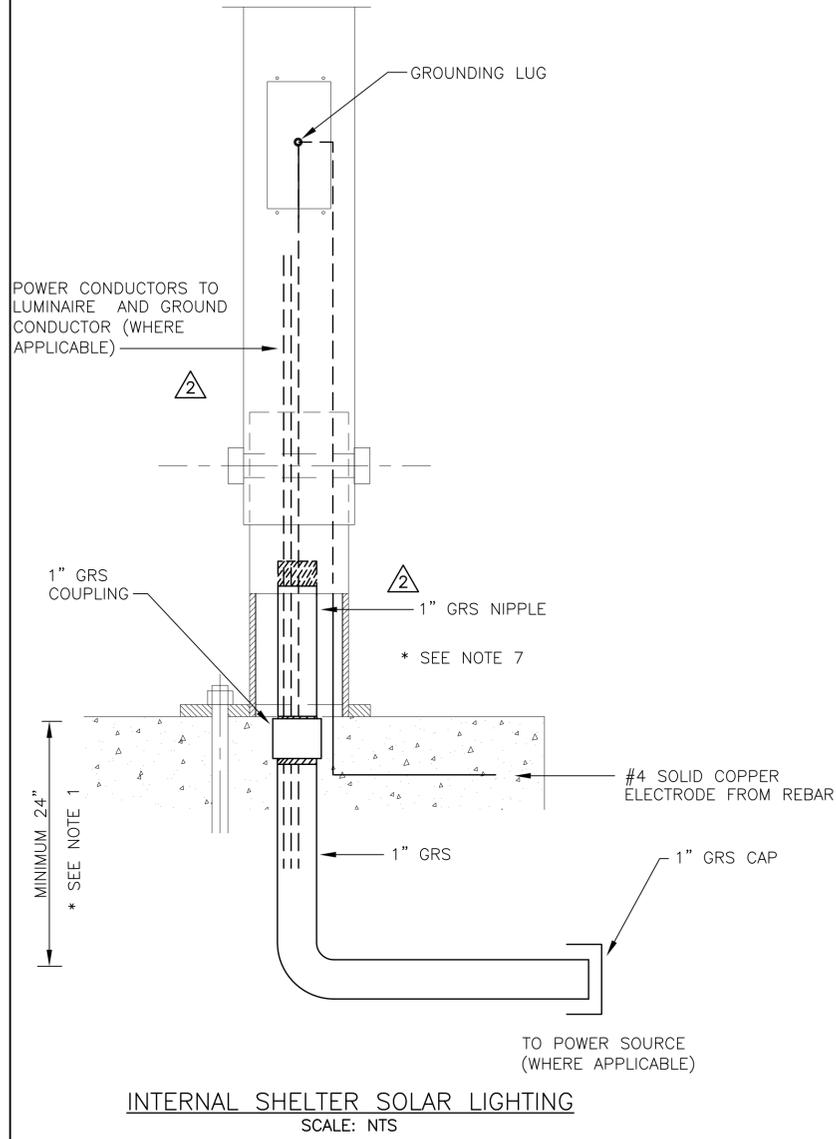
No.	REVISION	BY	APP'D	DATE

DESIGNED: C ASQUITH	CHECKED: P ENG
DRAWN: H SCHMITT	SCALE: NOTED
RECOMMENDED: D CRIPPEN	CONTRACT NO: C00256C07
APPROVED: R ISLER	



Department of Transportation - Transit Division  
STANDARDS FOR CONSTRUCTION OF TRANSIT PASSENGER FACILITIES  
**FOOTING PLANS, SECTION, DETAILS, NOTES, AND SCHEDULE**

DATE: JAN 08
FILE NO: D103C
DRAWING NO: D103
SHEET NO: 3 OF 12



**NOTES:**

- \*\*THE CONTRACTOR SHALL GROUND THE 12 VOLT SOLAR LIGHTING SYSTEM BY THE FOLLOWING:
- \*1. ALL NEW CONDUIT UNDERGROUND SHALL HAVE A MINIMUM COVER OF 24 INCHES FROM FINISHED GRADE OR 30 INCHES FROM TOP OF THE SHELTER PAD.
  - \*2. USING TIE-WIRE THE CONTRACTOR SHALL TIE 23 FEET OF THE #4 SOLID COPPER GROUNDING ELECTRODE TO THE SHELTER PAD REBAR, LEAVING 2 FEET FROM GRADE LEVEL TO ATTACH TO THE GROUNDING LUG IN THE SHELTER LEG.
  - \*3. THE #4 SOLID COPPER GROUNDING ELECTRODE SHALL BE ENCLOSED BY AT LEAST 2" OF CONCRETE IN ACCORDANCE WITH NEC 250.52 (A) (3).
  - \*4. AT THE BACK SHELTER LEG OF HIGHEST ELEVATION THE CONTRACTOR SHALL INSTALL THE 1 INCH GRS CONDUIT AND THE #4 SOLID COPPER ELECTRODE.
  - \*5. THE CONTRACTOR SHALL LEAVE THE #4 SOLID COPPER ELECTRODE AND THE CONDUIT CAPPED AND BURIED APPROXIMATELY 1/4" BENEATH THE CONCRETE SURFACE. PLACE TWO FEET OF THE #4 SOLID COPPER ELECTRODE INSIDE CONDUIT LEAVING A SMALL ARC AT THE TOP OF THE ENTRANCE INTO THE CONDUIT. (SEE DETAIL 1)
  - \*6. TO KEEP CONCRETE FROM ENTERING THE CONDUIT AND CAP SPACE, THE CONTRACTOR AFTER PLACING THE 2 FEET OF #4 SOLID COPPER ELECTRODE IN THE CONDUIT, SHALL USE A FOAM FILL OR MATERIAL INSIDE THE 3 INCH PVC CAP, ALLOWING THE INSTRUCTED TIME TO DRY BEFORE POURING THE CONCRETE.
  - \*7. KING COUNTY METRO SHALL REMOVE 3 INCH PVC CAP, PULL OUT THE #4 SOLID COPPER ELECTRODE, INSTALL A 1 INCH THREADED GRS NIPPLE AND CONNECT THE #4 SOLID COPPER ELECTRODE (AND FIXTURE GROUND IF APPLICABLE) TO THE GROUNDING LUG IN THE SHELTER LEG.
  - \*8. IF THERE IS NO SPECIFIED CONNECTION TO A POWER SOURCE, 1" GRS CONDUIT SHALL BE EXTENDED 6 INCHES BEYOND THE EDGE OF SHELTER FOOTING AND CAPPED. OTHERWISE THE CONTRACTOR SHALL RUN THE CONDUIT TO THE SPECIFIED LOCATION.
  - \*9. THE CONTRACTOR SHALL PREPARE AN AS-BUILT DRAWING FOR EACH SHELTER LOCATION. A COPY OF THE AS-BUILT DRAWING SHALL BE DELIVERED TO THE KING COUNTY METRO TRANSIT PROJECT REPRESENTATIVE FOR EACH SHELTER PAD LOCATION.

**EQUIPMENT:**

1. 1-INCH GRS CONDUIT
2. #4 SOLID COPPER ELECTRODE
3. 1-INCH GRS CAP
4. 1-INCH GRS PLUG
5. 1-INCH GRS NIPPLE
6. 1-INCH GRS COUPLING
7. 4-INCH PVC CAP
8. FOAM FILL

ONE INCH  
AT FULL SIZE. IF NOT ONE  
INCH SCALE ACCORDINGLY

△				
△				
△				
△	ADDENDA	KLW	CDR	8/15/05
△	ADDENDA	KLW	CDR	5/4/05
No.	REVISION	BY	APP'D	DATE

**NOT FOR  
CONSTRUCTION**

DESIGNED: K WATKINS	CHECKED: C REYNOLDS
DRAWN: K WATKINS	SCALE: NOT TO SCALE
RECOMMENDED: C REYNOLDS	CONTRACT NO: C00256C07
APPROVED:	



Department of Transportation - Transit Division  
STANDARDS FOR CONSTRUCTION  
OF TRANSIT PASSENGER FACILITIES  
**INTERNAL SOLAR BUS SHELTER  
LIGHTING**

DATE: JAN 08
FILE NO: C111C
DRAWING NO: D111
SHEET NO: 11 OF 12

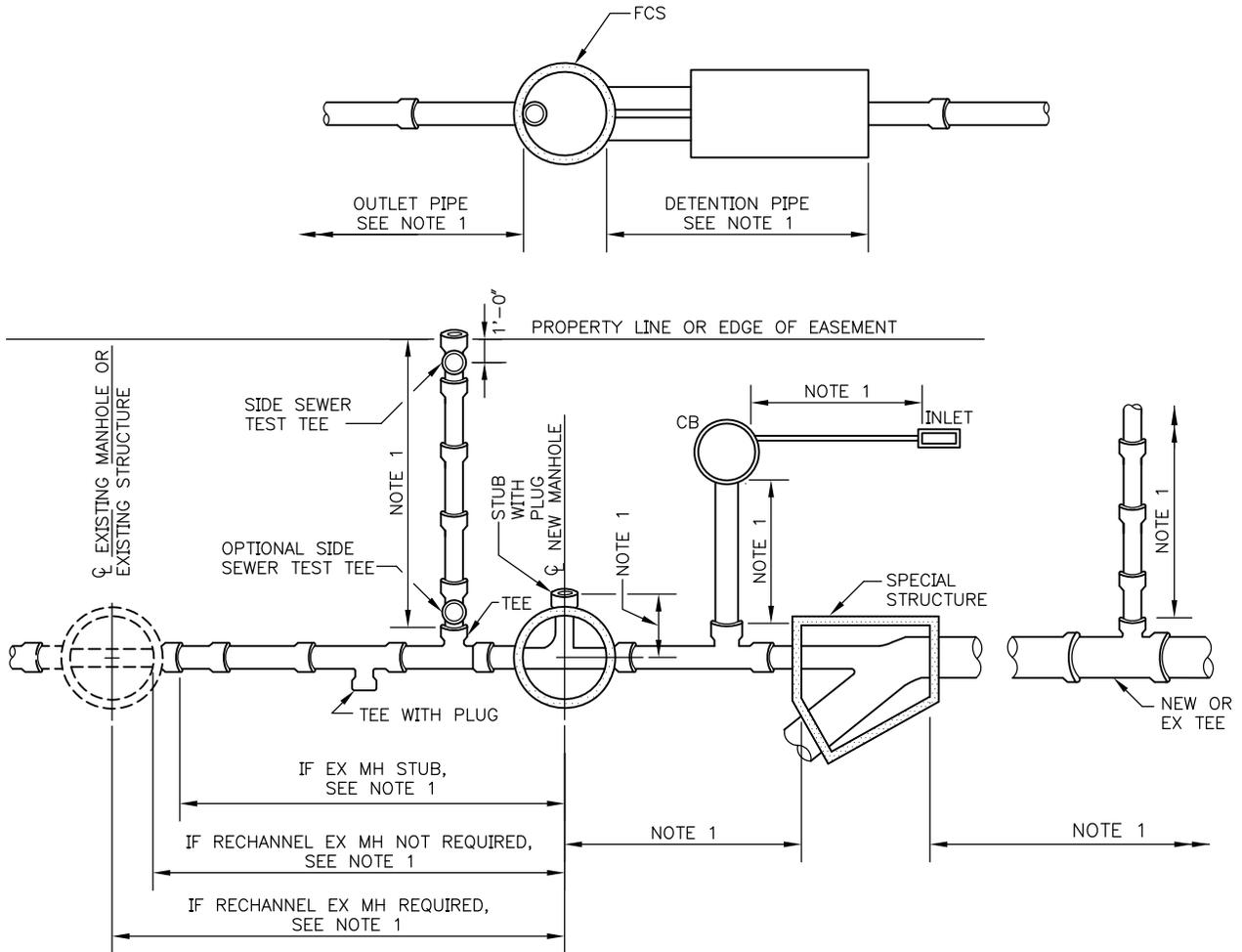
V:\Library & Standards\Standards\PPF\Metro\PPF Standard Construction Set\D111C.dwg | Layout: D111  
PLOTTED: Jan 02, 2008-09:32:02am By: suterj  
XREFS:  
IMAGES:

**SOUTH PARK BRIDGE NO. 3179**  
(14<sup>th</sup>/16<sup>th</sup> Avenue South over Duwamish Waterway)

**APPENDIX B**  
to the  
**SPECIAL PROVISIONS**

**City of Seattle Applicable Standard Plans**





**NOTES:**

1. MEASUREMENT PER LINEAR FOOT. PIPE ENDING IN STRUCTURE MEASURED TO EITHER INSIDE FACE OR TO CENTERLINE OF STRUCTURE AS INDICATED, OR TO TEE OR WYE AS INDICATED.
2. TEE OR WYE INCLUDING PLUG - UNIT PRICE EACH
3. ALL PIPE SHALL BE MEASURED ON THE SLOPE ALONG THE CENTERLINE OF PIPE TO NEAREST 0.10 LF.



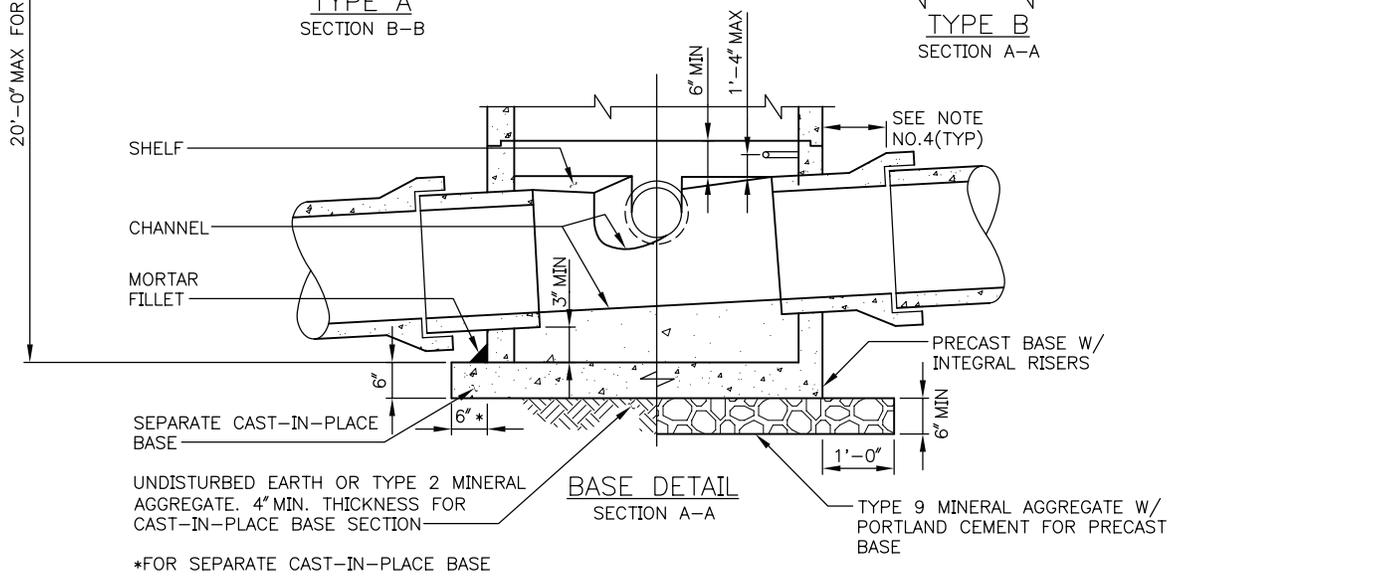
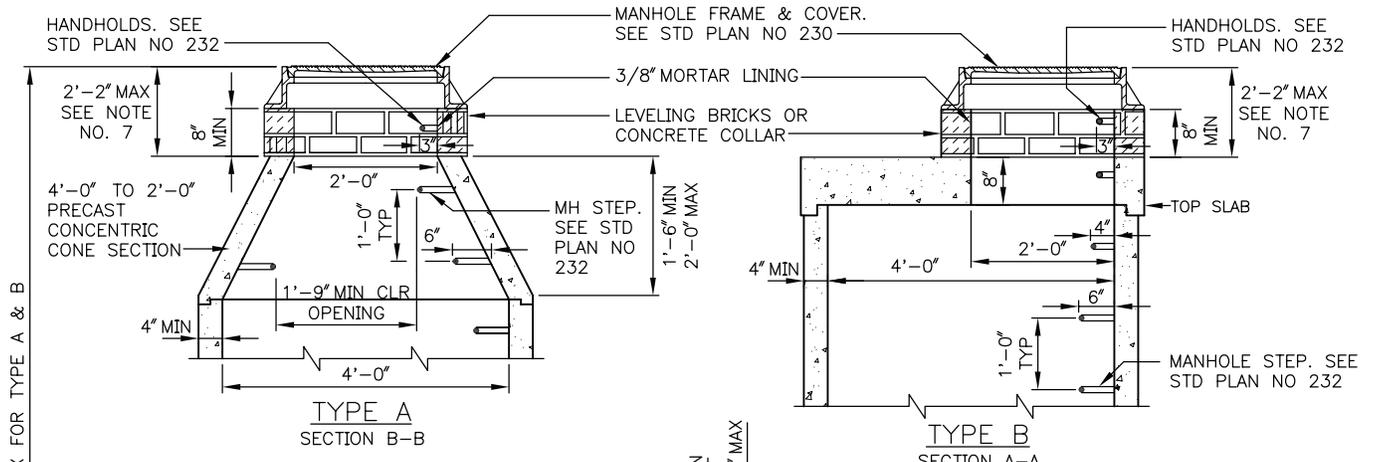
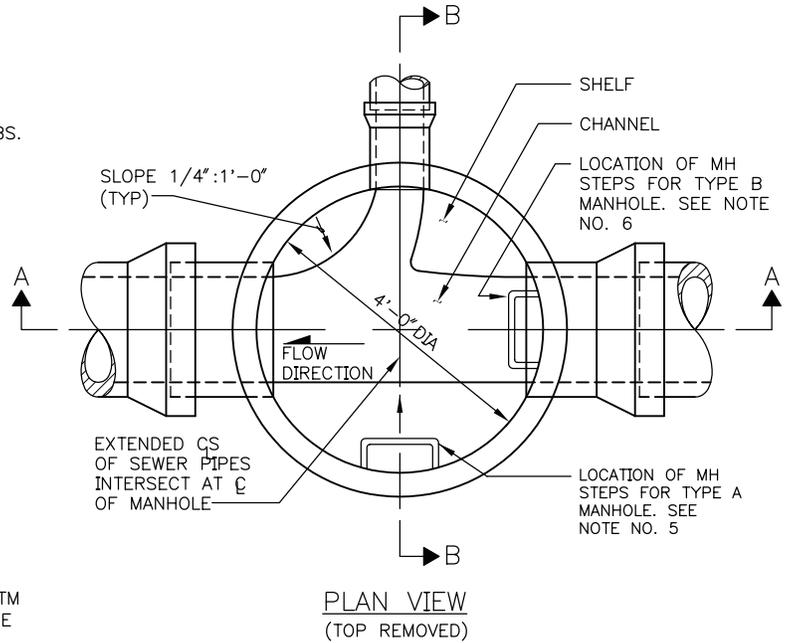
City of Seattle

NOT TO SCALE

SEWER/DRAINAGE  
MEASUREMENT DIAGRAM

**NOTES:**

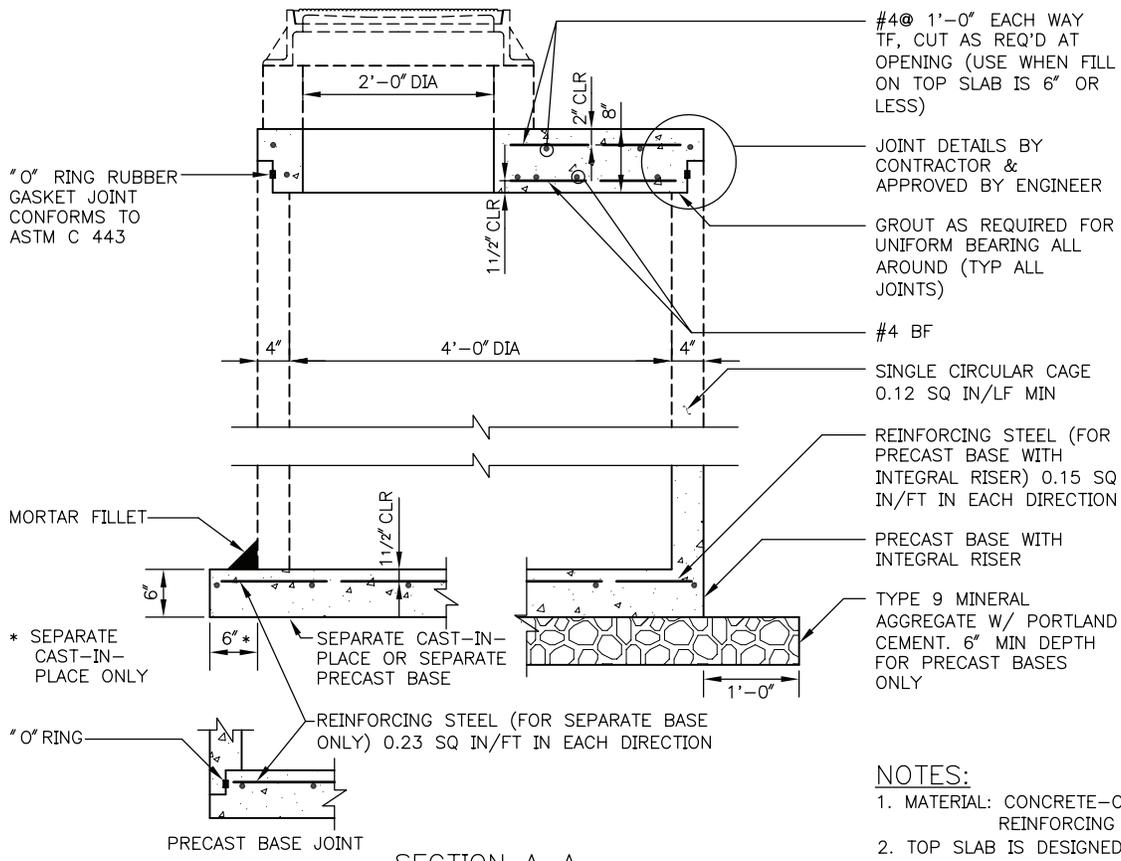
1. TYPE A MANHOLE DESIGNATES MANHOLES WITH PRECAST CONCENTRIC CONE SECTIONS.
2. TYPE B MANHOLE DESIGNATES MANHOLES WITH TOP SLABS.
3. TOP SLAB AND BASE SECTION DETAILS, SEE STANDARD PLAN NO 200b.
4. MAXIMUM DIMENSION FROM OUTSIDE MANHOLE WALL TO THE FIRST PIPE JOINT, THE GREATER OF 1/2 INSIDE PIPE DIAMETER OR 1'-0".
5. FOR TYPE A MANHOLE, LOCATE MANHOLE STEPS ON THE SIDE PERPENDICULAR TO THE DIRECTION OF THE FLOW IN THE CHANNEL.
6. FOR TYPE B MANHOLE, LOCATE MANHOLE STEPS OPPOSITE TO THE DOWNSTREAM OPENING.
7. TOTAL HEIGHT OF AN EXTENSION, MANHOLE FRAME AND LEVELING BRICKS SHALL NOT EXCEED 2'-2".
8. MANHOLE BASE SECTIONS SHOWN IN SECTION A-A AND SECTION B-B ARE TYPICAL FOR TYPE A AND TYPE B MANHOLES.
9. THE MAXIMUM HOLE SIZE SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS THE MANHOLE WALL THICKNESS. THE MINIMUM HOLE SIZE SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 4 INCHES. MINIMUM DISTANCE BETWEEN HOLES IS 8 INCHES.
10. PRECAST MANHOLE COMPONENTS SHALL CONFORM TO ASTM C 478. JOINTS BETWEEN PRECAST COMPONENTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C 443.



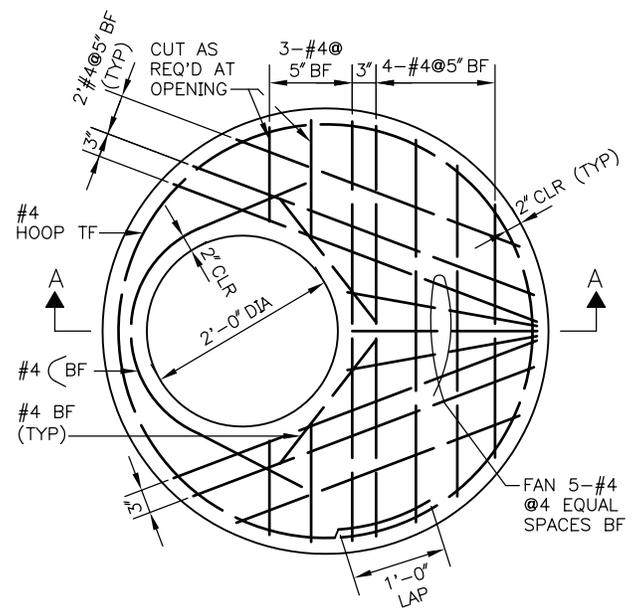
City of Seattle

NOT TO SCALE

TYPE 200 MANHOLE



SECTION A-A



TYPE 200 MH-TOP SLAB

#4@ 1'-0" EACH WAY TF, CUT AS REQ'D AT OPENING (USE WHEN FILL ON TOP SLAB IS 6" OR LESS)

JOINT DETAILS BY CONTRACTOR & APPROVED BY ENGINEER

GROUT AS REQUIRED FOR UNIFORM BEARING ALL AROUND (TYP ALL JOINTS)

#4 BF

SINGLE CIRCULAR CAGE 0.12 SQ IN/LF MIN

REINFORCING STEEL (FOR PRECAST BASE WITH INTEGRAL RISER) 0.15 SQ IN/FT IN EACH DIRECTION

PRECAST BASE WITH INTEGRAL RISER

TYPE 9 MINERAL AGGREGATE W/ PORTLAND CEMENT. 6" MIN DEPTH FOR PRECAST BASES ONLY

NOTES:

1. MATERIAL: CONCRETE-CLASS AX  
REINFORCING STEEL-ASTM A 615 GR 60
2. TOP SLAB IS DESIGNED FOR 3'-0" MAX COVER  
BASE IS DESIGNED FOR 20'-0" MAX COVER
3. HEIGHT 8'-0" TO 12'-0":  
MIN. REQUIRED SOIL BEARING = 3300 LBS/SQ FT
4. HEIGHT 12'-0" TO 20'-0":  
MIN. REQUIRED SOIL BEARING = 3800 LBS/SQ FT

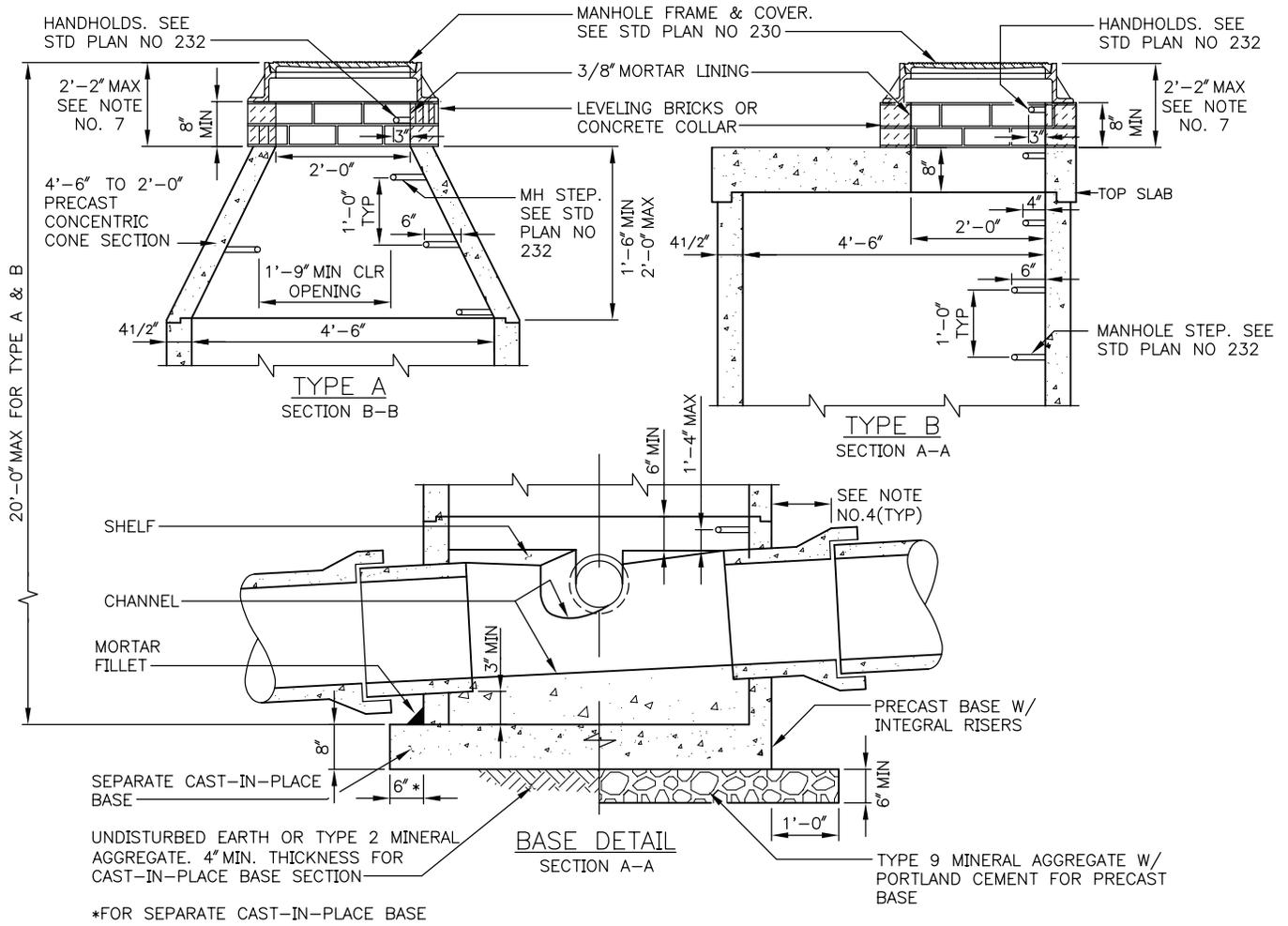
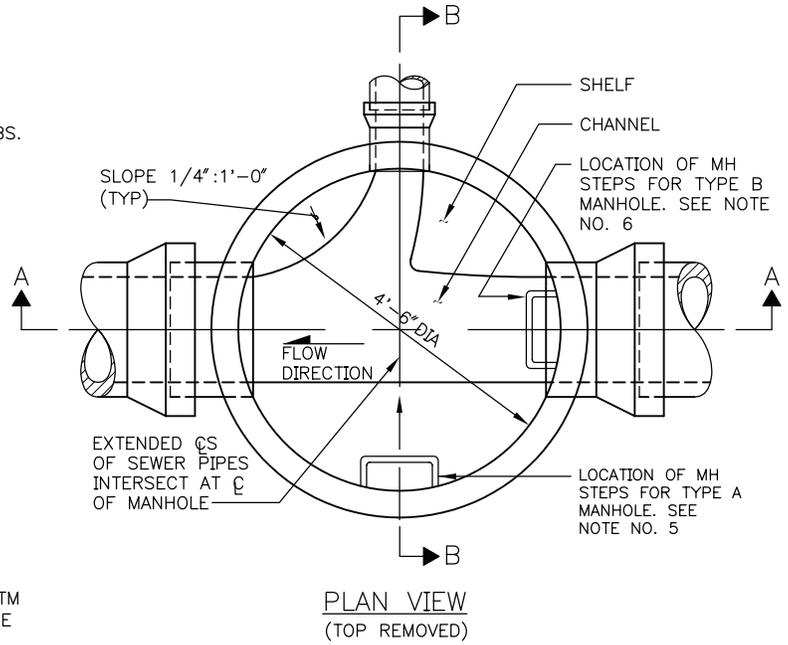


NOT TO SCALE

TYPE 200 MANHOLE  
TOP & BOTTOM SLABS

**NOTES:**

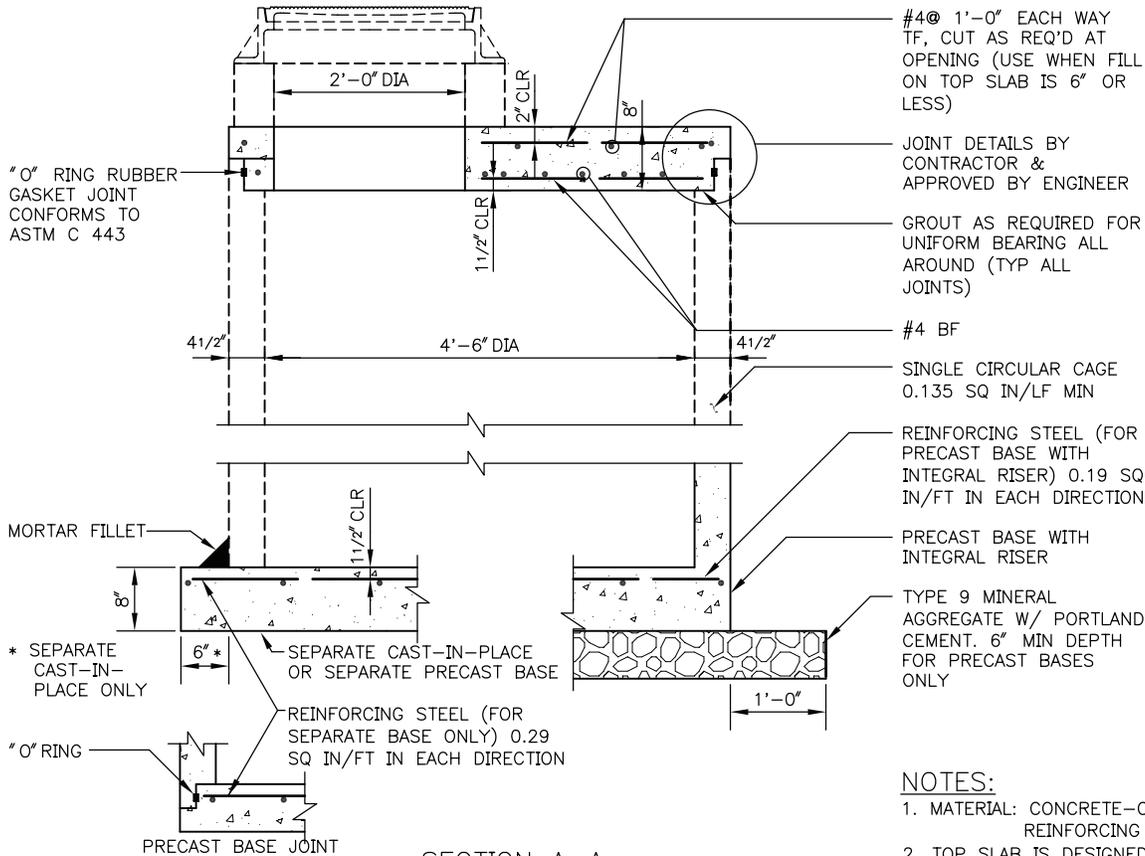
1. TYPE A MANHOLE DESIGNATES MANHOLES WITH PRECAST CONCENTRIC CONE SECTIONS.
2. TYPE B MANHOLE DESIGNATES MANHOLES WITH TOP SLABS.
3. TOP SLAB AND BASE SECTION DETAILS, SEE STANDARD PLAN NO 201b.
4. MAXIMUM DIMENSION FROM OUTSIDE MANHOLE WALL TO THE FIRST PIPE JOINT, THE GREATER OF 1/2 INSIDE PIPE DIAMETER OR 1'-0".
5. FOR TYPE A MANHOLE, LOCATE MANHOLE STEPS ON THE SIDE PERPENDICULAR TO THE DIRECTION OF THE FLOW IN THE CHANNEL.
6. FOR TYPE B MANHOLE, LOCATE MANHOLE STEPS OPPOSITE TO THE DOWNSTREAM OPENING.
7. TOTAL HEIGHT OF AN EXTENSION, MANHOLE FRAME AND LEVELING BRICKS SHALL NOT EXCEED 2'-2".
8. MANHOLE BASE SECTIONS SHOWN IN SECTION A-A AND SECTION B-B ARE TYPICAL FOR TYPE A AND TYPE B MANHOLES.
9. THE MAXIMUM HOLE SIZE SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS THE MANHOLE WALL THICKNESS. THE MINIMUM HOLE SIZE SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 4 INCHES. MINIMUM DISTANCE BETWEEN HOLES IS 8 INCHES.
10. PRECAST MANHOLE COMPONENTS SHALL CONFORM TO ASTM C 478. JOINTS BETWEEN PRECAST COMPONENTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C 443.



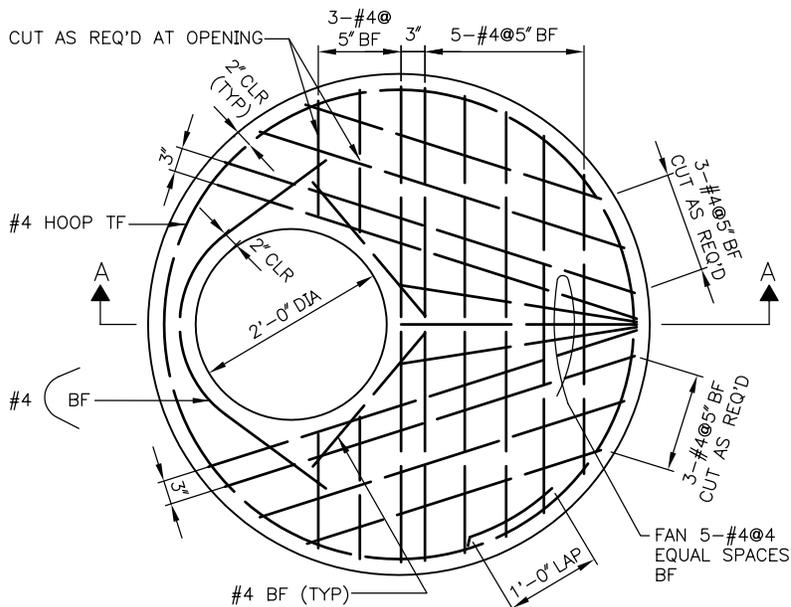
City of Seattle

NOT TO SCALE

TYPE 201 MANHOLE



SECTION A-A



TYPE 201 MH-TOP SLAB

NOTES:

1. MATERIAL: CONCRETE-CLASS AX  
REINFORCING STEEL-ASTM A 615 GR 60
2. TOP SLAB IS DESIGNED FOR 3'-0" MAX COVER  
BASE IS DESIGNED FOR 20'-0" MAX COVER
3. HEIGHT 8'-0" TO 12'-0":  
MIN. REQUIRED SOIL BEARING = 3300 LBS/SQ FT
4. HEIGHT 12'-0" TO 20'-0":  
MIN. REQUIRED SOIL BEARING = 3800 LBS/SQ FT

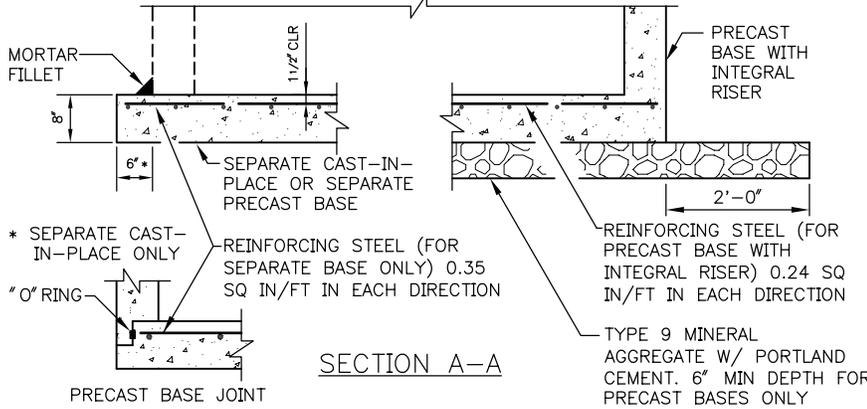
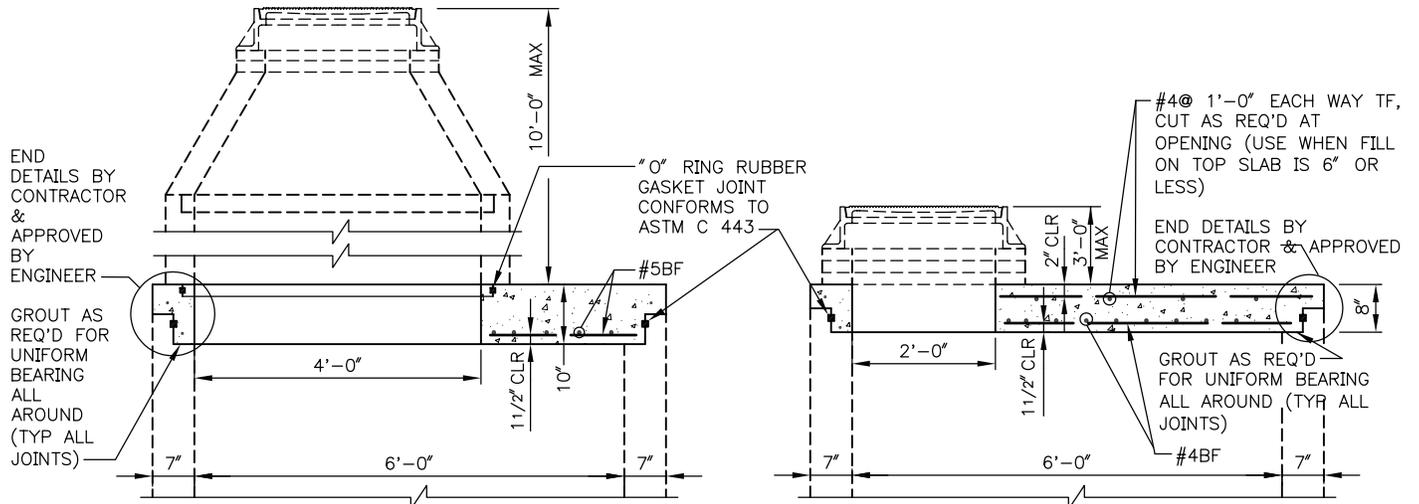


City of Seattle

NOT TO SCALE

TYPE 201 MANHOLE  
TOP & BOTTOM SLABS

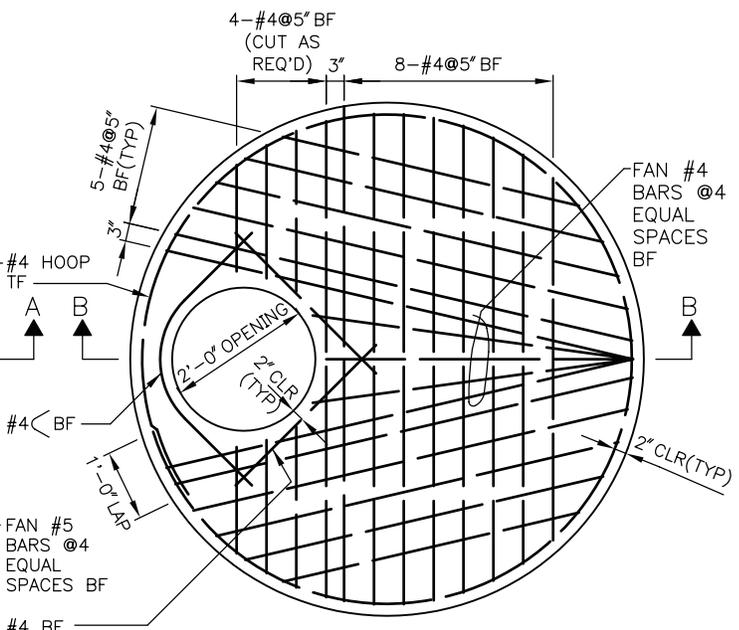
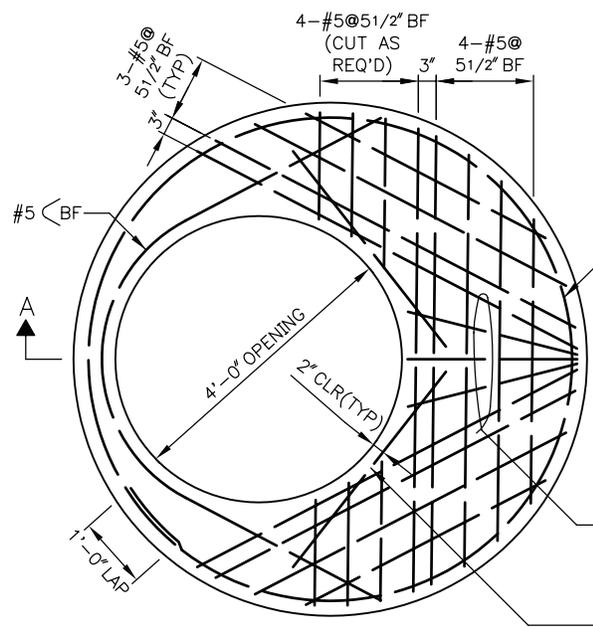




SECTION B-B  
TOP SLAB ONLY

NOTES:

1. MATERIAL: CONCRETE—CLASS AX  
REINFORCING STEEL—ASTM A 615 GR 60
2. TOP SLAB IS DESIGNED FOR 10'-0" MAX COVER FOR TYPE A AND 3'-0" MAX COVER FOR TYPE B
3. BASE IS DESIGNED FOR 20'-0" MAX COVER
4. HEIGHT 8'-0" TO 12'-0":  
MIN REQUIRED SOIL BEARING = 3300 LBS/SQ FT
5. HEIGHT 12'-0" TO 20'-0":  
MIN REQUIRED SOIL BEARING = 3800 LBS/SQ FT



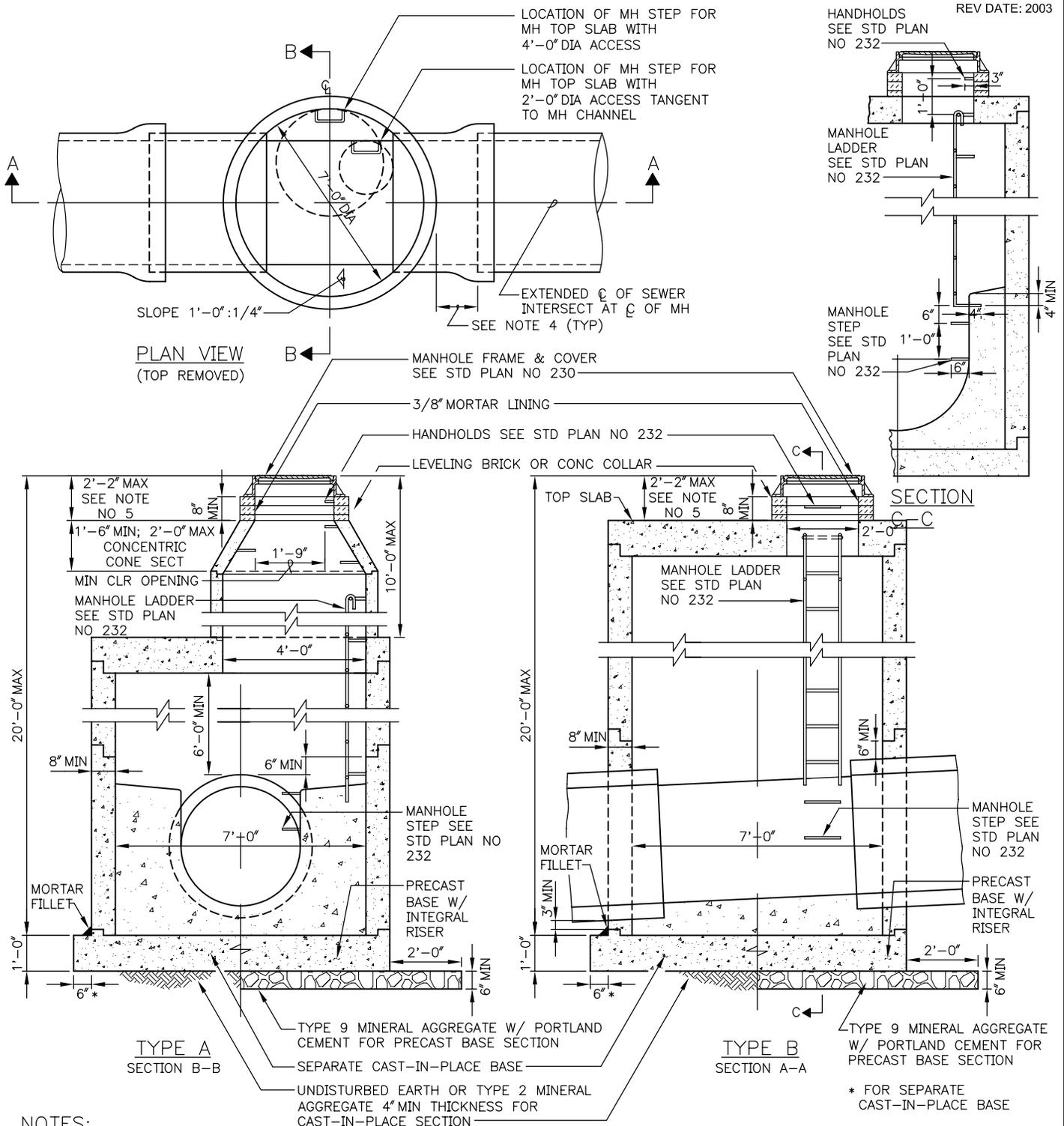
TYPE A MH-TOP SLAB

TYPE B MH-TOP SLAB



NOT TO SCALE

TYPE 202 MANHOLE  
TOP & BOTTOM SLABS



**NOTES:**

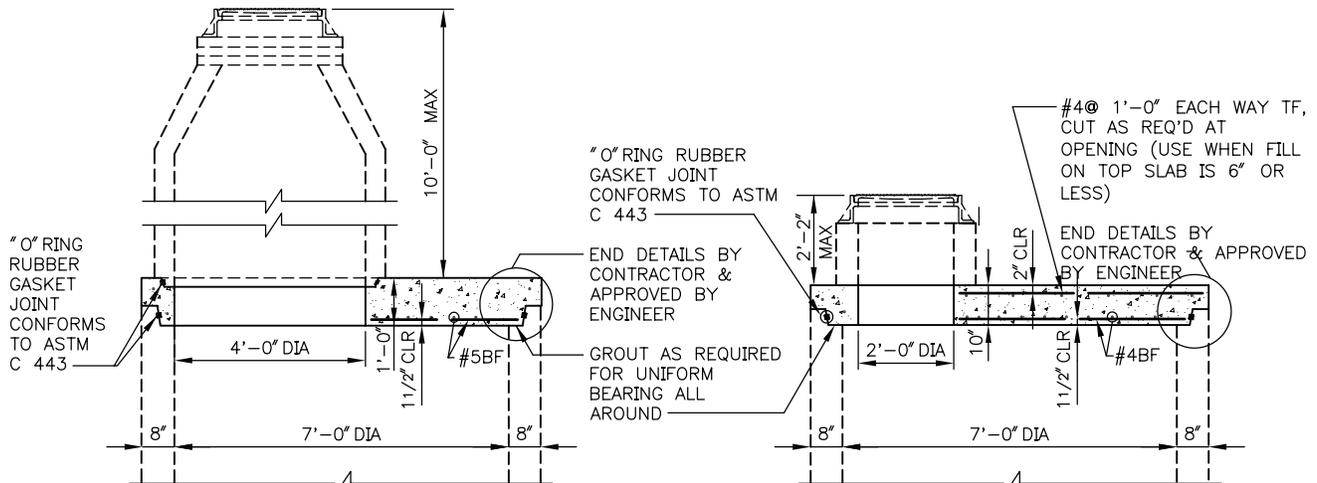
1. TYPE A MH DESIGNATES A MH TOP SLAB WITH A 4'-0" DIA ACCESS.
2. TYPE B MH DESIGNATES A MH TOP SLAB WITH A 2'-0" DIA ACCESS.
3. TOP SLAB AND BASE SECTION DETAILS, SEE STD PLAN NO 203b.
4. MAX DIMENSION FROM OUTSIDE MH WALL TO THE FIRST PIPE FLEX JOINT. THE GREATER OF 1/2 INSIDE PIPE DIAMETER OR 1'-0".
5. TOTAL HEIGHT OF FRAME EXTENSIONS, MH FRAME AND COVER, AND LEVELING BRICKS SHALL NOT EXCEED 2'-2".
6. MH BASE SECTIONS SHOWN IN SECTION A-A AND SECTION B-B ARE TYPICAL FOR TYPE A AND TYPE B MHS.
7. MAX HOLE SIZE IS EQUAL TO THE OUTSIDE DIAMETER OF THE PIPE PLUS THE MH WALL THICKNESS. MIN DISTANCE BETWEEN HOLES IS 1'-0".
8. PRECAST MH COMPONENTS SHALL CONFORM TO ASTM C 478. JOINTS BETWEEN PRECAST COMPONENTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C 443.



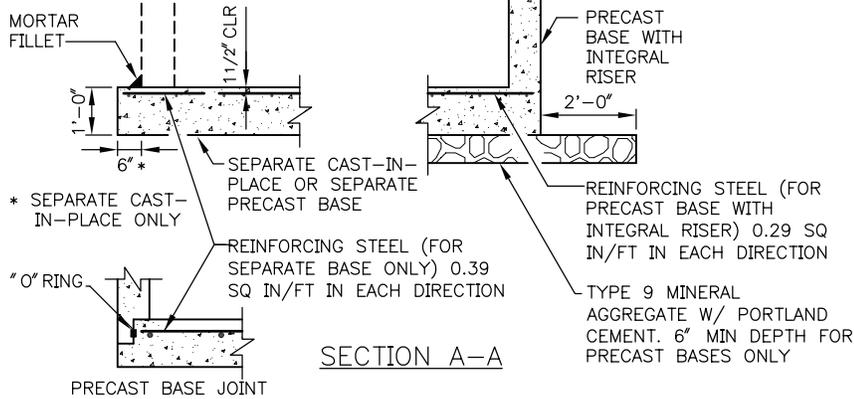
City of Seattle

NOT TO SCALE

TYPE 203 MANHOLE



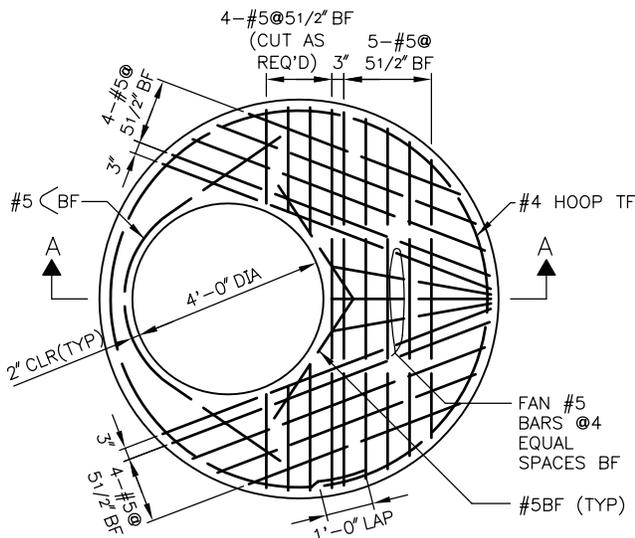
SECTION B-B  
TOP SLAB ONLY



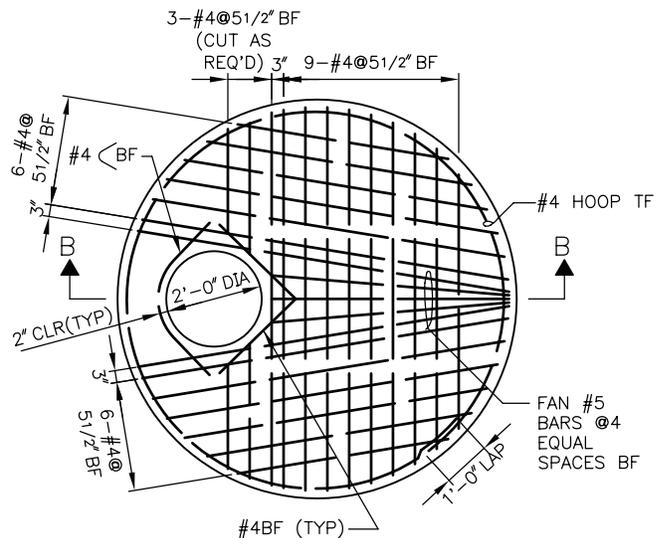
SECTION A-A  
PRECAST BASE JOINT

NOTES:

1. MATERIAL: CONCRETE—CLASS AX  
REINFORCING STEEL—ASTM A 615 GR 60
2. TOP SLAB IS DESIGNED FOR 10'-0" MAX COVER FOR TYPE A AND 2'-2" MAX COVER FOR TYPE B
3. BASE IS DESIGNED FOR 20'-0" MAX COVER
4. HEIGHT 8'-0" TO 12'-0":  
MIN REQUIRED SOIL BEARING = 3300 LBS/SQ FT
5. HEIGHT 12'-0" TO 20'-0":  
MIN REQUIRED SOIL BEARING = 3800 LBS/SQ FT



TYPE A MH-TOP SLAB



TYPE B MH-TOP SLAB



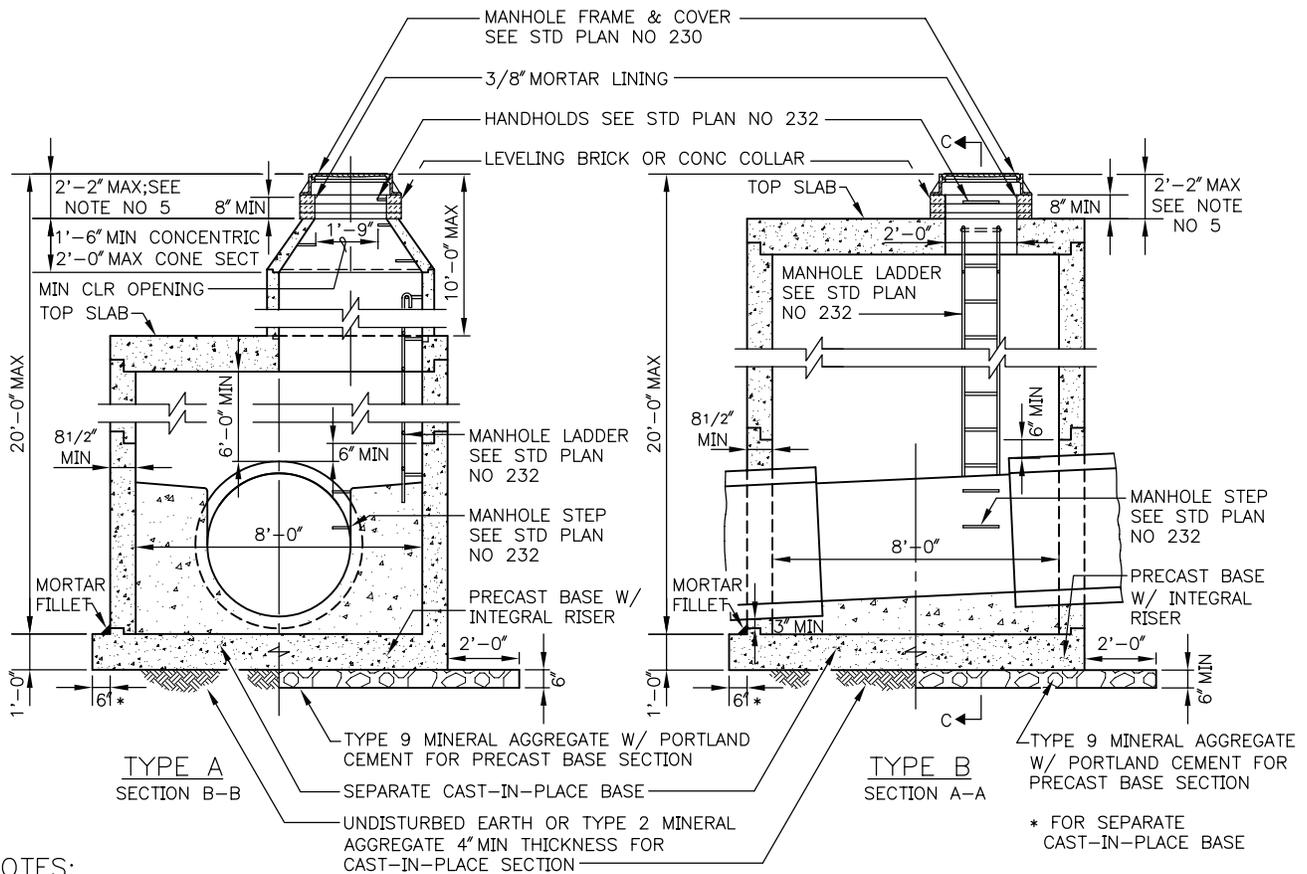
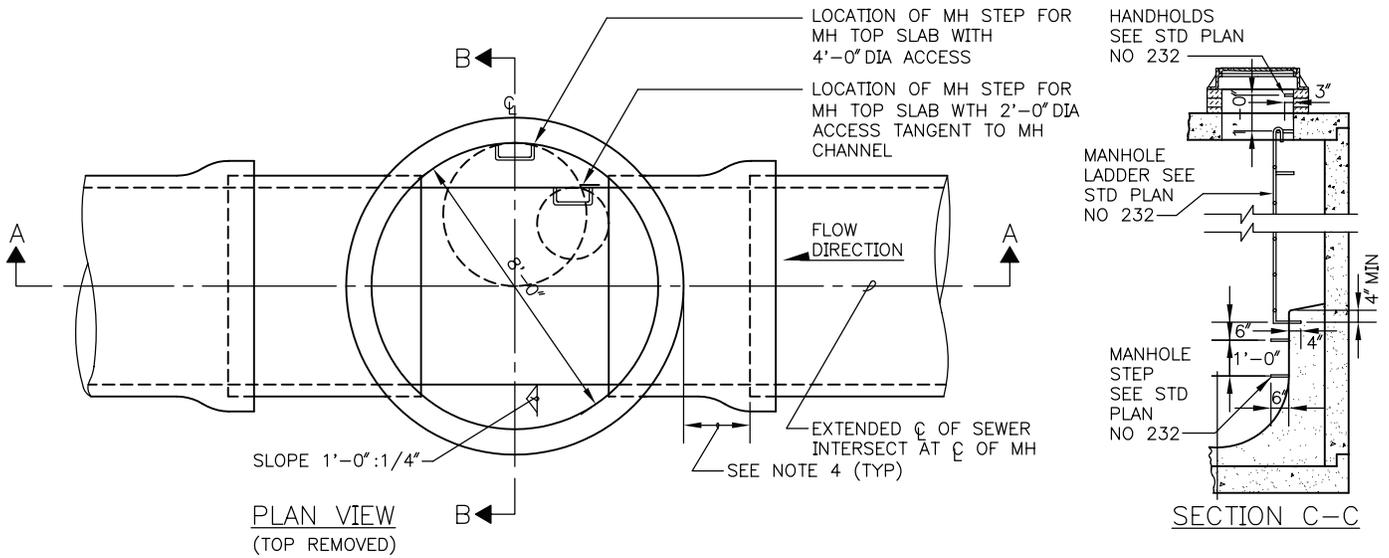
City of Seattle

NOT TO SCALE

TYPE 203 MANHOLE  
TOP & BOTTOM SLABS

# STANDARD PLAN NO 204a

REV DATE: 2003



**NOTES:**

1. TYPE A MH DESIGNATES A MH TOP SLAB WITH A 4'-0" DIA ACCESS.
2. TYPE B MH DESIGNATES A MH TOP SLAB WITH A 2'-0" DIA ACCESS.
3. TOP SLAB AND BASE SECTION DETAILS, SEE STD PLAN NO 204.B.
4. MAX DIMENSION FROM OUTSIDE MH WALL TO THE FIRST PIPE JOINT. THE GREATER OF 1/2 INSIDE PIPE DIAMETER OR 1'-0".
5. TOTAL HEIGHT OF FRAME EXTENSIONS, MH FRAME AND COVER, AND LEVELING BRICKS SHALL NOT EXCEED 2'-2".
6. MH BASE SECTIONS SHOWN IN SECTION A-A AND SECTION B-B ARE TYPICAL FOR TYPE A AND TYPE B MHS.
7. MAX HOLE SIZE IS EQUAL TO THE OUTSIDE DIAMETER OF THE PIPE PLUS THE MH WALL THICKNESS. MIN DISTANCE BETWEEN HOLES IS 1'-0".



City of Seattle

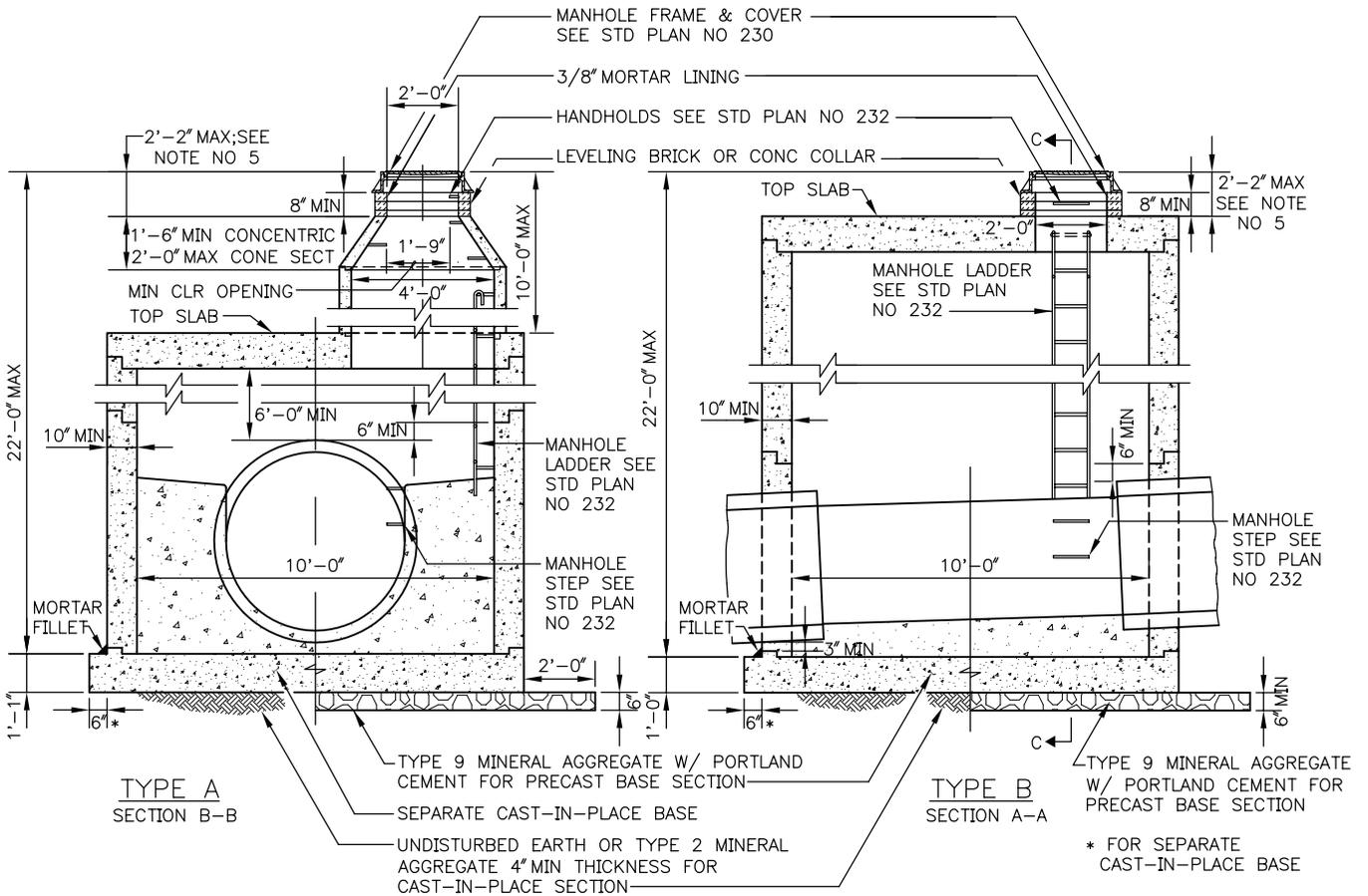
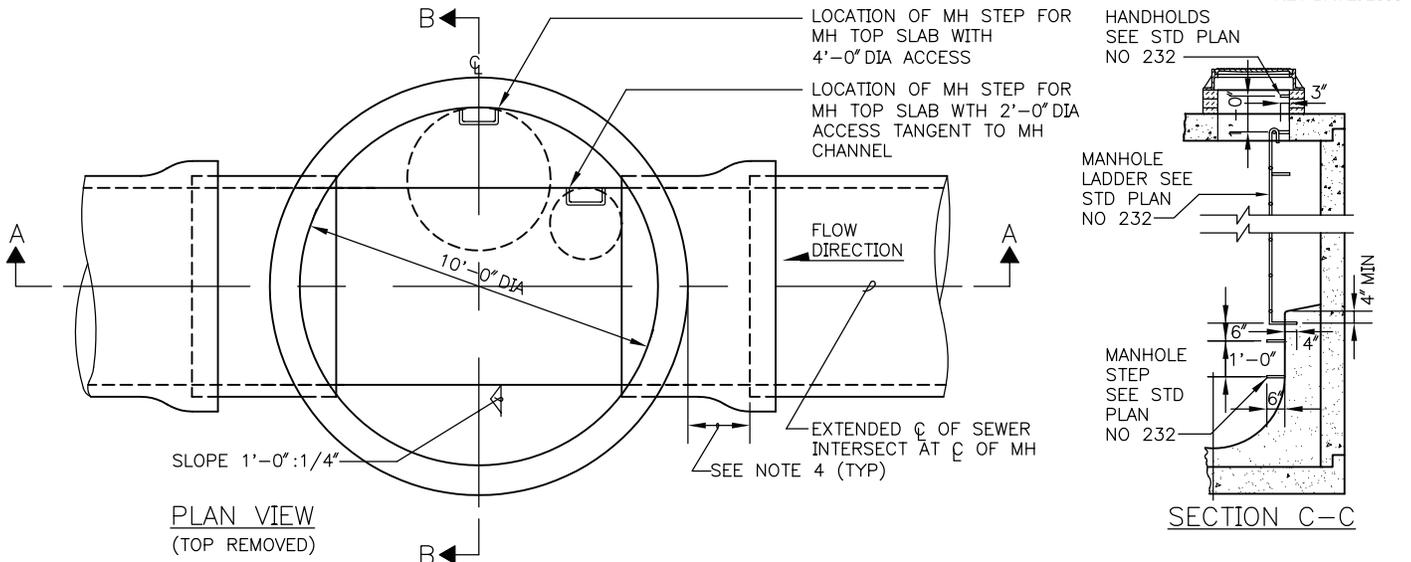
NOT TO SCALE

TYPE 204 MANHOLE



# STANDARD PLAN NO 205a

REV DATE: 2003



**NOTES:**

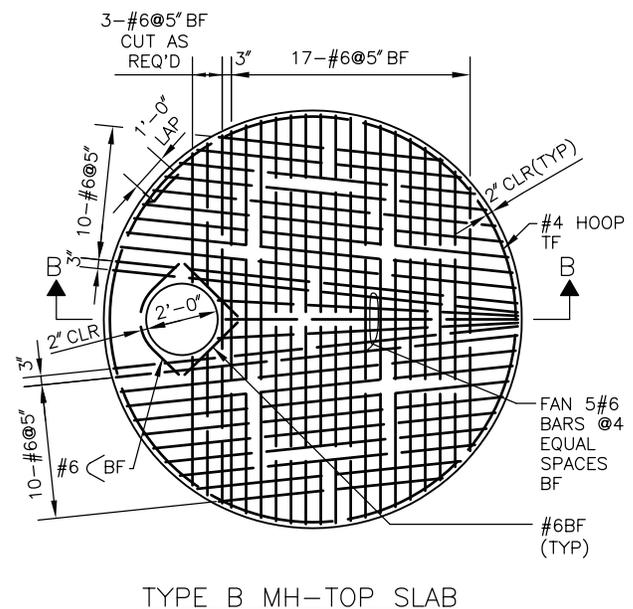
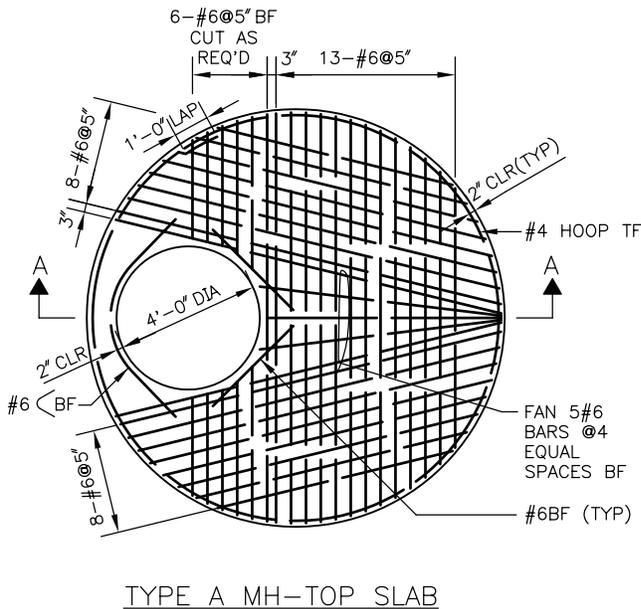
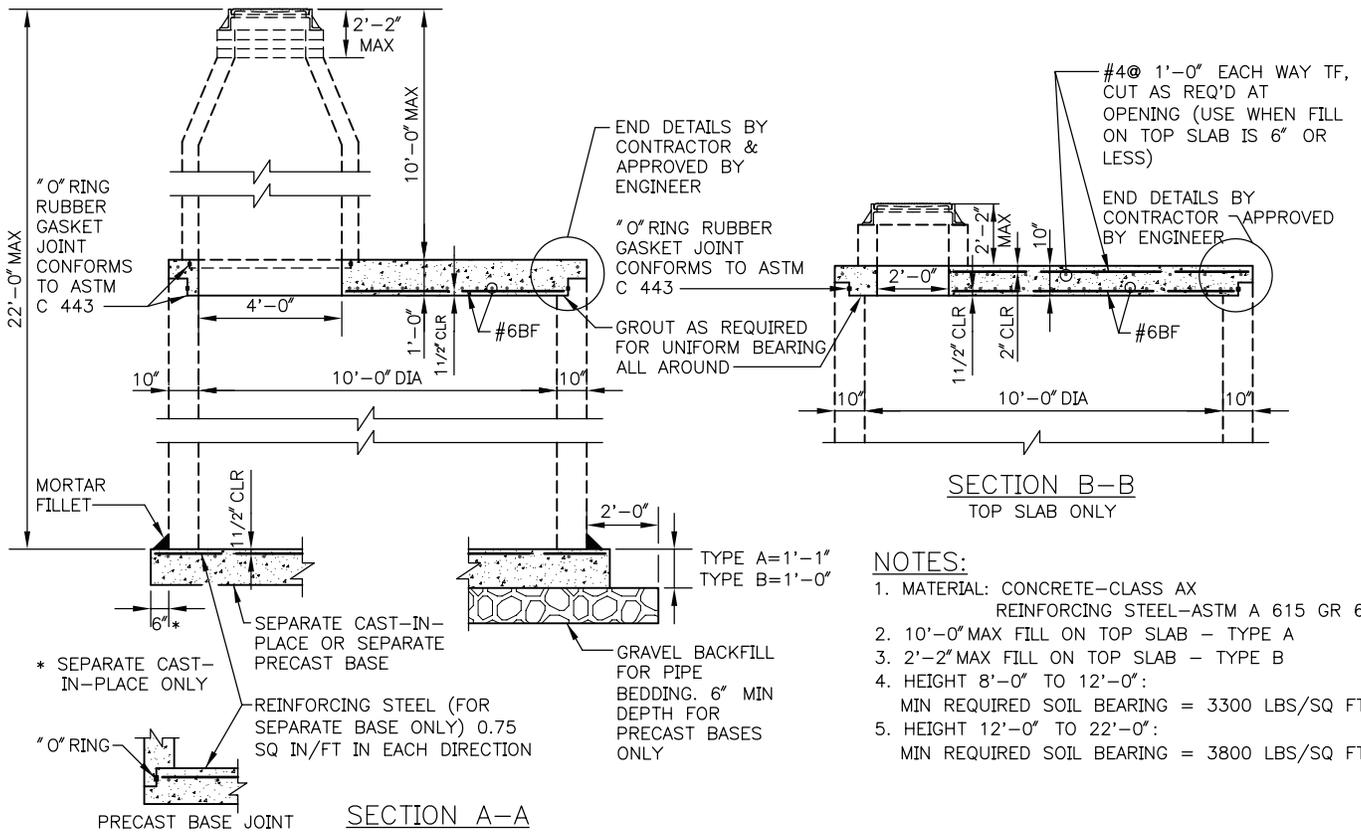
1. TYPE A MH DESIGNATES A MH TOP SLAB WITH A 4'-0" DIA ACCESS.
2. TYPE B MH DESIGNATES A MH TOP SLAB WITH A 2'-0" DIA ACCESS.
3. TOP SLAB AND BASE SECTION DETAILS, SEE STD PLAN NO 205b.
4. MAX DIMENSION FROM OUTSIDE MH WALL TO THE FIRST PIPE JOINT. THE GREATER OF 1/2 INSIDE PIPE DIAMETER OR 1'-0".
5. TOTAL HEIGHT OF FRAME EXTENSIONS, MH FRAME AND COVER, AND LEVELING BRICKS SHALL NOT EXCEED 2'-2".
6. MH BASE SECTIONS SHOWN IN SECTION A-A AND SECTION B-B ARE TYPICAL FOR TYPE A AND TYPE B MHS.
7. MAX HOLE SIZE IS EQUAL TO THE OUTSIDE DIAMETER OF THE PIPE PLUS THE MH WALL THICKNESS. MIN DISTANCE BETWEEN HOLES IS 1'-0".



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TYPE 205 MANHOLE



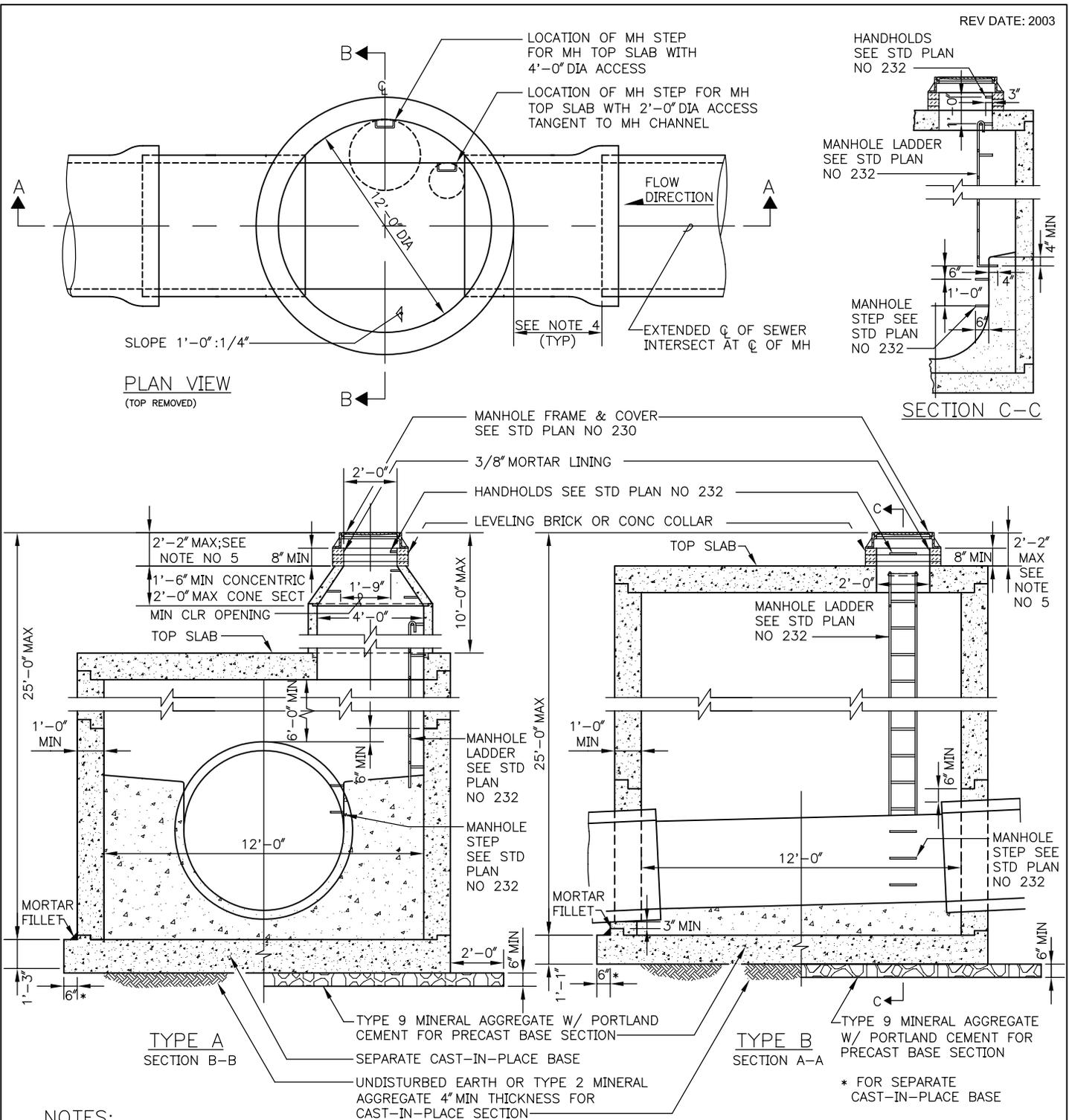
City of Seattle

NOT TO SCALE

TYPE 205 MANHOLE  
TOP & BOTTOM SLABS

# STANDARD PLAN NO 206a

REV DATE: 2003



**NOTES:**

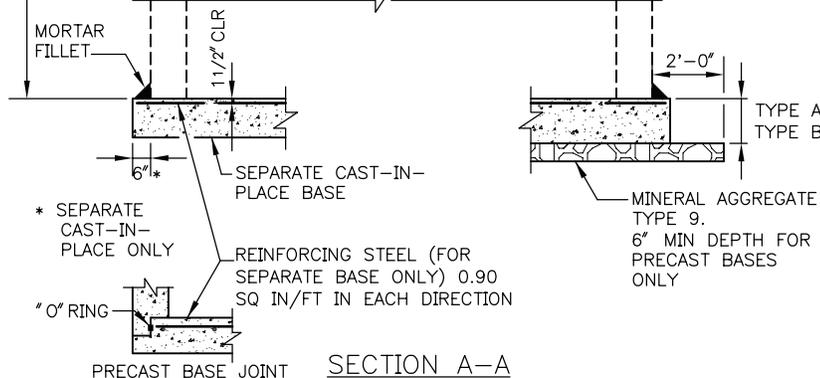
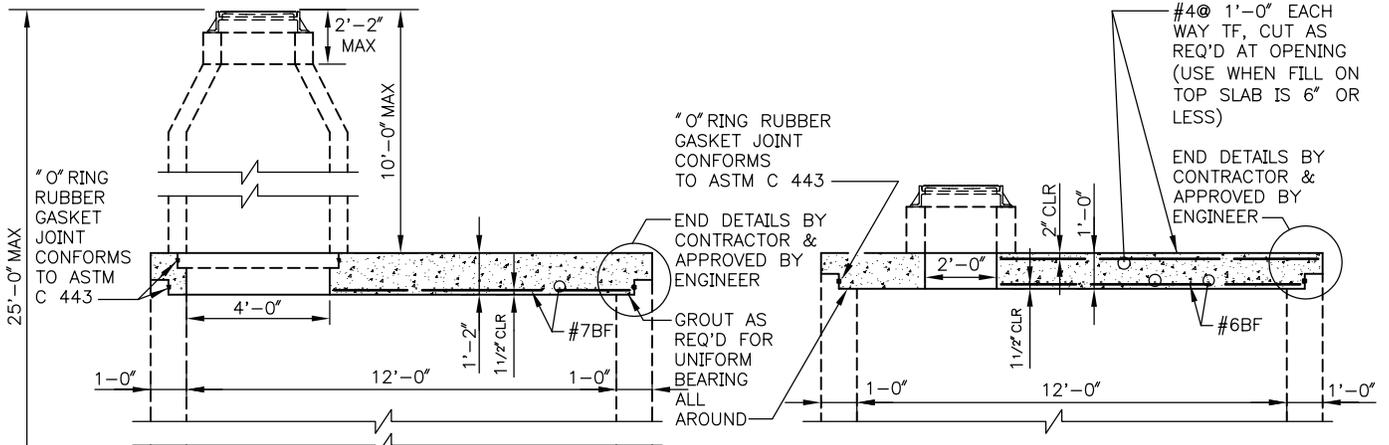
1. TYPE A MH DESIGNATES A MH TOP SLAB WITH A 4'-0" DIA ACCESS.
2. TYPE B MH DESIGNATES A MH TOP SLAB WITH A 2'-0" DIA ACCESS.
3. TOP SLAB AND BASE SECTION DETAILS, SEE STD PLAN NO 206b.
4. MAX DIMENSION FROM OUTSIDE MH WALL TO THE FIRST PIPE JOINT, THE GREATER OF 1/2 INSIDE PIPE DIAMETER OR 1'-0" EXCEPT PVC AND CMP.
5. TOTAL HEIGHT OF FRAME EXTENSIONS, MH FRAME AND COVER, AND LEVELING BRICKS SHALL NOT EXCEED 2'-2".
6. MH BASE SECTIONS SHOWN IN SECTION A-A AND SECTION B-B ARE TYPICAL FOR TYPE A AND TYPE B MHS.
7. MAX HOLE SIZE IS EQUAL TO THE OUTSIDE DIAMETER OF THE PIPE PLUS THE MH WALL THICKNESS. MIN DISTANCE BETWEEN HOLES IS 1'-0".



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NOT TO SCALE

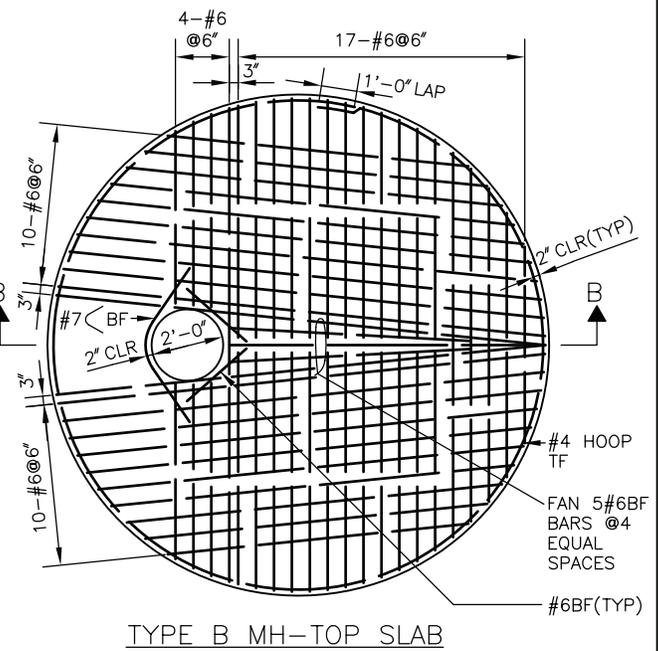
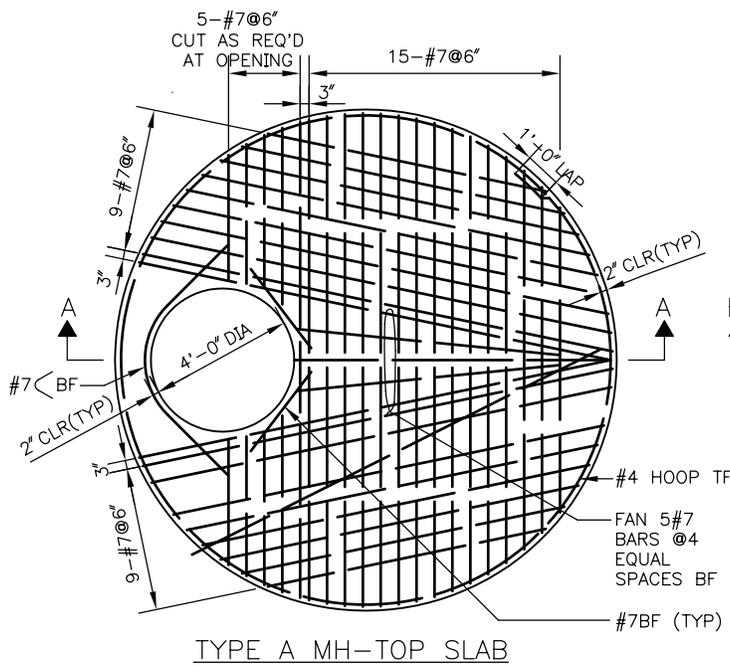
TYPE 206 MANHOLE



SECTION B-B  
TOP SLAB ONLY

NOTES:

1. MATERIAL: CONCRETE-CLASS AX  
REINFORCING STEEL-ASTM A 615 GR 60
2. 10'-0" MAX FILL ON TOP SLAB - TYPE A
3. 2'-2" MAX FILL ON TOP SLAB - TYPE B
4. HEIGHT 8'-0" TO 12'-0":  
MIN REQUIRED SOIL BEARING = 3300 LBS/SQ FT
5. HEIGHT 12'-0" TO 25'-0":  
MIN REQUIRED SOIL BEARING = 3800 LBS/SQ FT



TYPE A MH-TOP SLAB

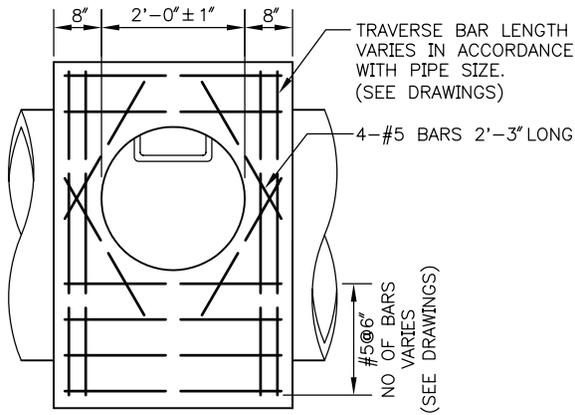
TYPE B MH-TOP SLAB



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NOT TO SCALE

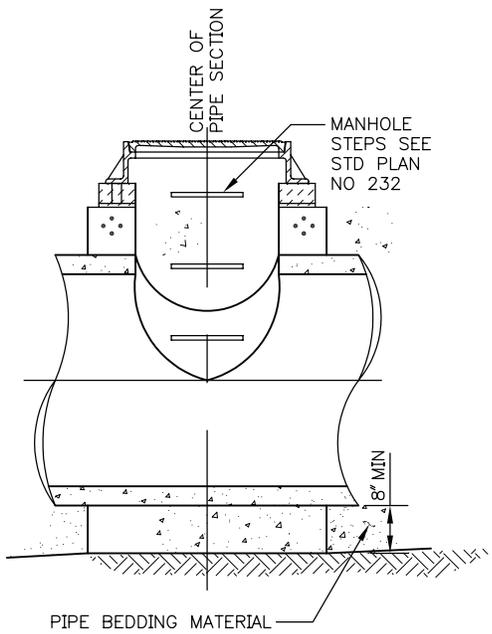
TYPE 206 MANHOLE  
TOP & BOTTOM SLABS



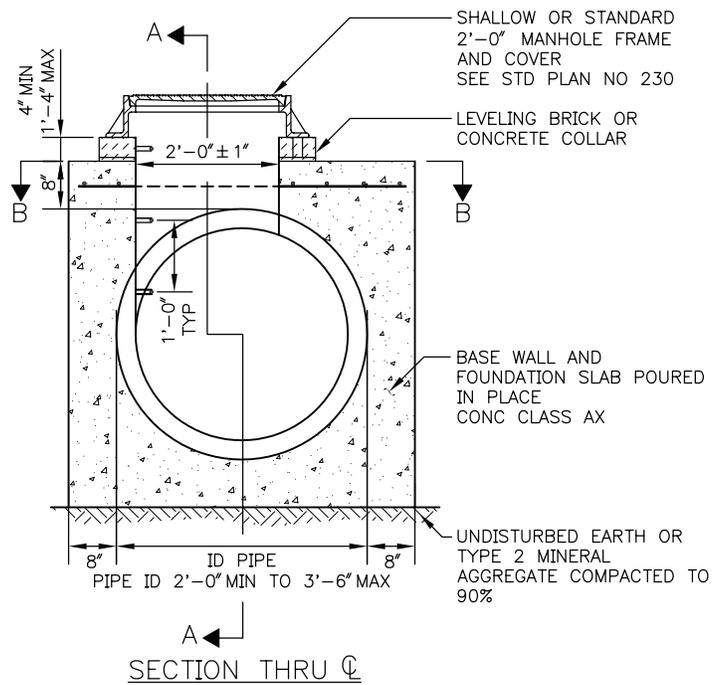
SECTION B-B

**NOTE:**

REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO ASTM A 615 GR 60 AND SHALL HAVE A MIN COVER OF 2"



SECTION A-A



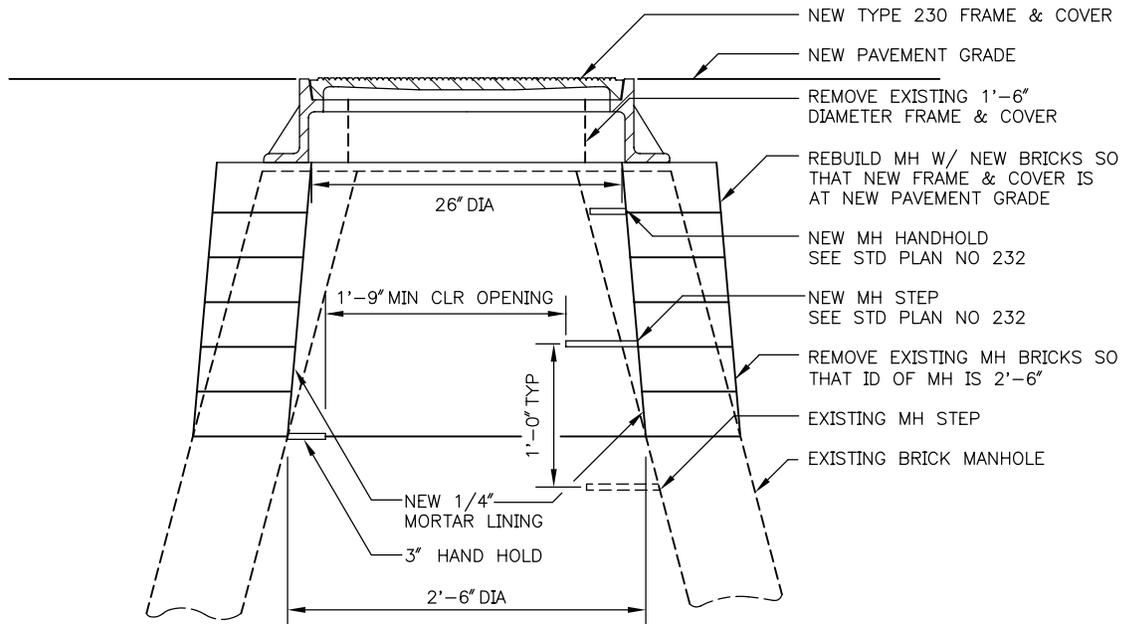
SECTION THRU C



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TYPE 207 MANHOLE

**NOTES:**

1. NEW MANHOLE STEPS AND HANDHOLDS SHALL BE INSTALLED AND LOCATED 1'-0" OC FROM THE FIRST EXISTING STEP IN THE MANHOLE AND SHALL MATCH THE EXISTING TYPE OF STEP. ANY SUBSTITUTIONS SHALL BE APPROVED BY THE ENGINEER. A MINIMUM 1'-9" CLEAR OPENING SHALL BE MAINTAINED.
2. FOR 7" RIGID PAVEMENT, THE RING AND COVER SHALL BE CONSTRUCTED TO THE FINISHED GRADE OF THE PAVEMENT. REINFORCEMENT SHALL BE PLACED AROUND THE CASTING AT MID-POINT BETWEEN THE FINISH GRADE OF THE RIGID PAVEMENT AND THE TOP OF THE FLANGE. #4 REINFORCING BARS SHALL BE USED IN THE CONFIGURATION OF 2 SEPARATE SQUARES OFF-ROTATED 45 DEGREES FROM EACH OTHER AND GIVING A MINIMUM CLEARANCE OF 2" AT THE SHORTEST DISTANCE WITH THE FRAME.
3. FOR PAVEMENT DEPTH GREATER THAN 7", USE FRAME EXTENSION(S) AS SHOWN IN STANDARD PLAN NO 231 TO BRING THE COVER UP TO THE LEVEL OF THE FINISHED PAVEMENT WITHOUT EMBEDDING BOTTOM FLANGE OF THE CASTING IN THE PAVEMENT.

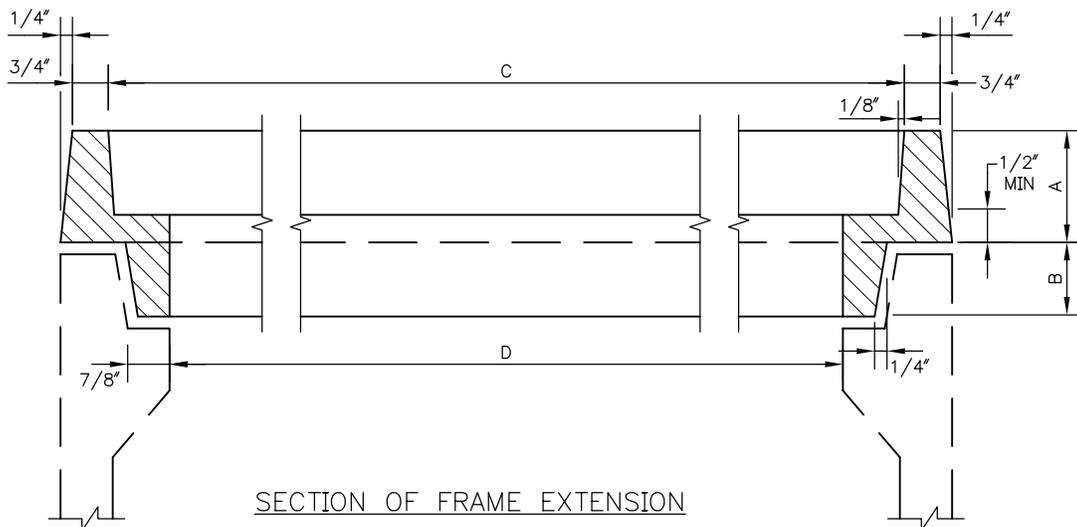


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REBUILD EXISTING  
BRICK MANHOLE



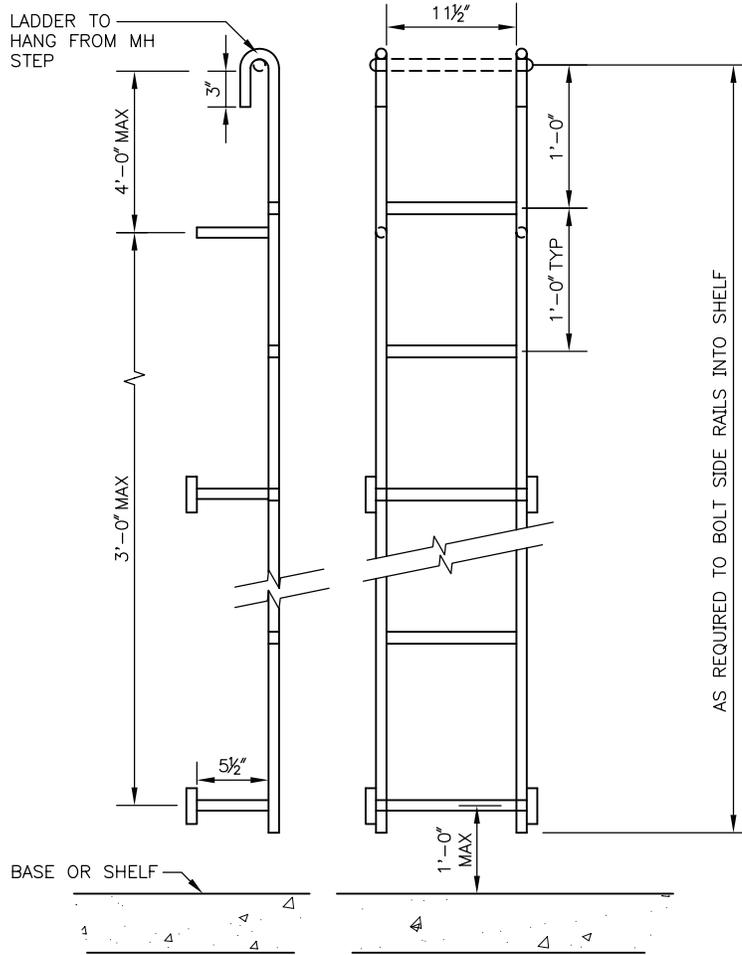
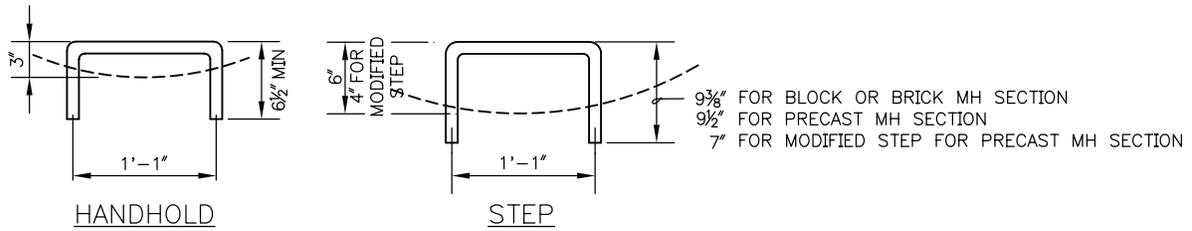


SECTION OF FRAME EXTENSION

NOTES:

1. DIMENSION "A" REFERS TO HEIGHT OF FRAME EXTENSION ABOVE MANHOLE FRAME THAT THE FRAME EXTENSION TO BE USED ON
2. DIMENSIONS "B", "C" AND "D" SHALL MATCH THE MANHOLE FRAME AND COVER
3. WHEN FRAME EXTENSIONS ARE USED ON A NEW MANHOLE FRAME AND COVER, THE FRAME EXTENSION SHALL BE PERMANENTLY ATTACHED TO THE MANHOLE FRAME AT THE FACTORY, NOT IN THE FIELD. APPROVAL OF ATTACHMENT METHOD IS REQUIRED
4. FRAME EXTENSIONS SHALL BE DUCTILE OR CAST IRON





**NOTE:**

1. DIMENSIONS FOR THE MH LADDER AND STEP ARE MINIMUM REQUIREMENTS ONLY.
2. STEPS AND HANDHOLDS SHALL BE INSTALLED AT 1'-0" SPACING. WHEN THE DISTANCE FROM THE LAST (HIGHEST) STEP OR HANDHOLD TO THE TOP OF THE MH FRAME EXCEEDS 1'-0" AND ANOTHER STEP OR HANDHOLD CANNOT BE INSTALLED BECAUSE OF THE LOCATION OF THE MH FRAME, A HANDHOLD SHALL BE INSTALLED BETWEEN THE TOP 2 LAYERS OF BRICK.
3. IF BOTH STEPS AND LADDER ARE REQ'D IN ANY MH, THEY SHALL BE FROM THE SAME MANUFACTURER.

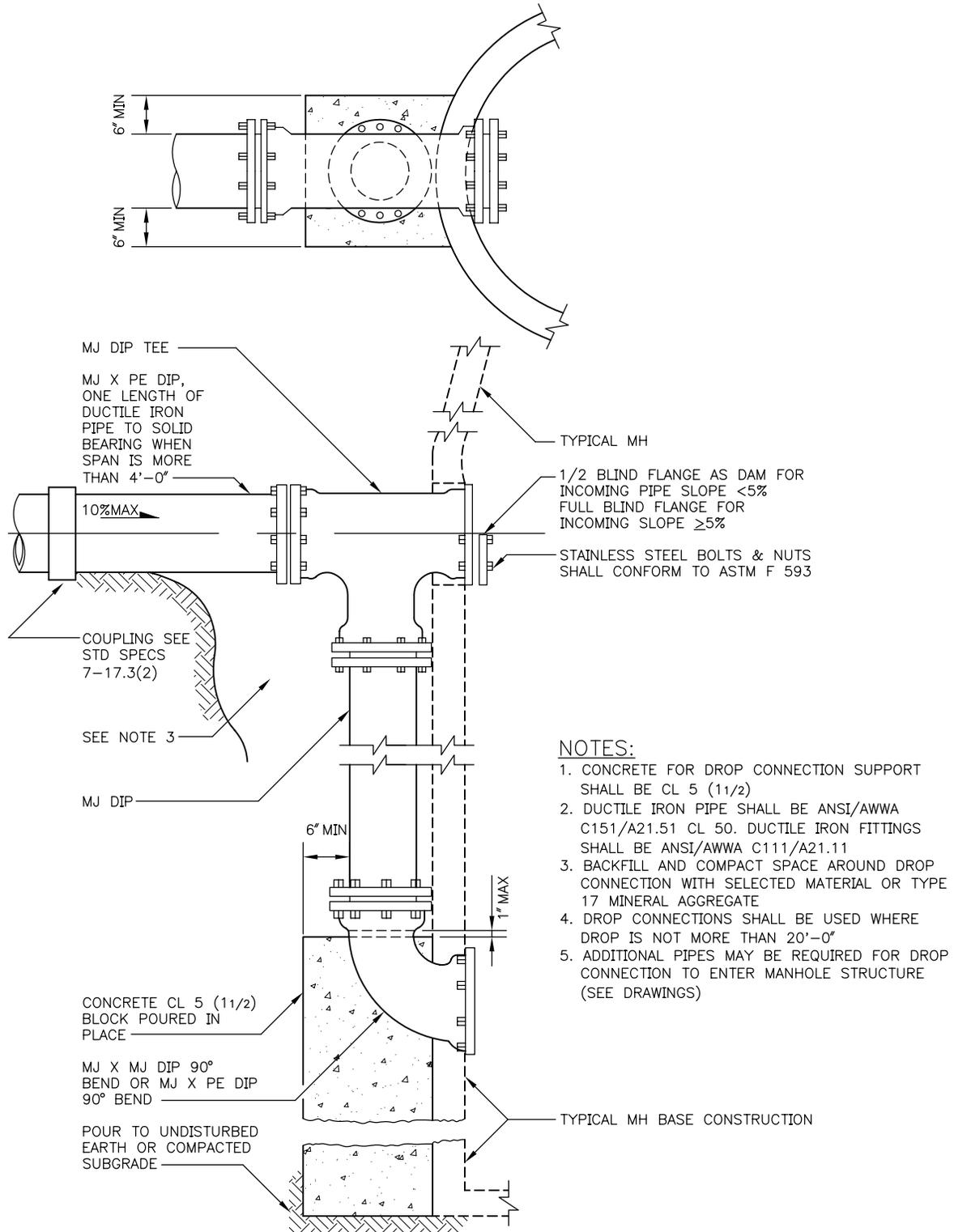
LADDER



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MANHOLE LADDER,  
STEP AND HANDHOLD



**NOTES:**

1. CONCRETE FOR DROP CONNECTION SUPPORT SHALL BE CL 5 (1 1/2)
2. DUCTILE IRON PIPE SHALL BE ANSI/AWWA C151/A21.51 CL 50. DUCTILE IRON FITTINGS SHALL BE ANSI/AWWA C111/A21.11
3. BACKFILL AND COMPACT SPACE AROUND DROP CONNECTION WITH SELECTED MATERIAL OR TYPE 17 MINERAL AGGREGATE
4. DROP CONNECTIONS SHALL BE USED WHERE DROP IS NOT MORE THAN 20'-0"
5. ADDITIONAL PIPES MAY BE REQUIRED FOR DROP CONNECTION TO ENTER MANHOLE STRUCTURE (SEE DRAWINGS)

DUCTILE IRON OUTSIDE DROP CONNECTION



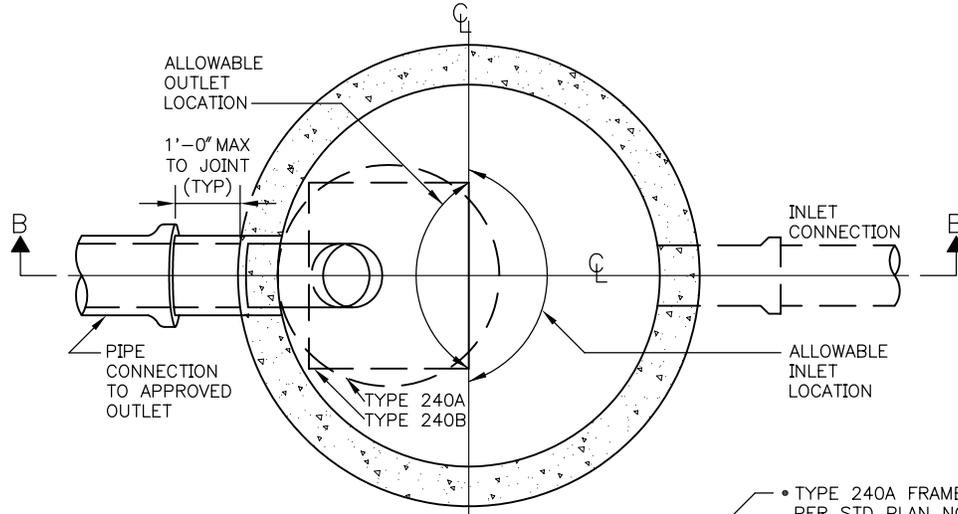
City of Seattle

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OUTSIDE DROP CONNECTION

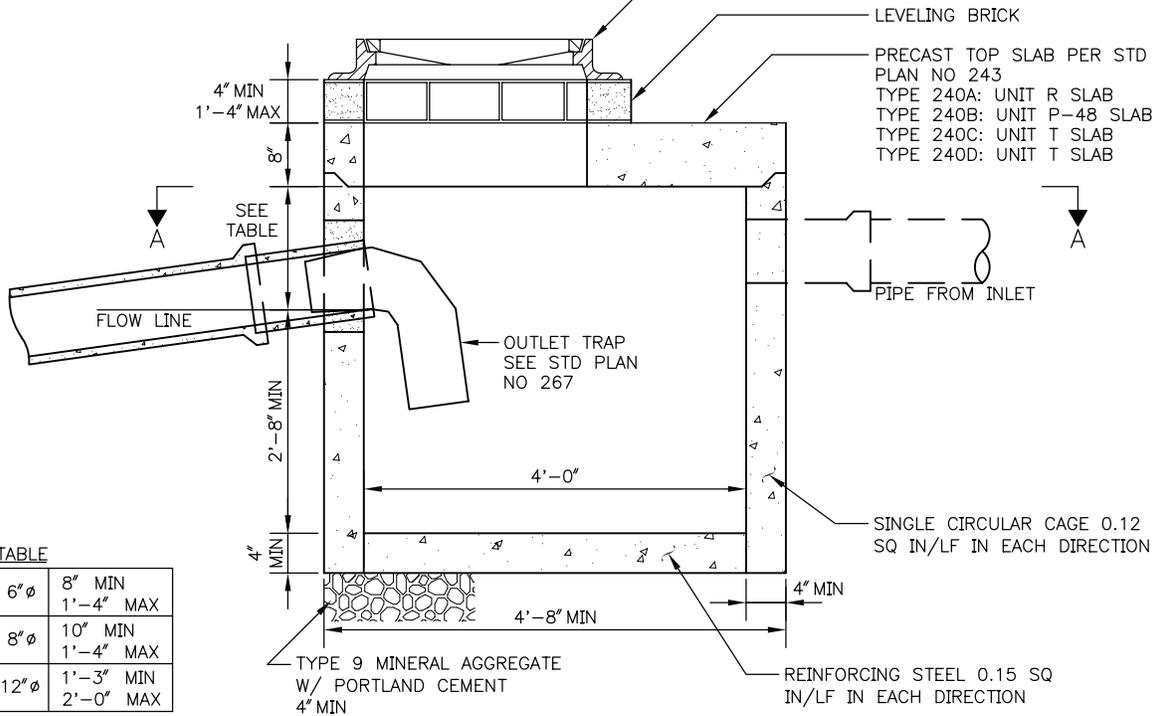
# STANDARD PLAN NO 240

REV DATE: 2008



SECTION A-A

- TYPE 240A FRAME & COVER PER STD PLAN NO 230
- TYPE 240B FRAME & GRATE PER STD PLAN NO 264
- TYPE 240C FRAME PER STD PLAN NO 262 AND GRATE PER STD PLAN NO 265
- TYPE 240D FRAME PER STD PLAN NO 263 AND GRATE PER STD PLAN NO 265



SECTION B-B

TABLE

6" $\phi$	8" MIN 1'-4" MAX
8" $\phi$	10" MIN 1'-4" MAX
12" $\phi$	1'-3" MIN 2'-0" MAX

**NOTES:**

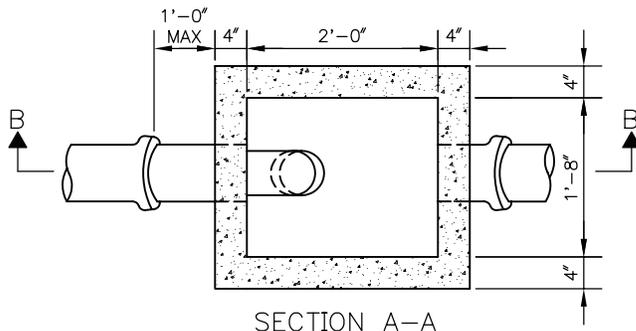
1. FRAME & GRATE OR FRAME & COVER SHALL BE LOCATED OVER TRAP
2. INVERT OF INLET PIPE SHALL BE 2" MIN ABOVE INVERT OF OUTLET PIPE
3. FRAME AND GRATE SHALL BE LOCATED OVER OUTLET TRAP



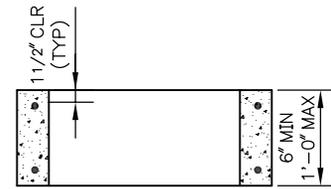
City of Seattle

NOT TO SCALE

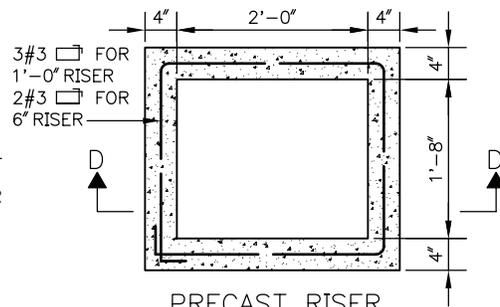
TYPE 240 CATCH BASIN



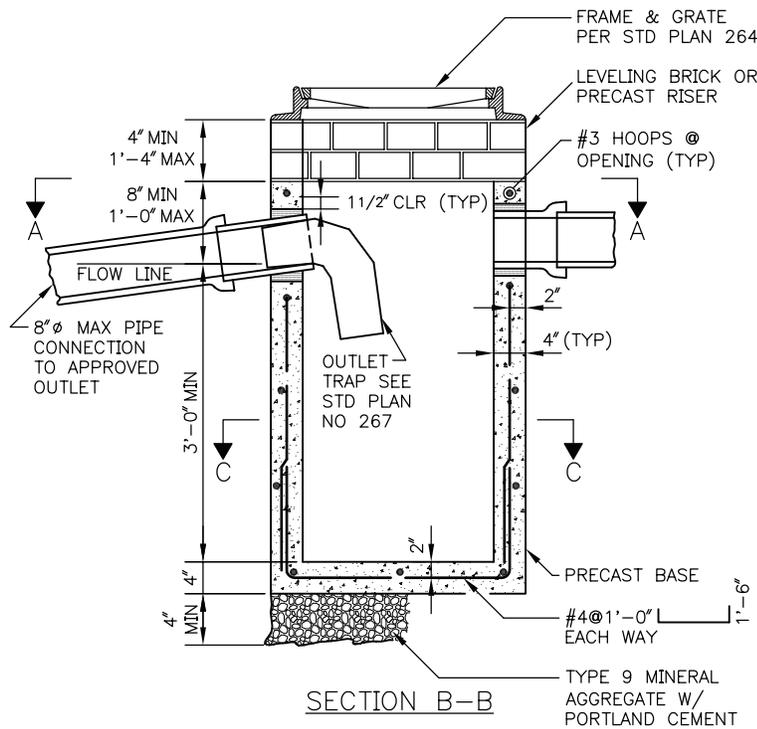
SECTION A-A



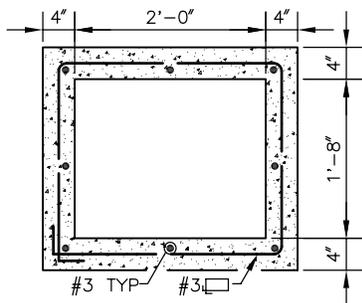
SECTION D-D



PRECAST RISER REINFORCING



SECTION B-B

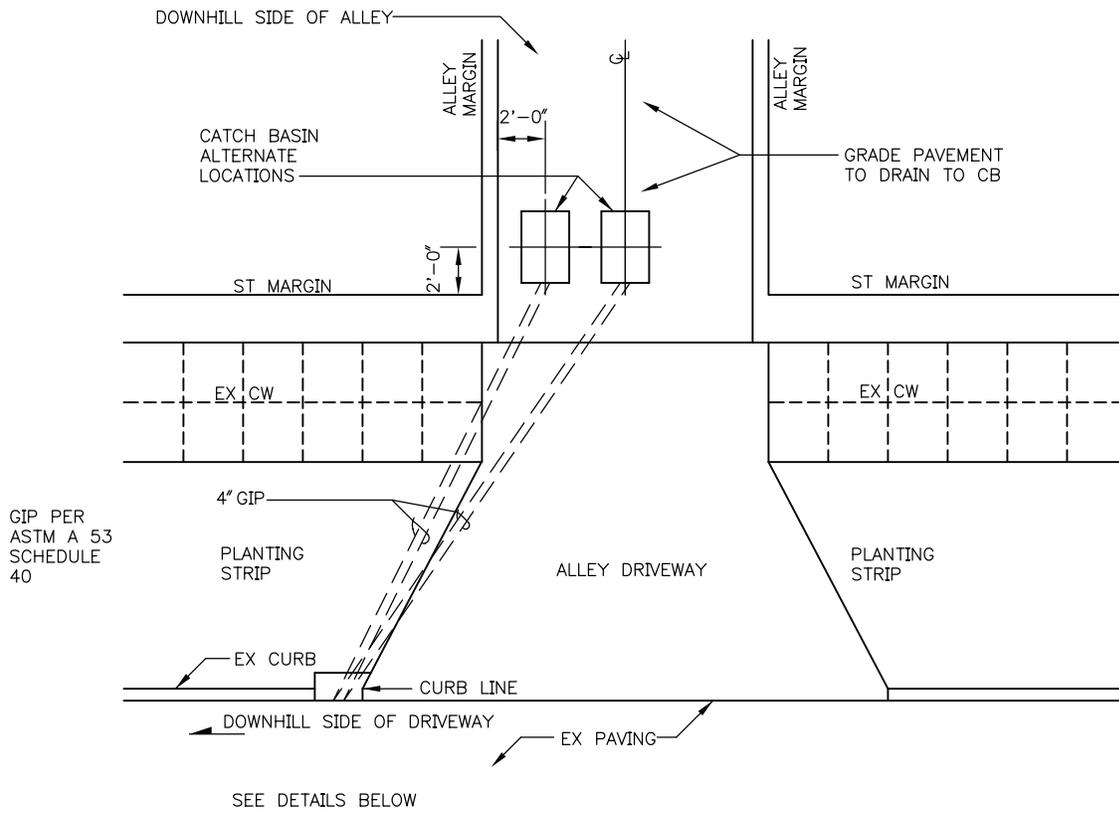


SECTION C-C

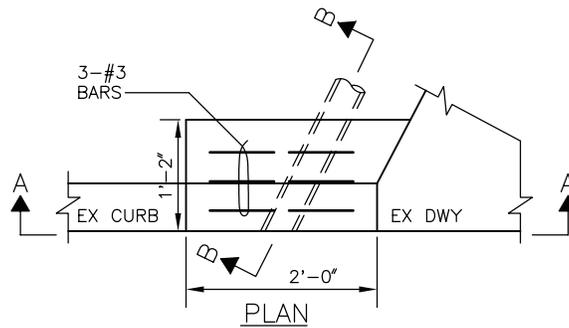
**NOTES:**

1. THIS CATCH BASIN IS FOR INSTALLATIONS IN ALLEYS AND UNPAVED AREAS IN THE RIGHT-OF-WAY. ANY OTHER USE IN THE R/W WILL REQUIRE APPROVAL OF SPU
2. FOR CURB DISCHARGE INSTALLATION SEE STD PLAN NO 241b
3. INSTALL PER STD PLAN NO 261
4. MATERIAL: CONCRETE CLASS AX REINFORCING STEEL ASTM A615 GR60
5. INLET INVERT EL. TO BE HIGHER THAN OUTLET INVERT EL.

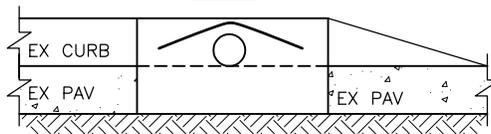




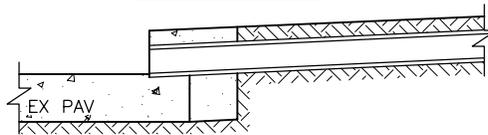
PLAN



PLAN



SECTION A-A



SECTION B-B

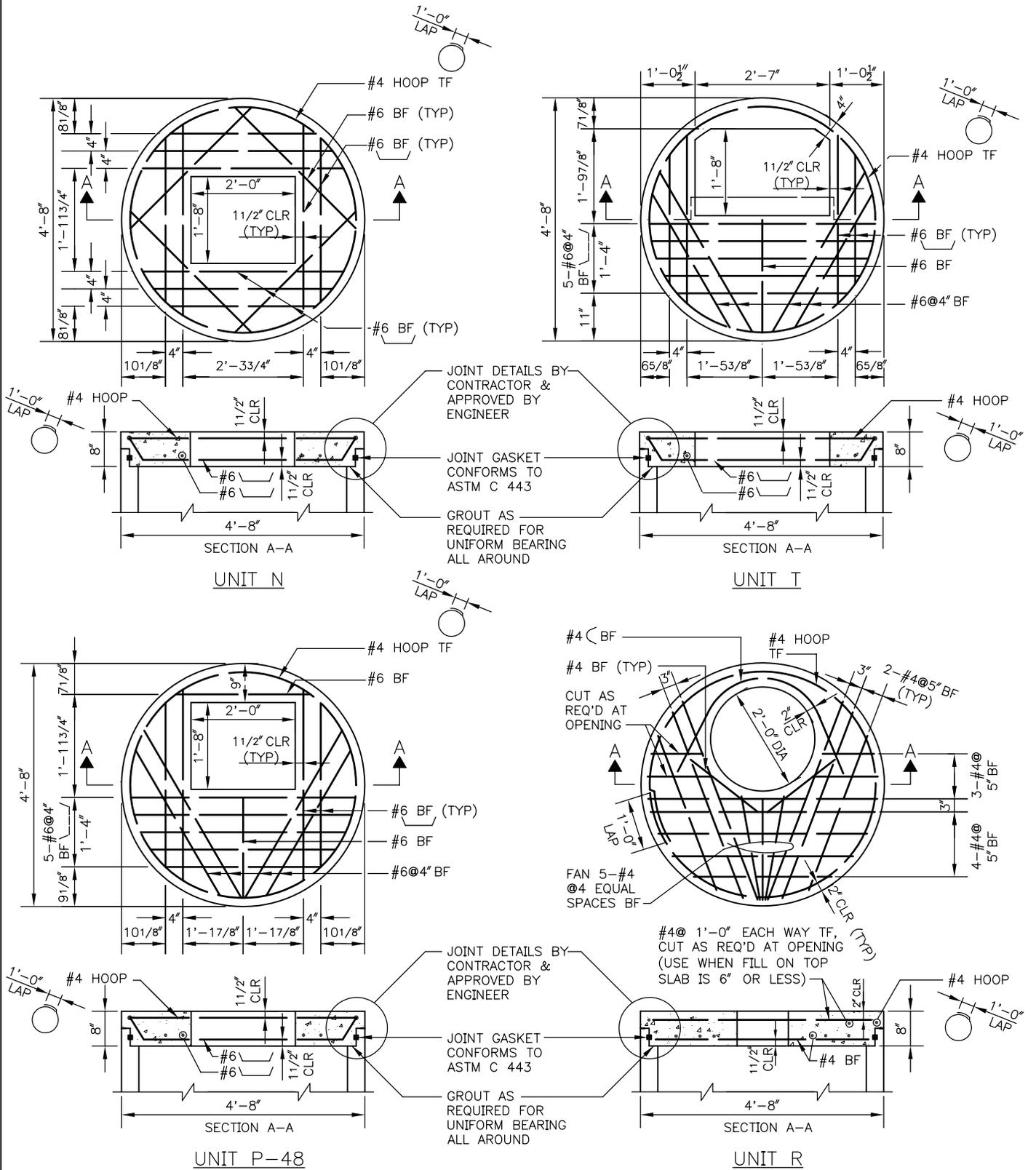


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TYPE 241 CATCH BASIN INSTALLATIONS

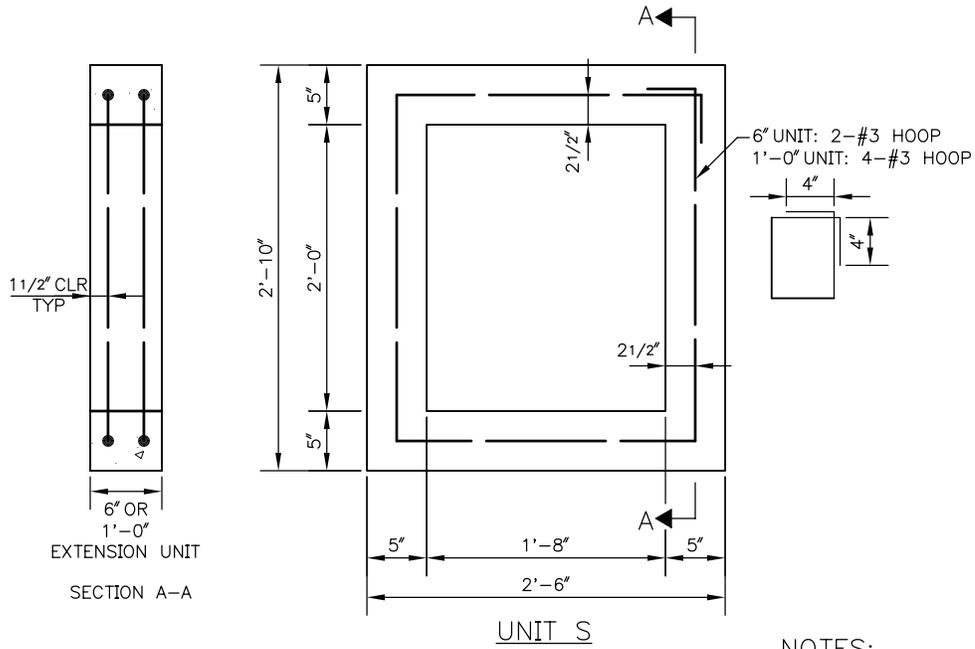




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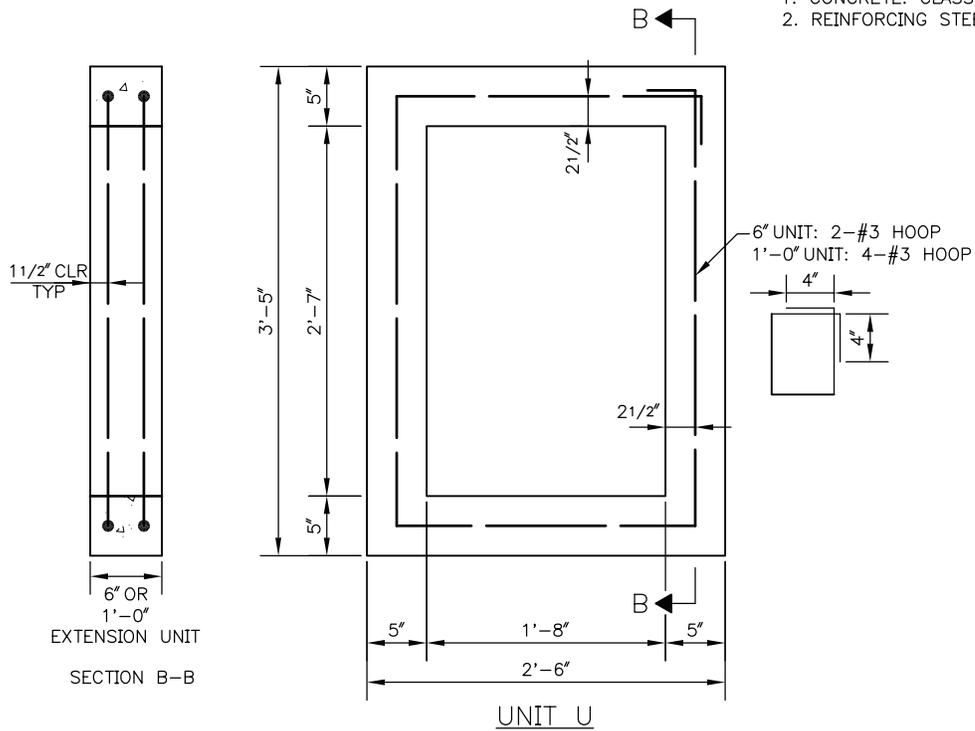
NOT TO SCALE

PRECAST CATCH BASIN  
TOP SLAB



NOTES:

1. CONCRETE: CLASS AX
2. REINFORCING STEEL: ASTM A615 GR 60



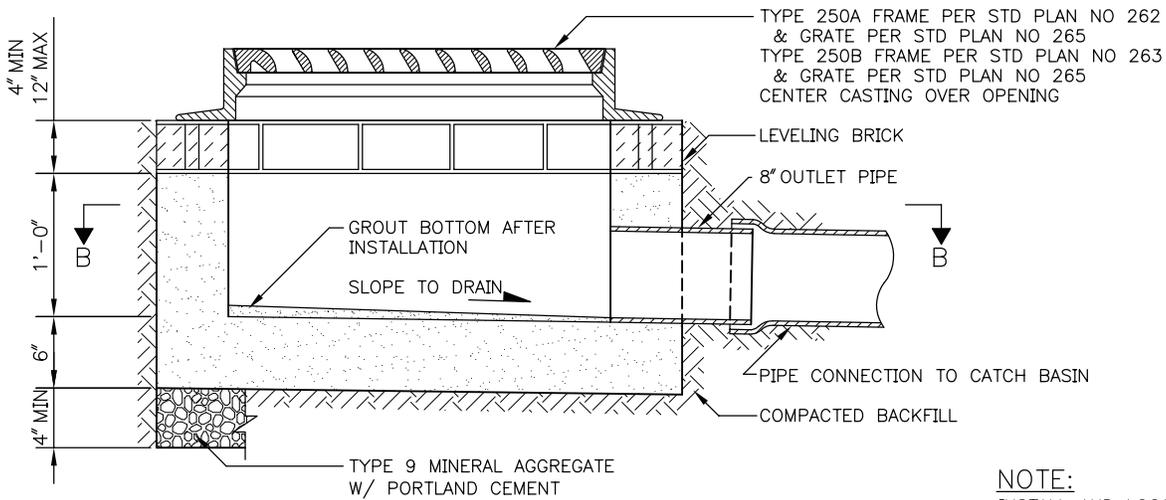
City of Seattle

NOT TO SCALE

PRECAST CATCH BASIN  
EXTENSION RISERS

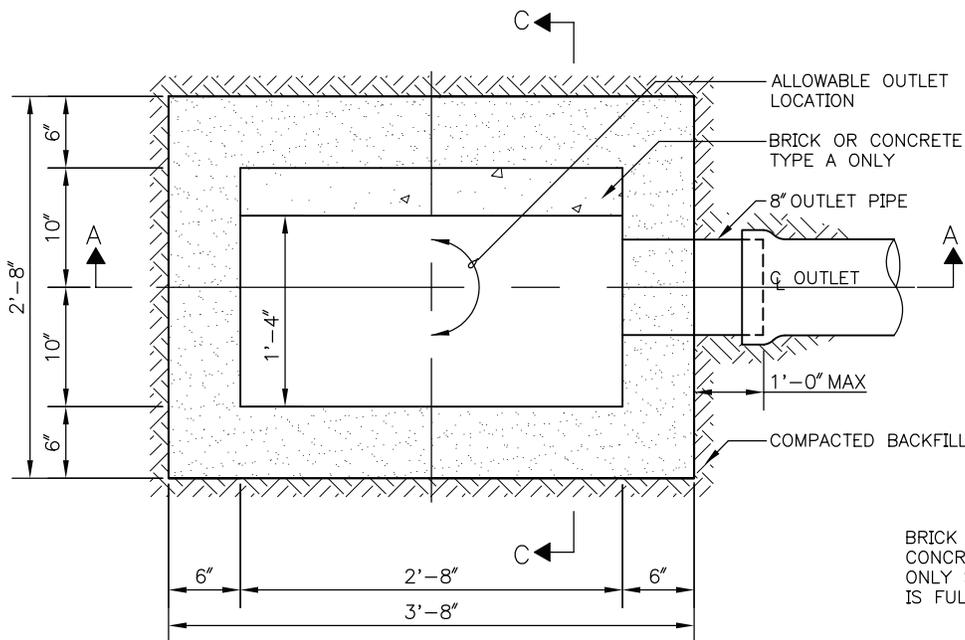
# STANDARD PLAN NO 250

REV DATE: 2008

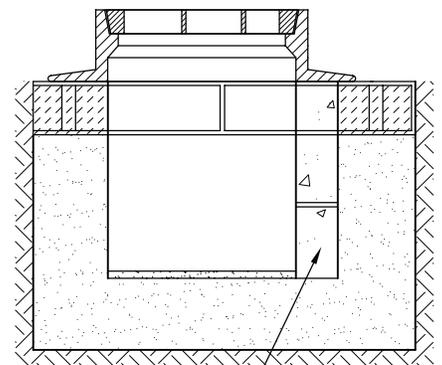


SECTION A-A

**NOTE:**  
INSTALL AND LOCATE  
PER STD PLAN NO 260



SECTION B-B



SECTION C-C  
TYPE A ONLY

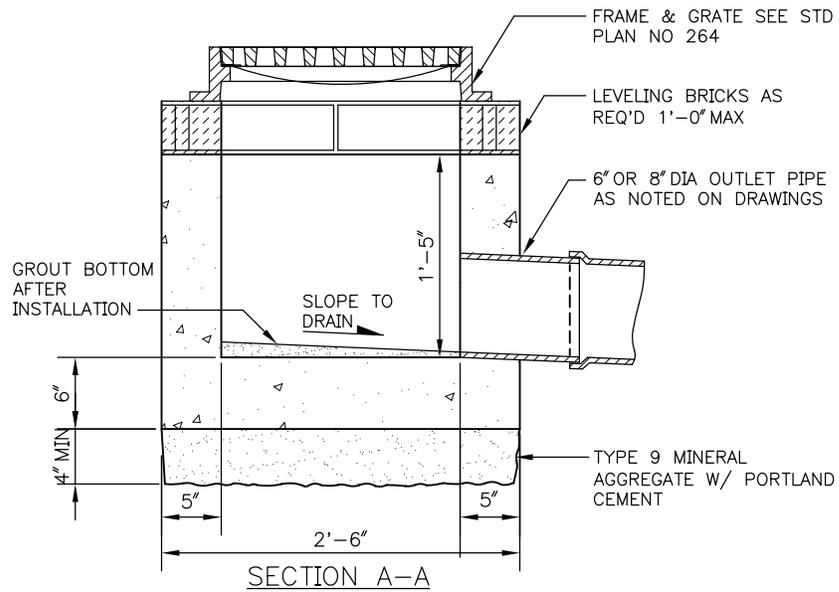
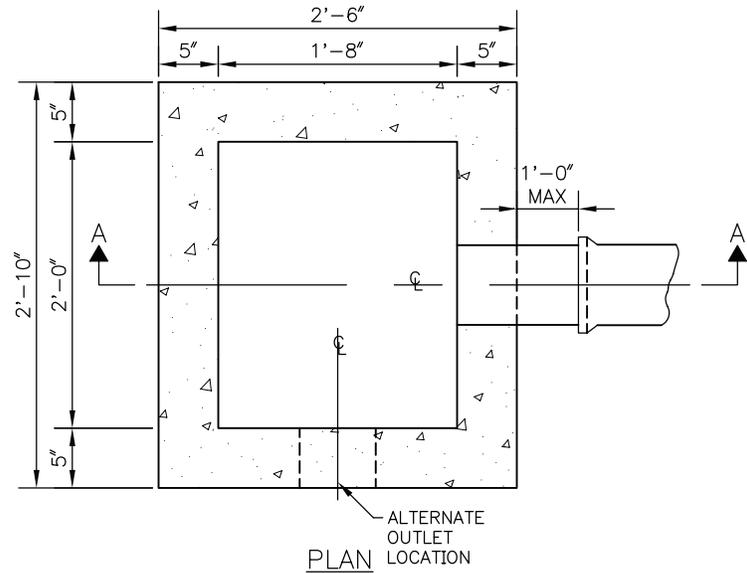
**NOTE:**  
PROVIDE MINIMUM REINFORCING STEEL AS REQUIRED BY AASHTO.



City of Seattle

NOT TO SCALE

TYPE 250 INLET



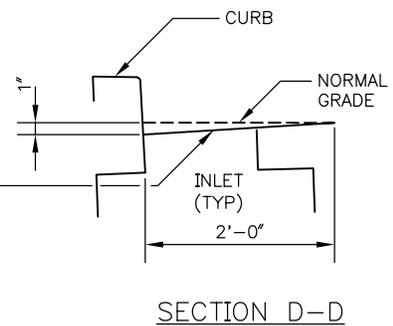
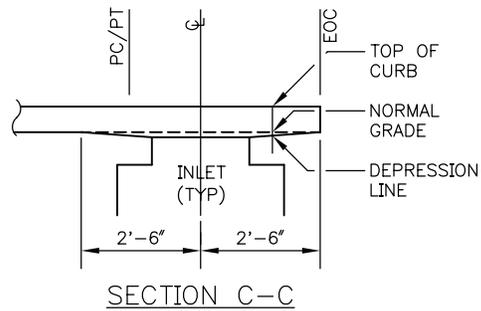
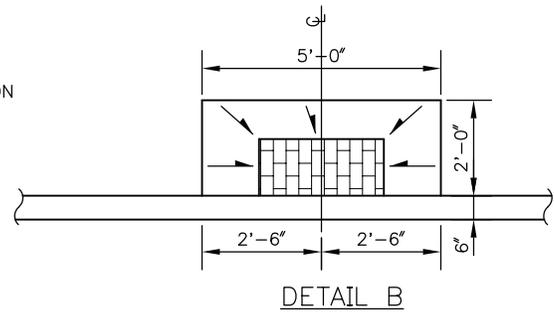
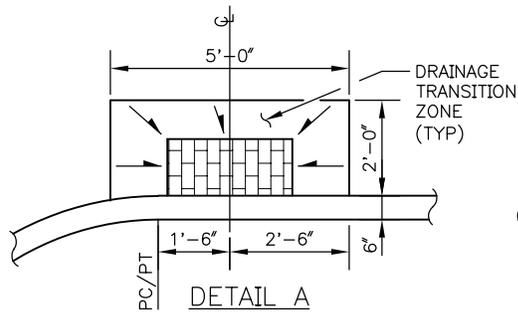
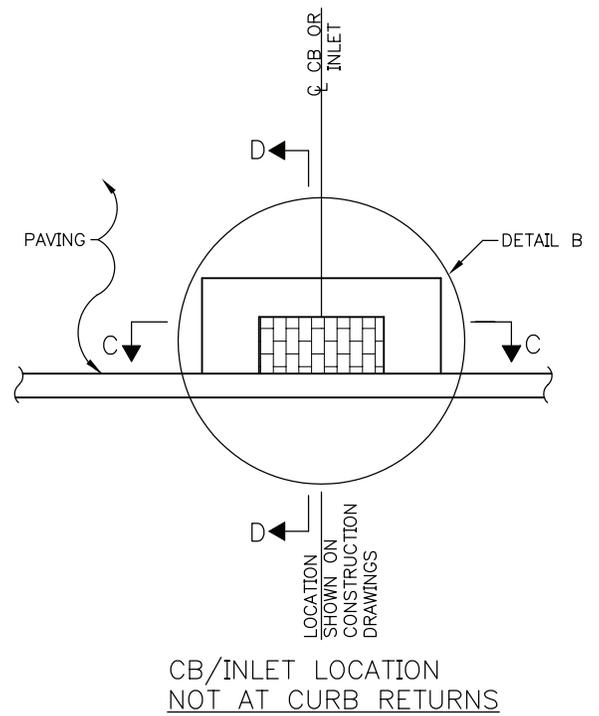
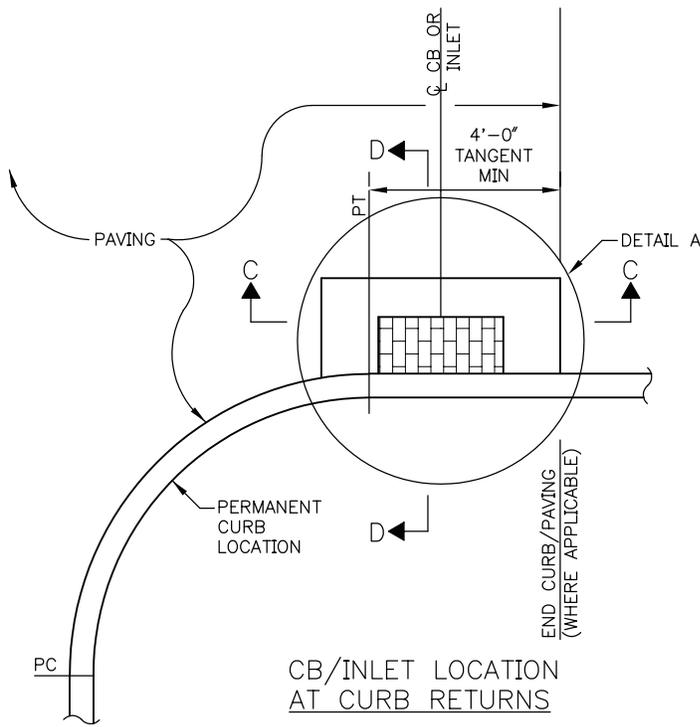
NOTE:  
PROVIDE MINIMUM REINFORCING STEEL AS REQUIRED BY AASHTO.



City of Seattle

NOT TO SCALE

TYPE 252 INLET



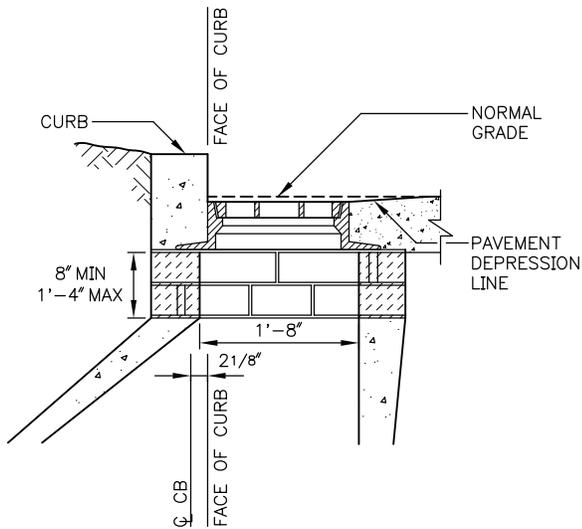
**NOTE**  
 INLET/CB SHALL NOT BE PLACED IN CROSSWALKS OR IN FRONT OF WHEELCHAIR RAMPS



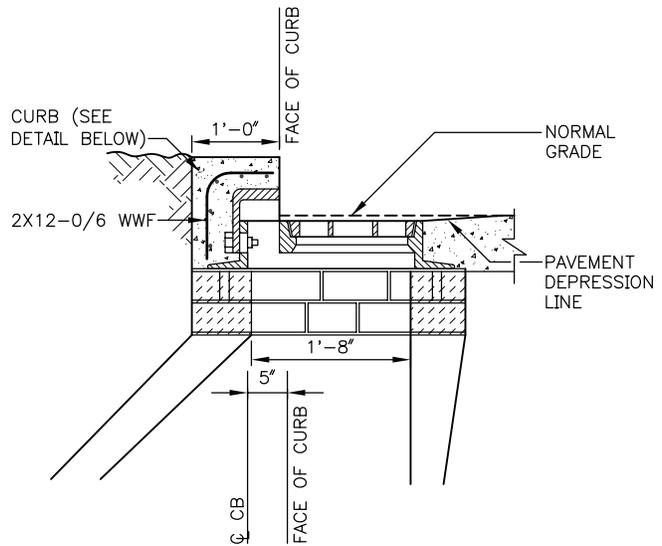
City of Seattle

NOT TO SCALE

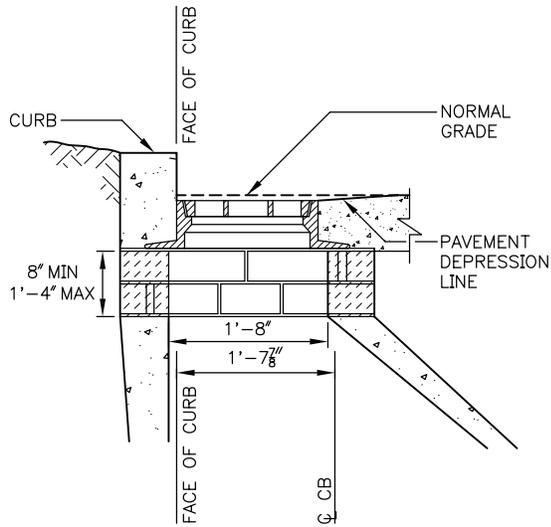
INLET / CATCH BASIN LOCATION & INSTALLATION



TYPE 242A CB  
(TYPE 250A INLET SIMILAR)  
NOTE - TYPE 240C GRATE



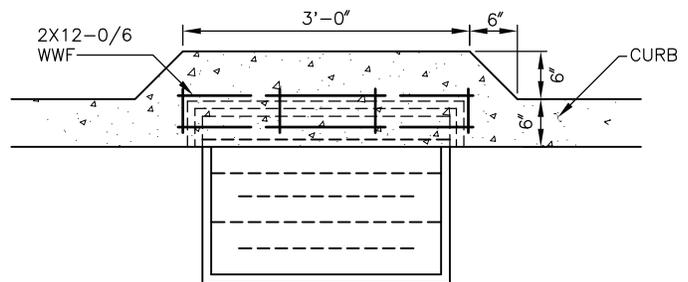
TYPE 242B CB  
(TYPE 250B INLET SIMILAR)



TYPE 242A.1 CB

NOTES:

1. TYPE 242A.1 OR B.1 INSTALLATION IS ROTATED 180° FROM TYPE 242A OR 242B
2. A.1 IS SHOWN, B.1 IS SIMILAR
3. A.1 OR B.1 CAN ONLY BE USED WHEN SPECIFIED ON DRAWINGS



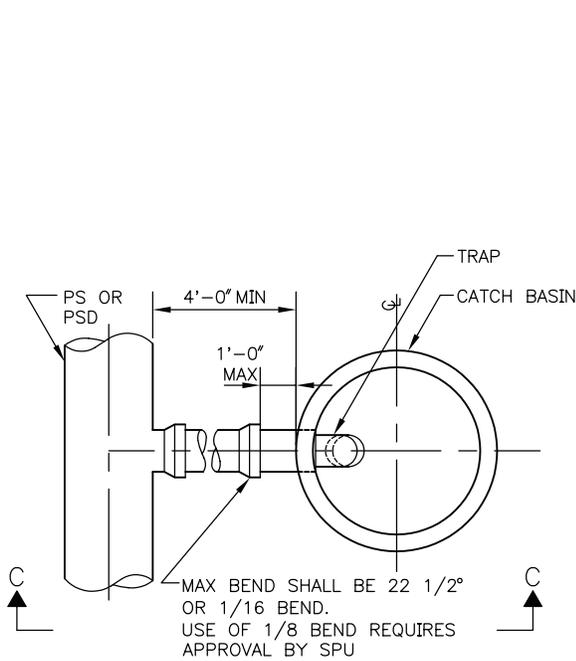
CURB DETAIL (PLAN VIEW) FOR  
TYPE 242B CB & TYPE 250B INLET



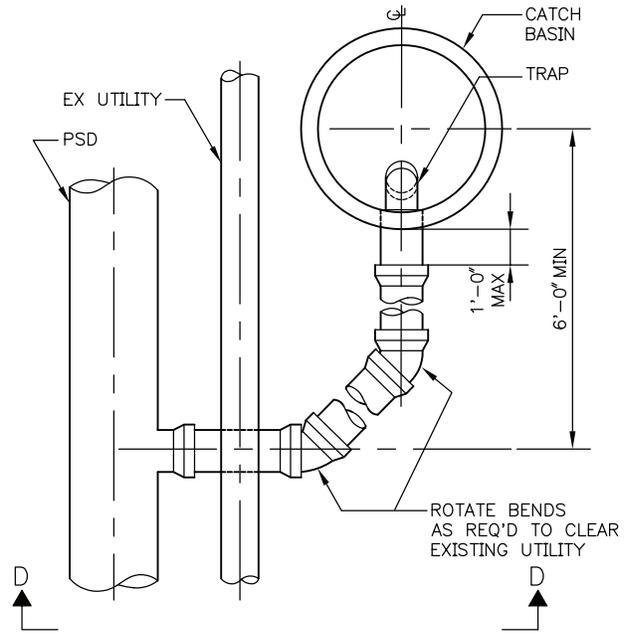
City of Seattle

NOT TO SCALE

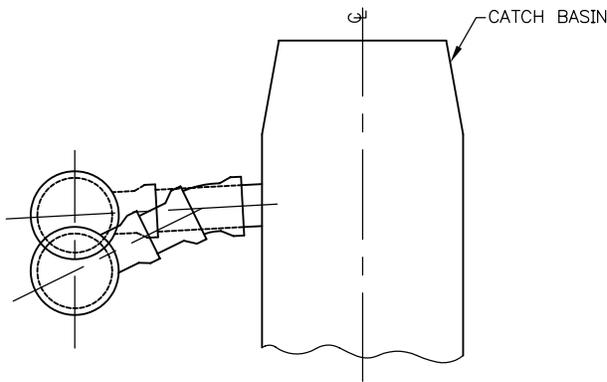
CATCH BASIN &  
INLET INSTALLATION



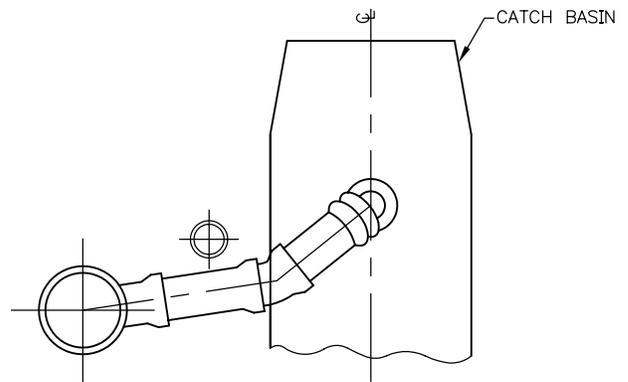
TYPE A



TYPE B



SECTION C-C



SECTION D-D

NOTES:

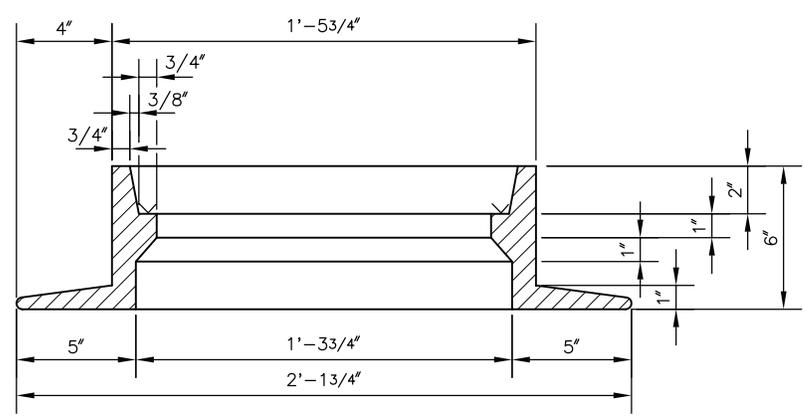
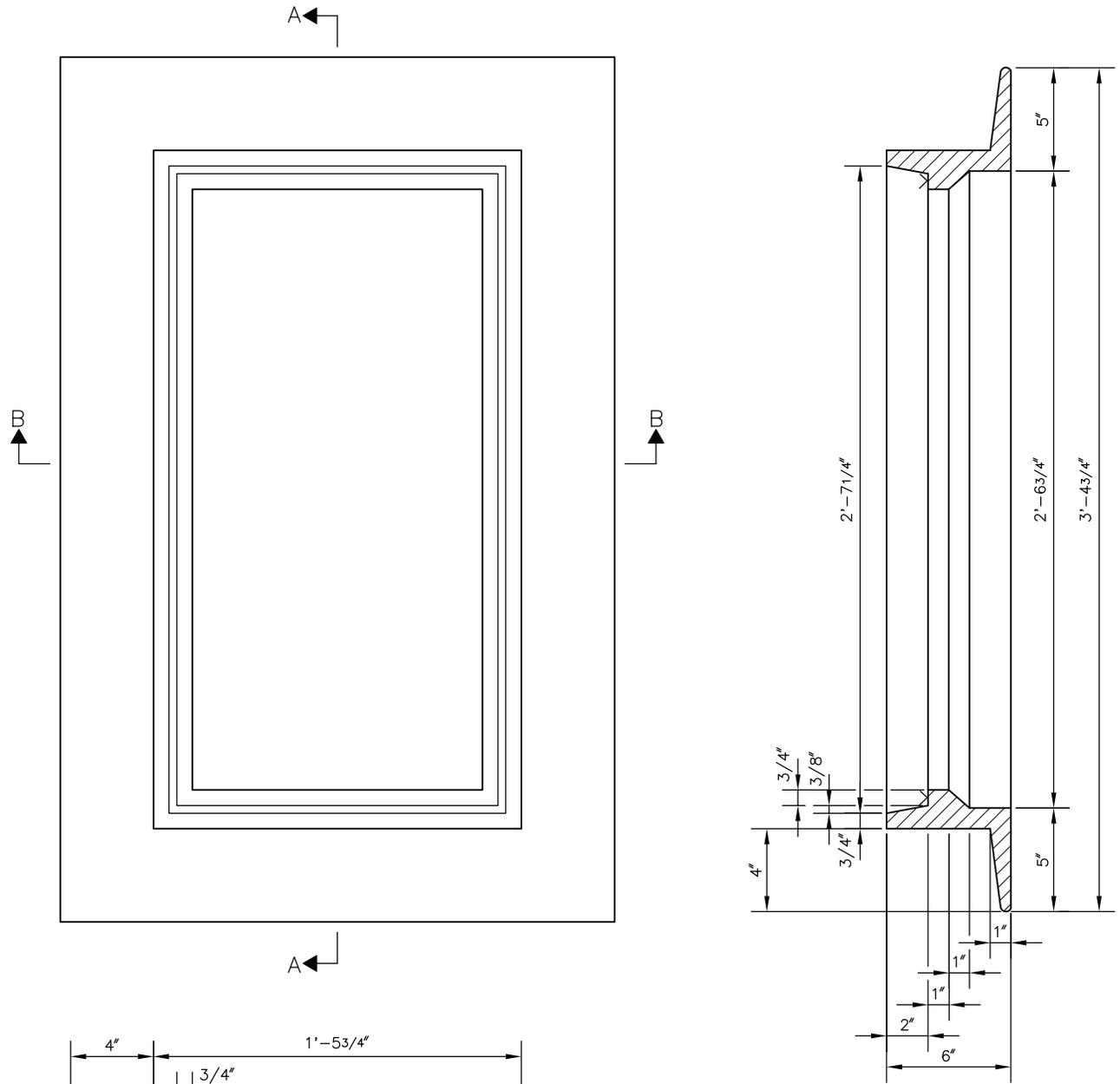
1. CONNECTIONS SHALL MAINTAIN A MINIMUM OF 2% AND A MAXIMUM OF 50% GRADE
2. TYPE A CONNECTION MAY BE USED UNDER THE FOLLOWING CIRCUMSTANCES:
  - A. THE MAXIMUM OF 50% GRADE IS NOT EXCEEDED
  - B. THERE IS NO INTERFERENCE WITH EXISTING OR PROPOSED UTILITIES



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TYPICAL CATCH BASIN CONNECTION



SECTION A-A

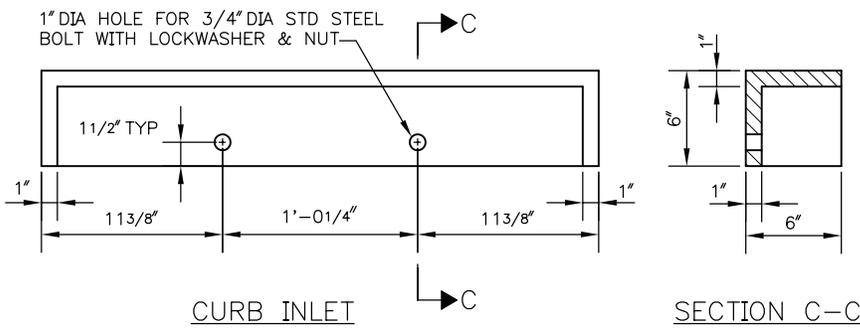
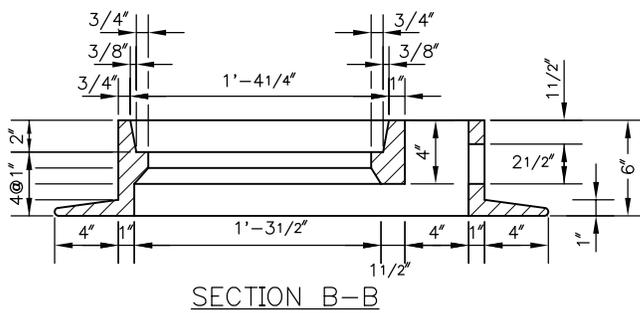
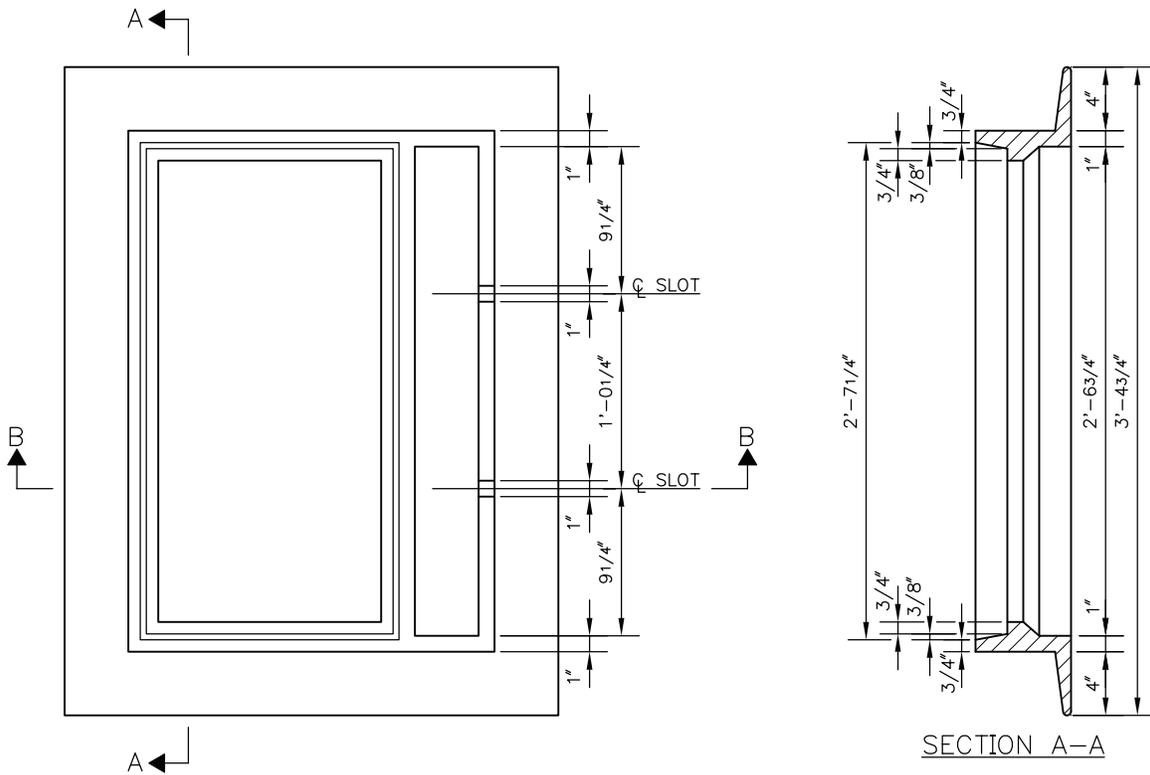
SECTION B-B

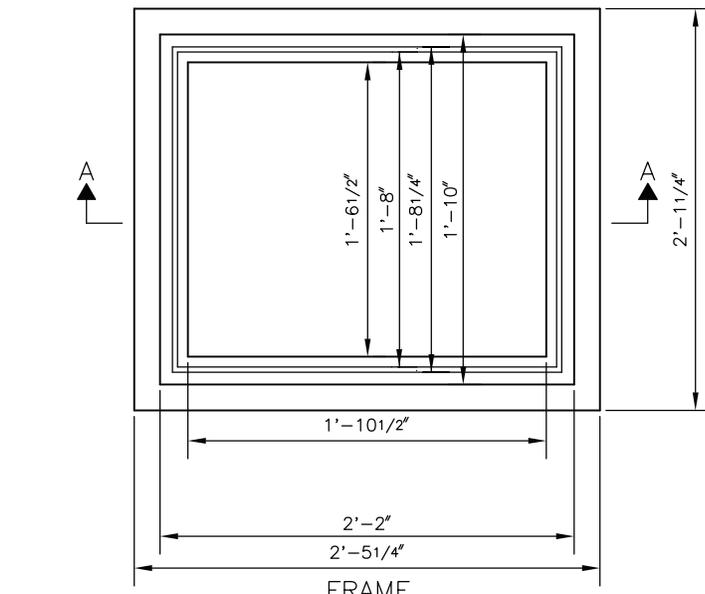


City of Seattle

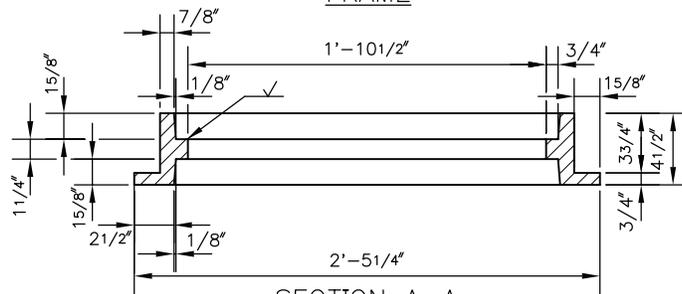
NOT TO SCALE

TYPE 262 INLET FRAME





FRAME

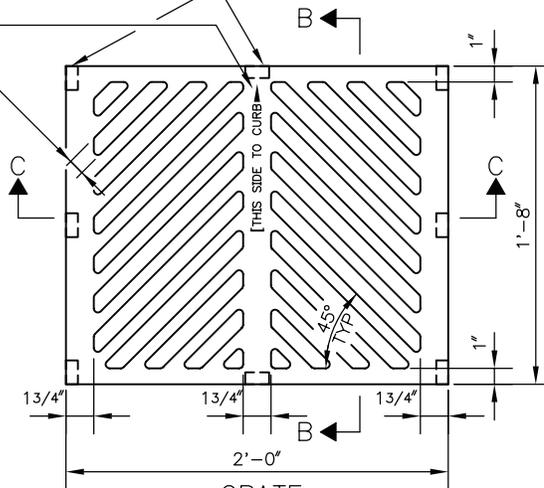


SECTION A-A

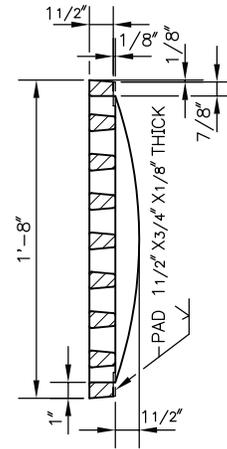
PAD 1 1/2" X 3/4" X 1/8" THICK (8 REQ'D)

EMBOSSSED ON GRATE

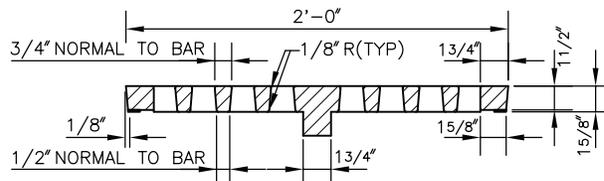
1" OPENING (TYP)



GRATE



SECTION B-B



SECTION C-C

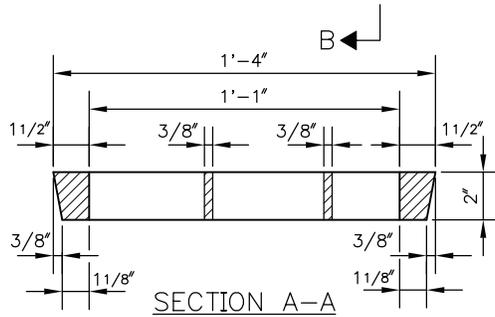
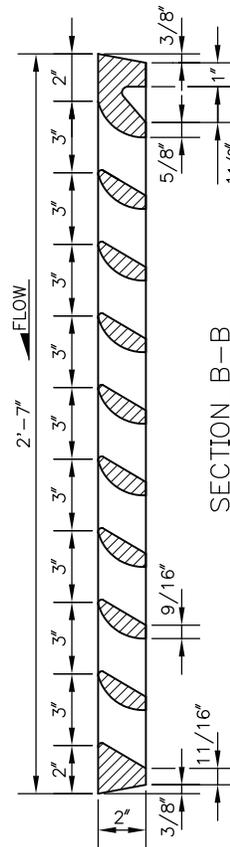
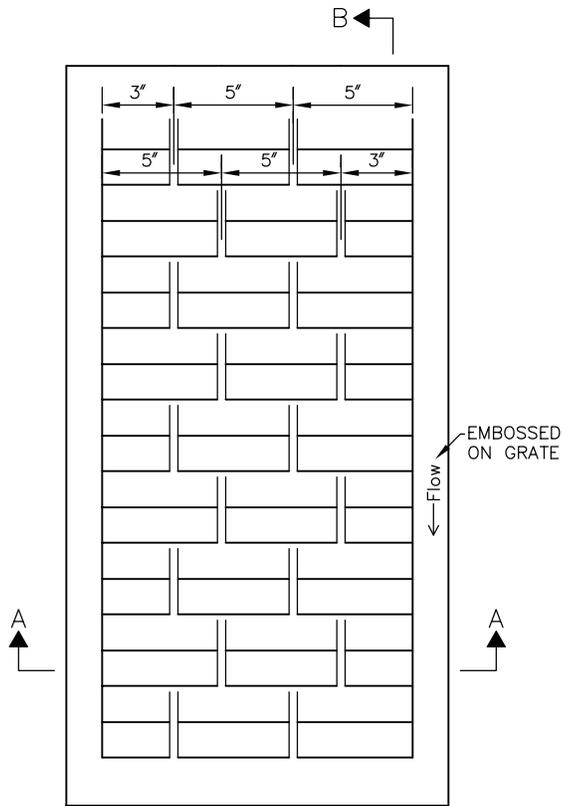
GRATE MATERIAL: DUCTILE IRON



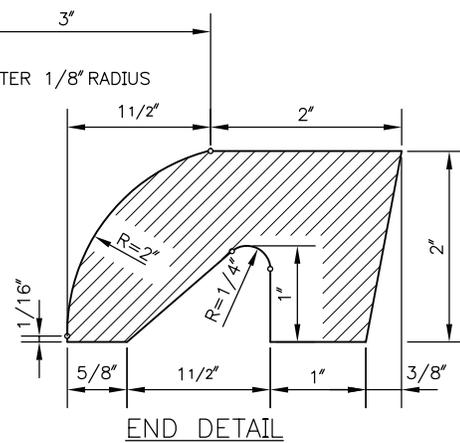
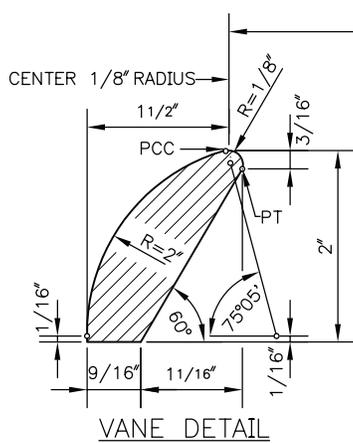
City of Seattle

NOT TO SCALE

INLET FRAME & GRATE



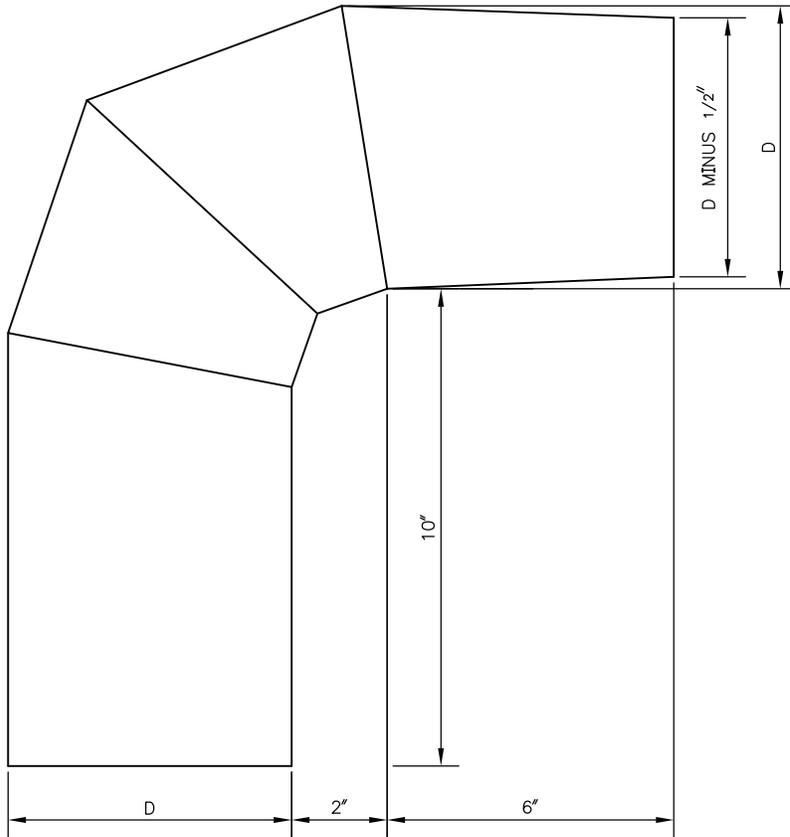
GRATE MATERIAL:  
DUCTILE IRON



City of Seattle

NOT TO SCALE

VANED GRATE



NOTES:

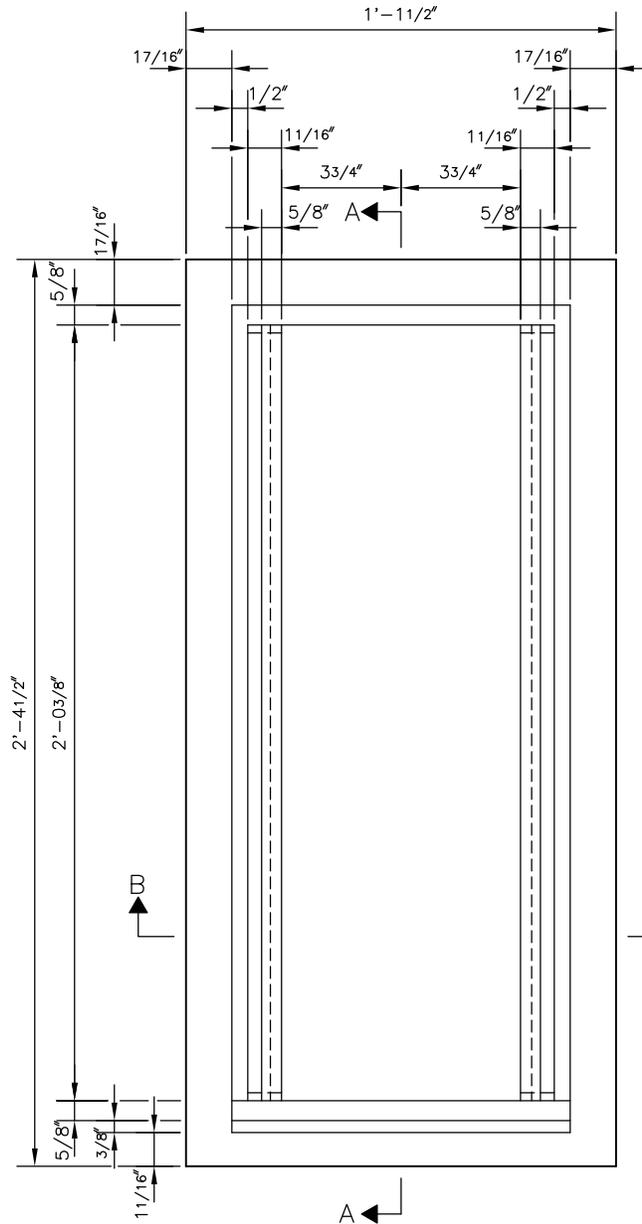
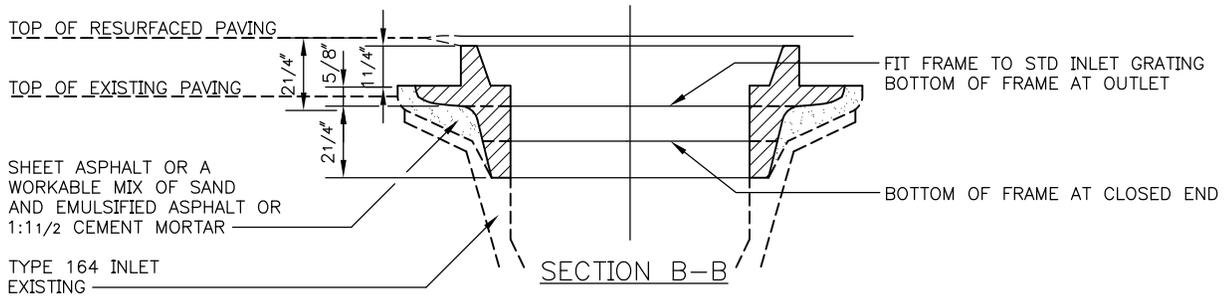
1. 1. TRAP TO BE MADE OF 22 GA (0.0336") SHEET METAL OR 18GA (0.05") ALUMINUM
2. ALL JOINTS TO BE SEAMED AND SOLDERED, OR WELDED
3. ALL LONGITUDINAL JOINTS TO BE RIVETED OR WELDED
4. DIAMETER "D" IS NOMINAL DIAMETER OF OUTLET PIPE



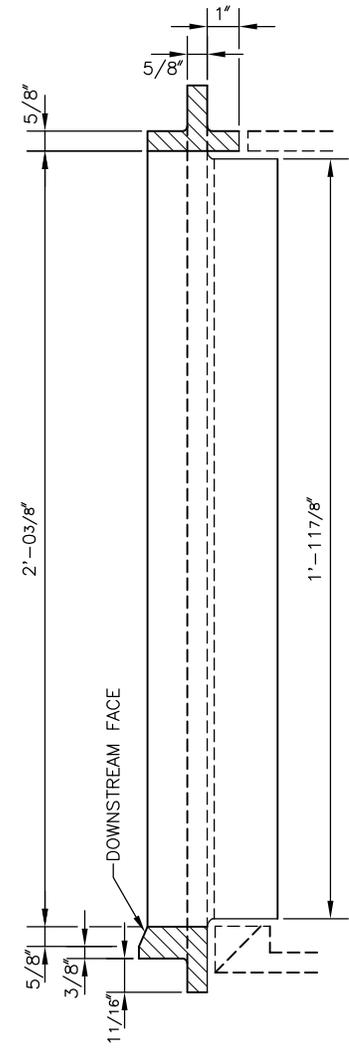
City of Seattle

NOT TO SCALE

OUTLET TRAP



PLAN



SECTION A-A

THESE DIMENSIONS MAY BE CHANGED IF NECESSARY TO FIT EXISTING CASTINGS



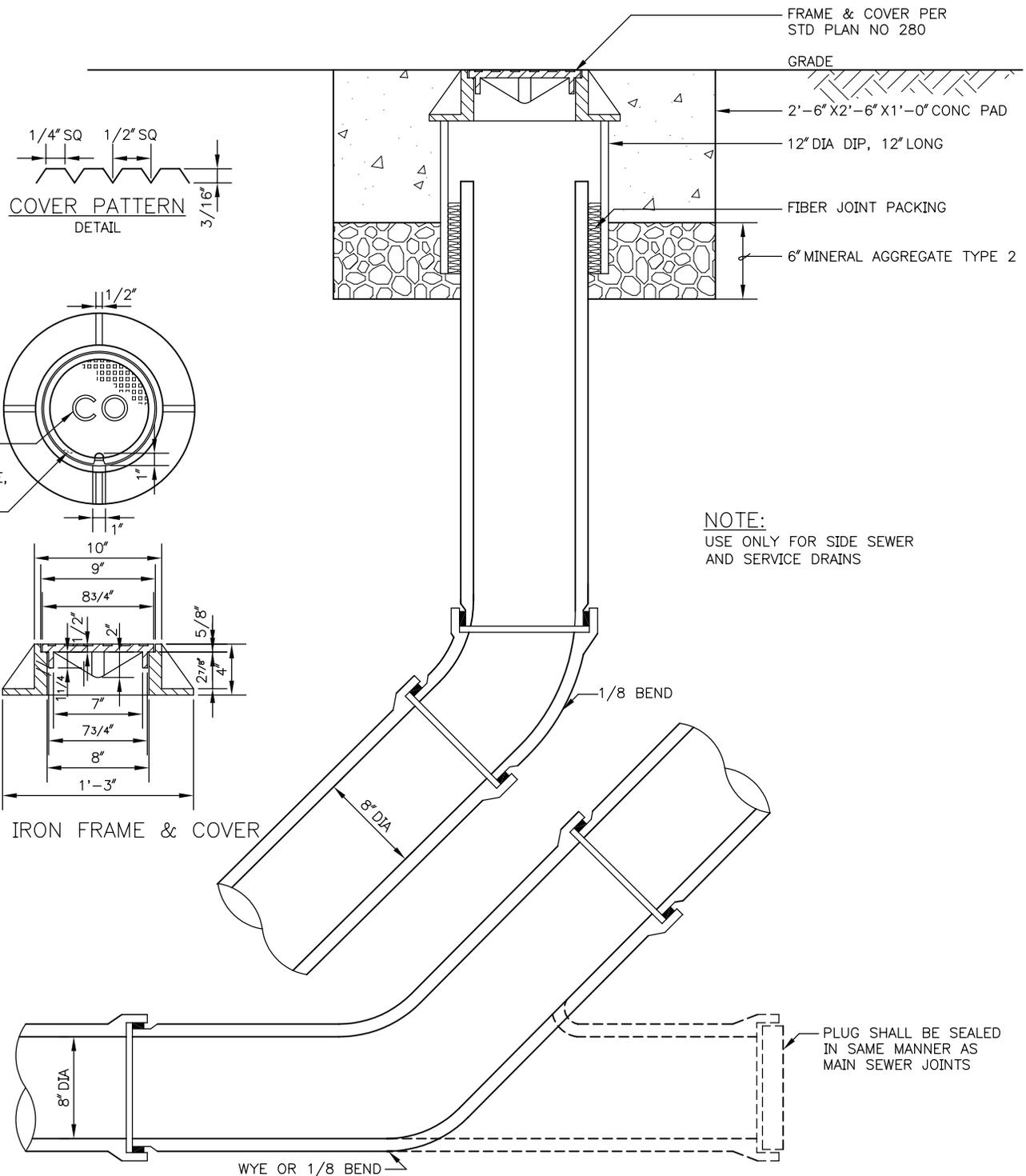
City of Seattle

NOT TO SCALE

EXTENSION FOR INLET

# STANDARD PLAN NO 280

REV DATE: 2003



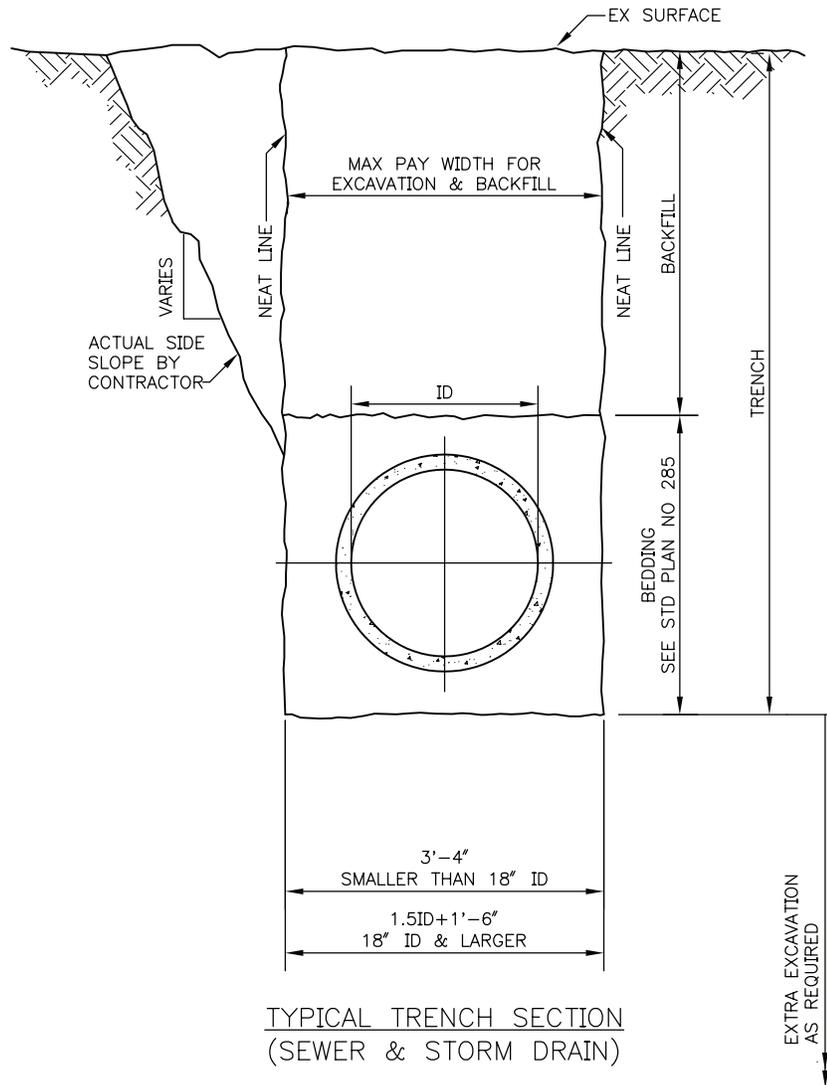
**NOTE:**  
USE ONLY FOR SIDE SEWER AND SERVICE DRAINS



City of Seattle

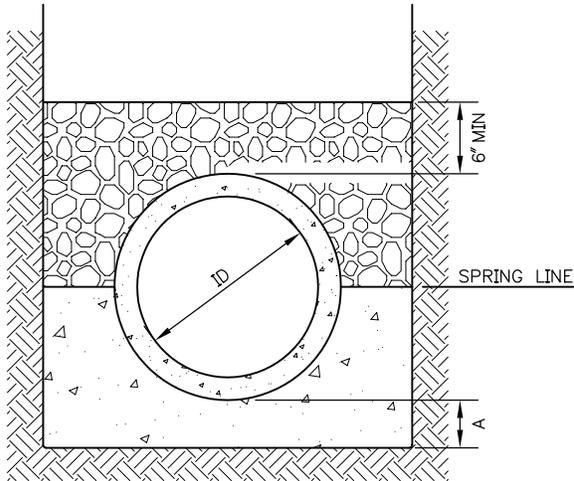
NOT TO SCALE

8" CLEAN-OUT

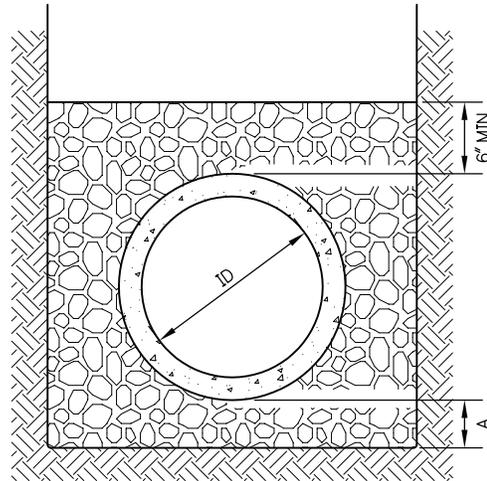


NOTE:  
FOR PAVEMENT REMOVAL  
AND RESTORATION SEE  
STD PLAN NO 404

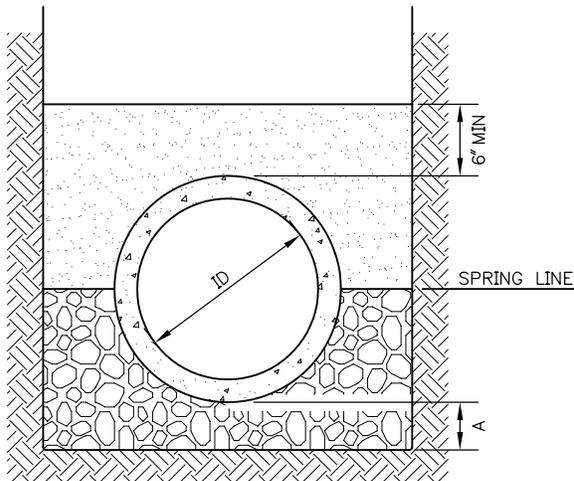




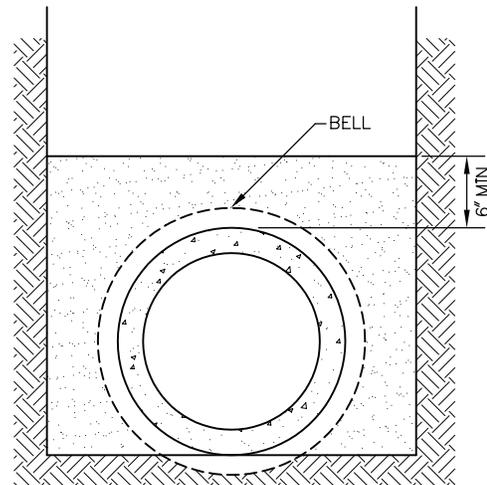
CLASS A BEDDING  
(CONCRETE BEDDING)



CLASS B BEDDING



CLASS C BEDDING



CLASS D BEDDING



MINERAL AGGREGATE PER STD SPEC 4-01  
TYPE 9 FOR RIGID PIPE  
TYPE 22 FOR FLEXIBLE PIPE



CONCRETE  
(4 SACK MIN 1 1/2" MAX AGGREGATE)



SELECTED NATIVE MATERIAL

NOTES:

1. FOR TRENCH WIDTH SEE STD PLAN NO 284
2. A=4" WHEN ID IS LESS THAN 2'-6"
- A=6" WHEN ID IS 2'-6" OR MORE
3. FOR CLASS D BEDDING EXCAVATE FOR BELL



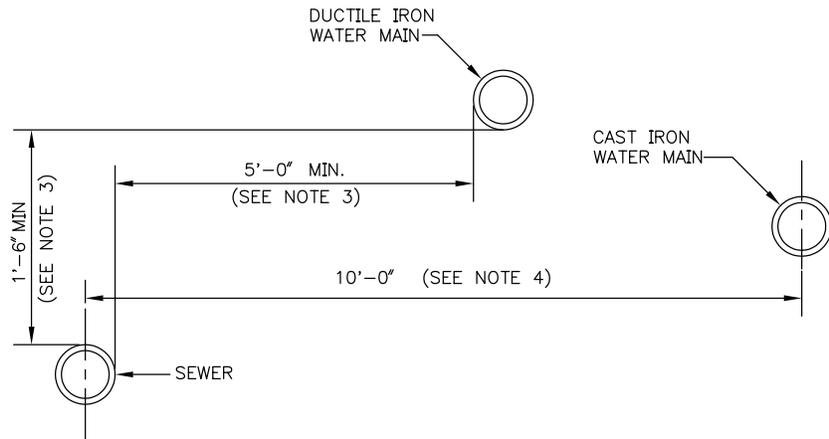
City of Seattle

NOT TO SCALE

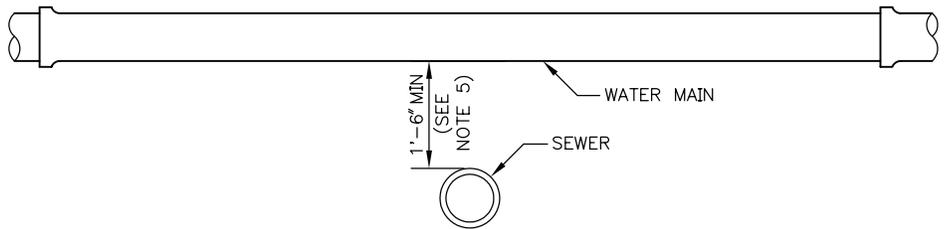
PIPE BEDDING  
SEWER / STORM DRAIN

**NOTES**

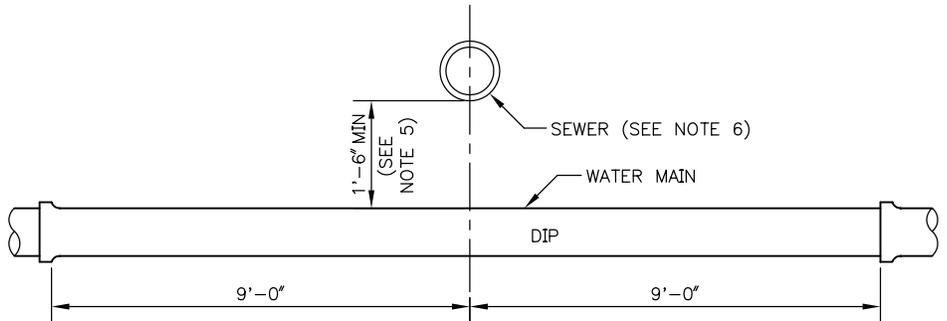
1. EXCEPTIONS TO STD PLAN NO. 286 SHALL BE APPROVED BY SEATTLE PUBLIC UTILITIES, WATER QUALITY DIVISION.
2. "SEWER" INCLUDES SANITARY SEWER, COMBINED SEWER AND SIDE SEWER.
3. WHERE MINIMUM CLEARANCES CANNOT BE MET, SEWER SHALL BE CONSTRUCTED OF MATERIALS AND WITH JOINTS THAT ARE EQUIVALENT TO WATER MAIN STANDARDS INCLUDING WATER MAIN PRESSURE TESTING REQUIREMENTS.
4. NO VERTICAL CLEARANCE REQUIRED.
5. IF MINIMUM VERTICAL SEPARATION CANNOT BE MET, WATER MAIN SHALL BE A STANDARD SINGLE 18'-0" NOMINAL LENGTH DUCTILE IRON WATER MAIN SECTION CENTERED AT THE POINT OF CROSSING.
6. SEWER SHALL HAVE ADEQUATE FOUNDATION SUPPORT TO PREVENT SETTLEMENT ON THE WATER MAIN AND TO PREVENT DEFLECTION OF WATER MAIN JOINTS.
7. CROSSINGS AT AN ANGLE BETWEEN 90° AND 45° MAY OCCUR BETWEEN 9'-0" AND 6'-0" OF WATER MAIN JOINT. FOR CROSSINGS LESS THAN 45°, SEE NOTE 1.
8. ORDINANCE 97016 APPLIES TO SIDE SEWERS. SEE STD SPEC SEC 1-07.17(2)A.



PARALLEL INSTALLATION



CROSSING WATER OVER SEWER



STANDARD SINGLE 18'-0" NOMINAL LENGTH DUCTILE IRON WATER MAIN SECTION CENTERED AT THE POINT OF CROSSING

CROSSING WATER UNDER SEWER



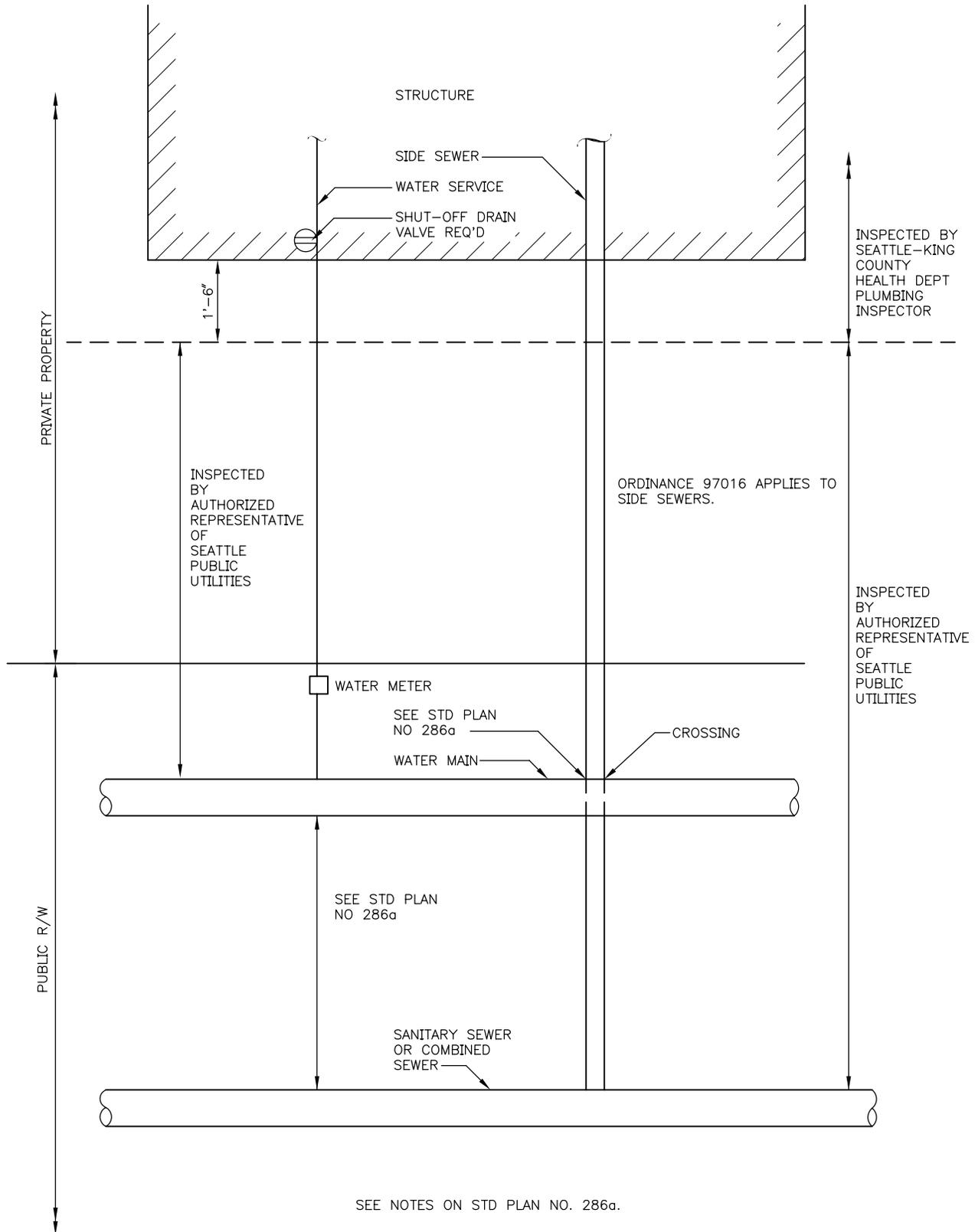
City of Seattle

NOT TO SCALE

SEWER & WATER  
SPACING & CLEARANCES

# STANDARD PLAN NO 286b

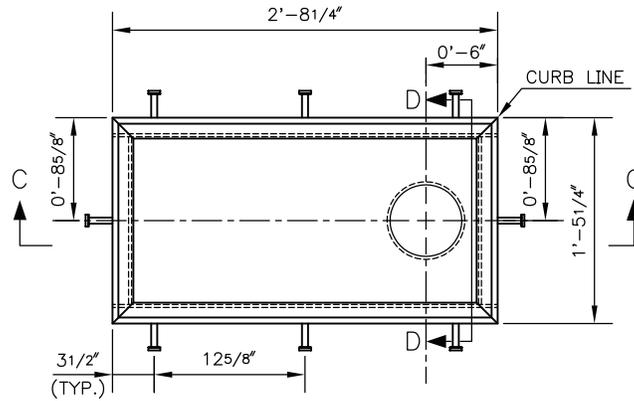
REV DATE: 2003



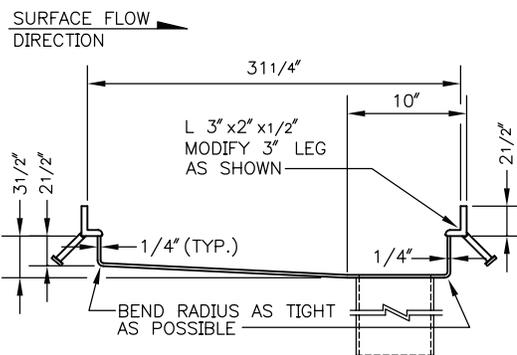
City of Seattle

NOT TO SCALE

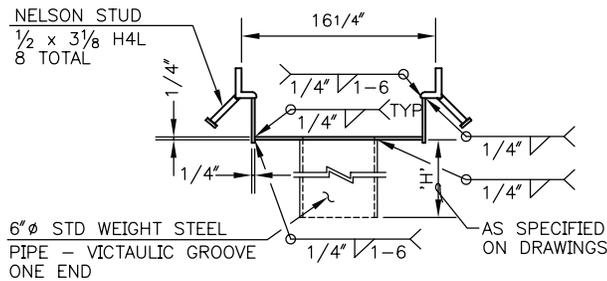
SEWER & WATER  
SPACING & CLEARANCES



PLAN VIEW - BRIDGE DRAIN



SECTION C-C



SECTION D-D

NOTES:

1. ALL 1/4" STEEL & L3" x 2" x 1/2" TO BE A-36.
2. 6" PIPE TO BE STANDARD WEIGHT STEEL.
3. AFTER FABRICATION, DRAIN ASSEMBLY TO BE HOT DIP GALVANIZED.
4. VANED GRATE TO BE PER STD PLAN NO 265.



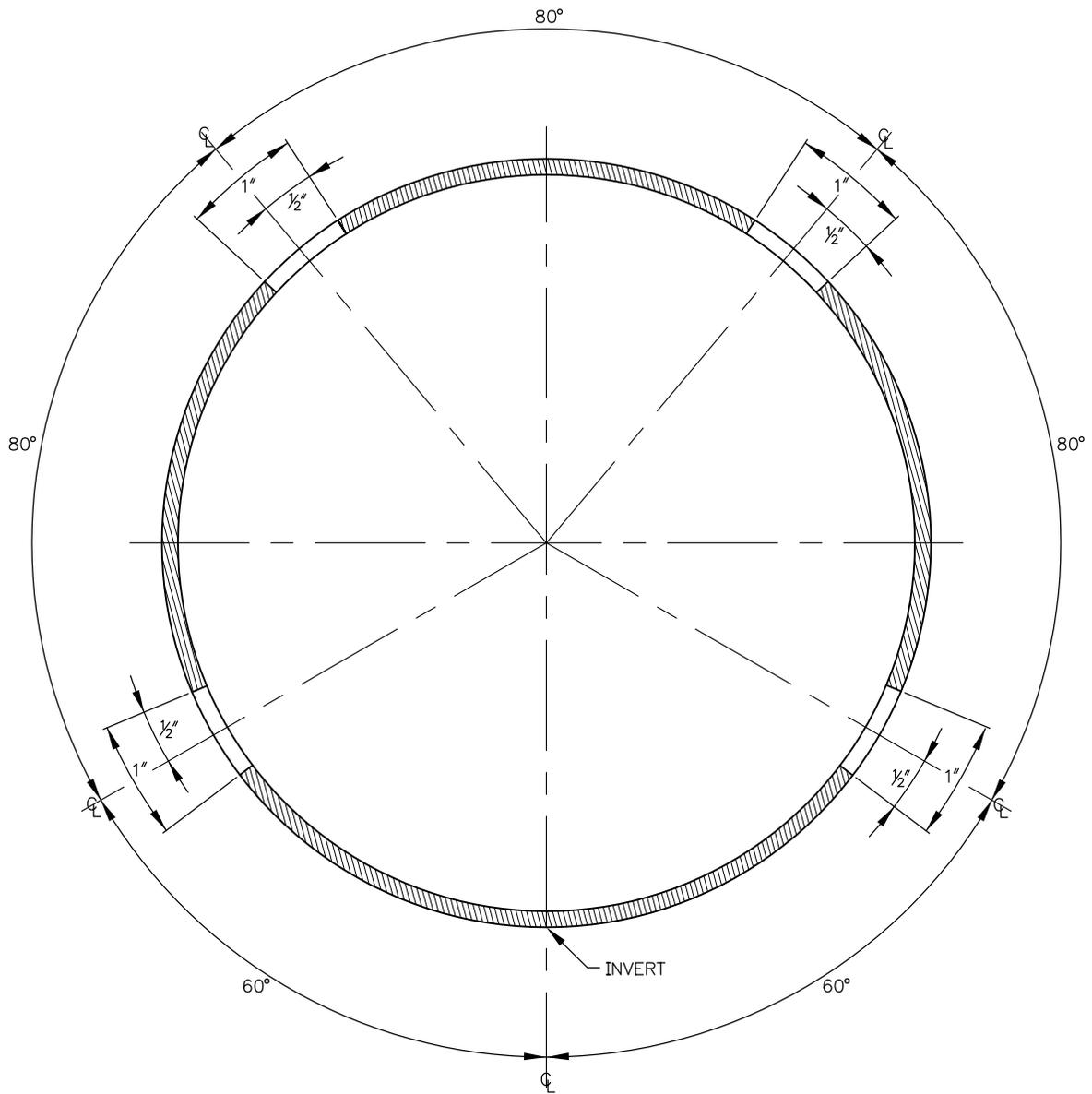
City of Seattle

NOT TO SCALE

BRIDGE DRAIN

# STANDARD PLAN NO 291

REV DATE: 2005



**NOTES:**

1. ASTM D 2241 SDR 21 CLASS 200 PVC PIPE.
2. SLOT DIMENSIONS ARE 0.040" WIDE X 1.00" LONG SPACED ALONG PIPE AT 0.25" ON CENTER

REF STD SPEC SEC 9-05 .3(1)



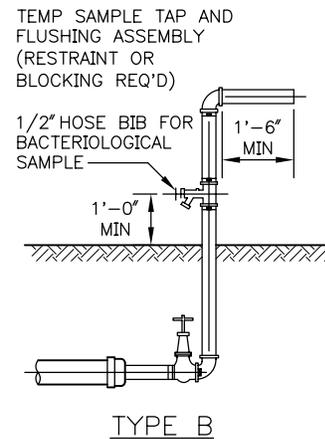
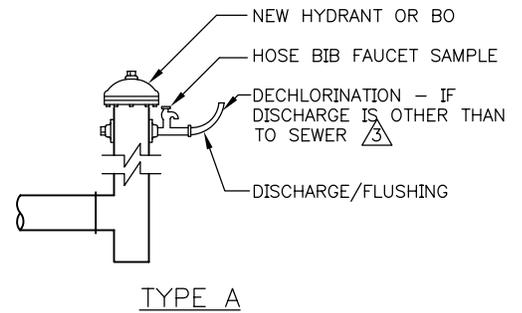
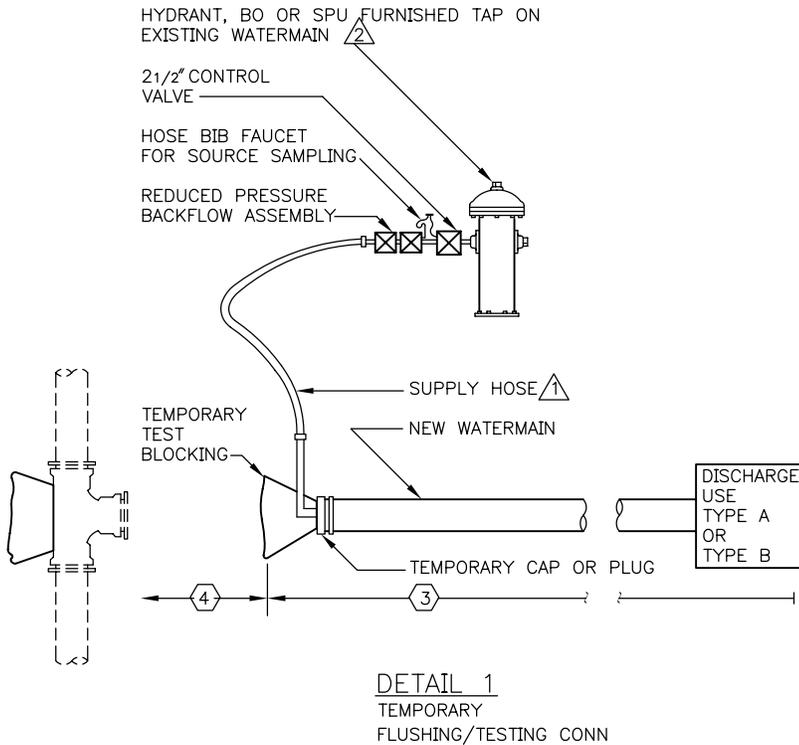
City of Seattle

NOT TO SCALE

PVC SUBSURFACE DRAIN PIPE

# STANDARD PLAN NO 300a

REV DATE: 2003



## NOTES

1. ALL FITTINGS SHALL BE DUCTILE IRON
2. ALL EXCAVATION SHALL PROVIDE A MINIMUM OF 1'-0" CLEAR AROUND PIPE AND FITTINGS.
3. THESE PLANS ARE FOR DIP AND CIP WATERMAINS 12" OR SMALLER DIA OTHER SIZES AND TYPES SEE PROJECT DRAWINGS
4. REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) SHALL BE INSTALLED AS A UNIT (TWO SHUT-OFF VALVES, RELIEF PORT, TWO CHECK VALVES AND FOUR TEST COCKS). WHEN RPBA IS CONNECTED TO HYDRANT AND THE HOSE BIB FAUCET SAMPLE THEY SHALL BE CAPPED WHEN NOT IN USE. ASSEMBLY SHALL BE TESTED WHEN INSTALLED BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER (BAT) AND A CURRENT TEST REPORT SHALL BE ON SITE. FOR INSTALLATION PROCEDURES CALL 684-3536.

## LEGEND

- ① CLEAN & DISINFECTED POTABLE WATER HOSE ONLY. SIZE FLUSHING RISER PER TABLE IN STD SPEC SEC 7-11.3(12)
- ② HYDRANT PERMIT REQUIRED
- ③ CHECK WITH SEWER UTILITY BEFORE DISCHARGE TO SEWERS
- ④ CONTRACTOR TO DETERMINE ALIGNMENT & GRADE OF EXISTING PIPE PRIOR TO INSTALLING NEW WATERMAIN. ENGINEER TO DETERMINE OUTSIDE DIAMETER OF EXISTING PIPE WHEN CONTRACTOR EXCAVATES TO DETERMINE ALIGNMENT & GRADE.
- ⑤ ALL EXCAVATION, PIPE, FITTINGS (EXCEPT AS NOTED BELOW), OTHER MATERIAL, BEDDING, BACKFILL, COMPACTION & STREET RESTORATION BY CONTRACTOR. ALL MATERIALS SHALL BE ON JOB SITE PRIOR TO SHUTDOWN OF EXISTING MAIN.
- ⑥ INSTALLED BY CONTRACTOR
- ⑦ CONNECTION PIPE: CONTRACTOR FURNISHED, INSTALLED BY SPU
- ⑧ WATERMAIN WITH PLAIN ENDS
- ⑨ MECHANICAL JOINT SLEEVE WITH SPACER CUT TO FIT GAP, FURNISHED AND INSERTED AT TIME OF CONNECTION BY SPU
- ⑩ TAPPING SLEEVE & TAPPING VALVE FURNISHED AND INSTALLED BY SPU
- ⑪ APPLIES TO PIPES 4" THROUGH 12". ALL LARGER SIZES TO BE ADDRESSED ON DRAWINGS
- ⑫ MECHANICAL JOINT SLEEVE, FURNISHED BY CONTRACTOR AND INSTALLED BY SPU, SPACERS BY SPU WHERE REQUIRED



City of Seattle

NOT TO SCALE

CONNECTIONS TO  
EXISTING WATERMAINS

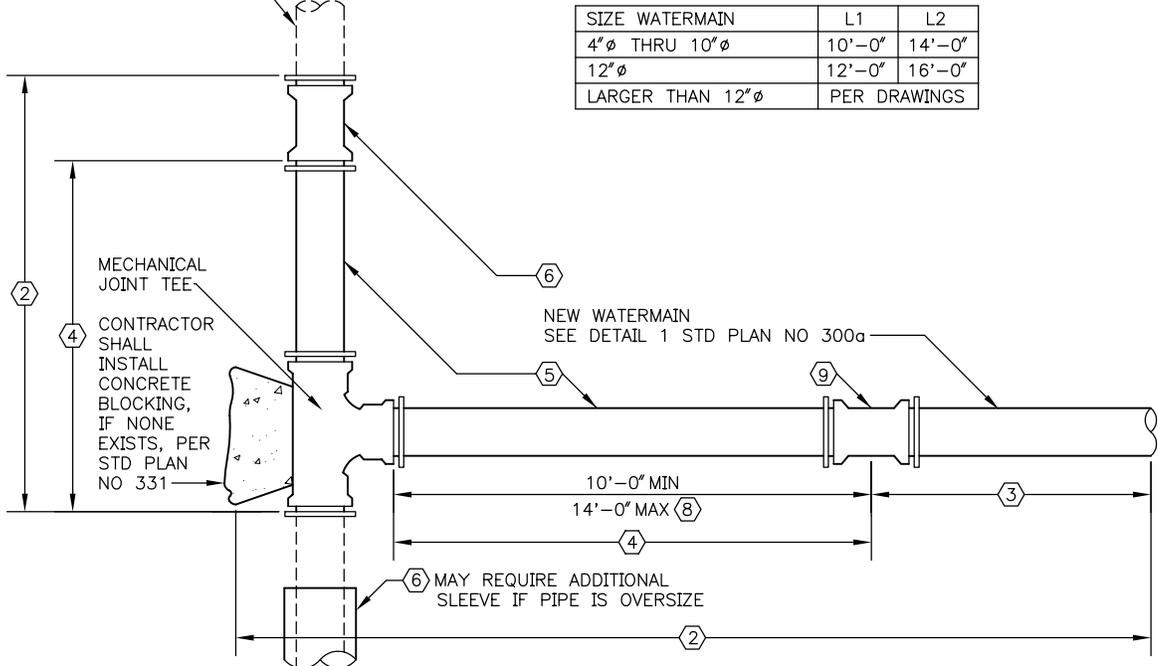
ELEVATION



TABLE

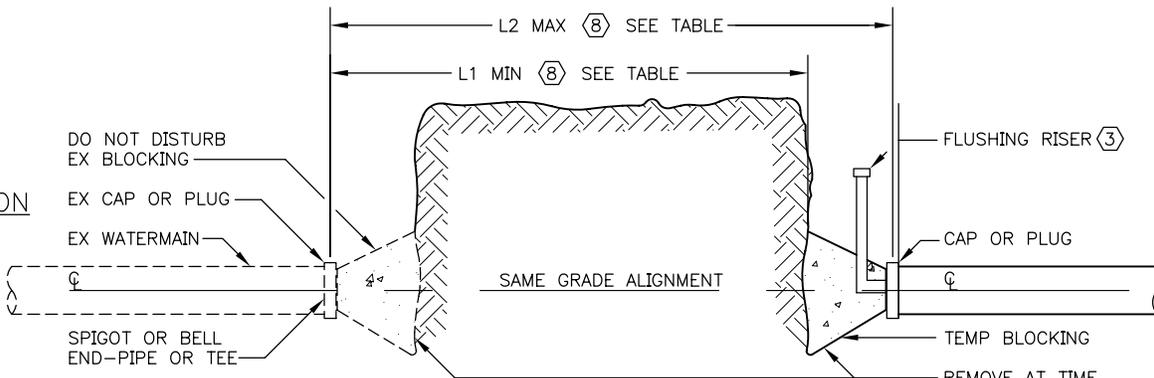
SIZE WATERMAIN	L1	L2
4" $\phi$ THRU 10" $\phi$	10'-0"	14'-0"
12" $\phi$	12'-0"	16'-0"
LARGER THAN 12" $\phi$	PER DRAWINGS	

PLAN

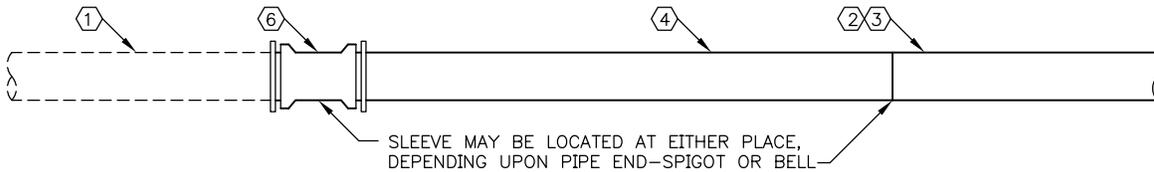


CONNECTIONS TO EXISTING MAIN, WITH A NEW TEE OR CROSS  
(CUT IN NEW TEE)

ELEVATION



PLAN



CONNECTIONS TO EXISTING MAIN, STUB  
OR END OUTLET OF TEE OR CROSS

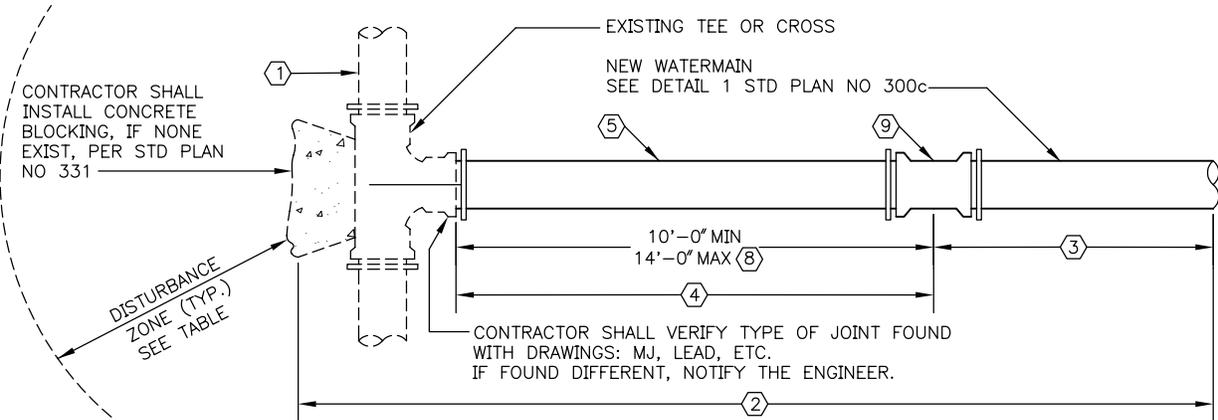
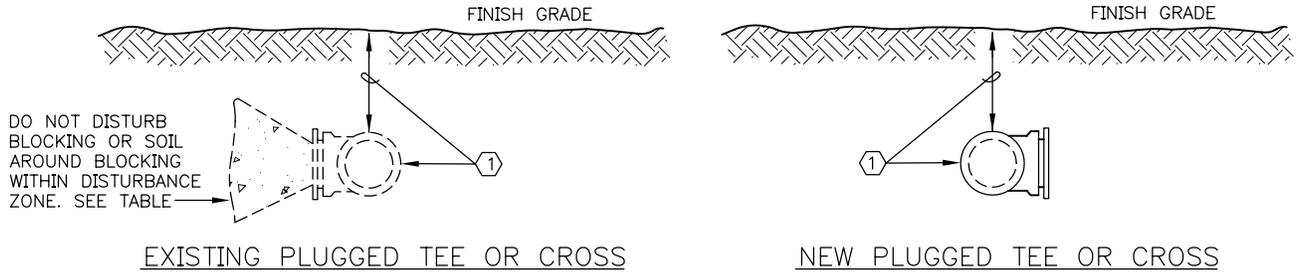
FOR LEGEND (6) AND NOTES SEE STD PLAN NO 300a



City of Seattle

NOT TO SCALE

CONNECTIONS TO EXISTING WATERMAINS

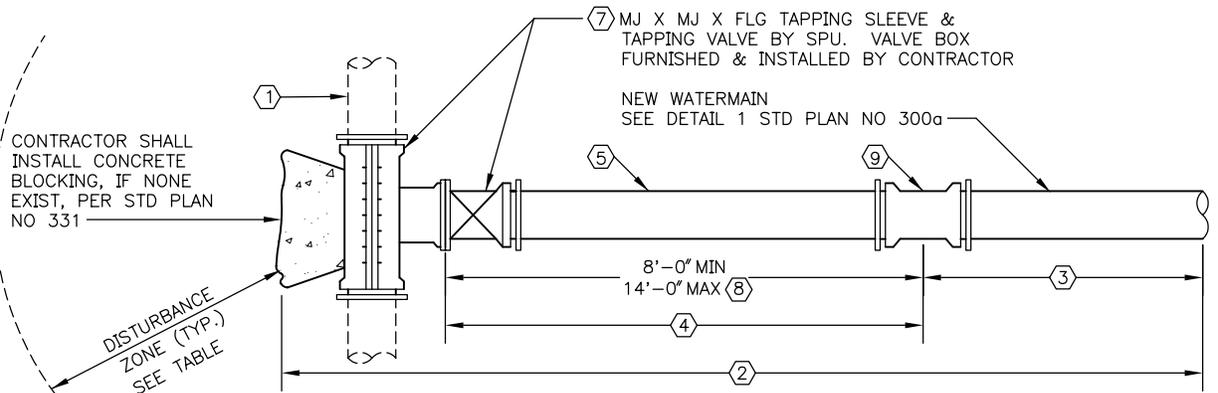


CONNECTIONS TO EXISTING TEE OR CROSS— PLAN VIEW

TABLE

SIZE WATERMAIN	DISTURBANCE ZONE
UP TO & INCLUDING 10" $\phi$	10'-0"
OVER 10" $\phi$	12'-0"

\* SPU MAY INCREASE DISTURBANCE ZONE. SEE CONTRACT DOCUMENTS



CONNECTIONS TO EXISTING MAIN, NO TEE OR CROSS — PLAN VIEW  
(TAPPING SLEEVE & TAPPING VALVE)

FOR LEGEND AND NOTES SEE STD PLAN NO 300a



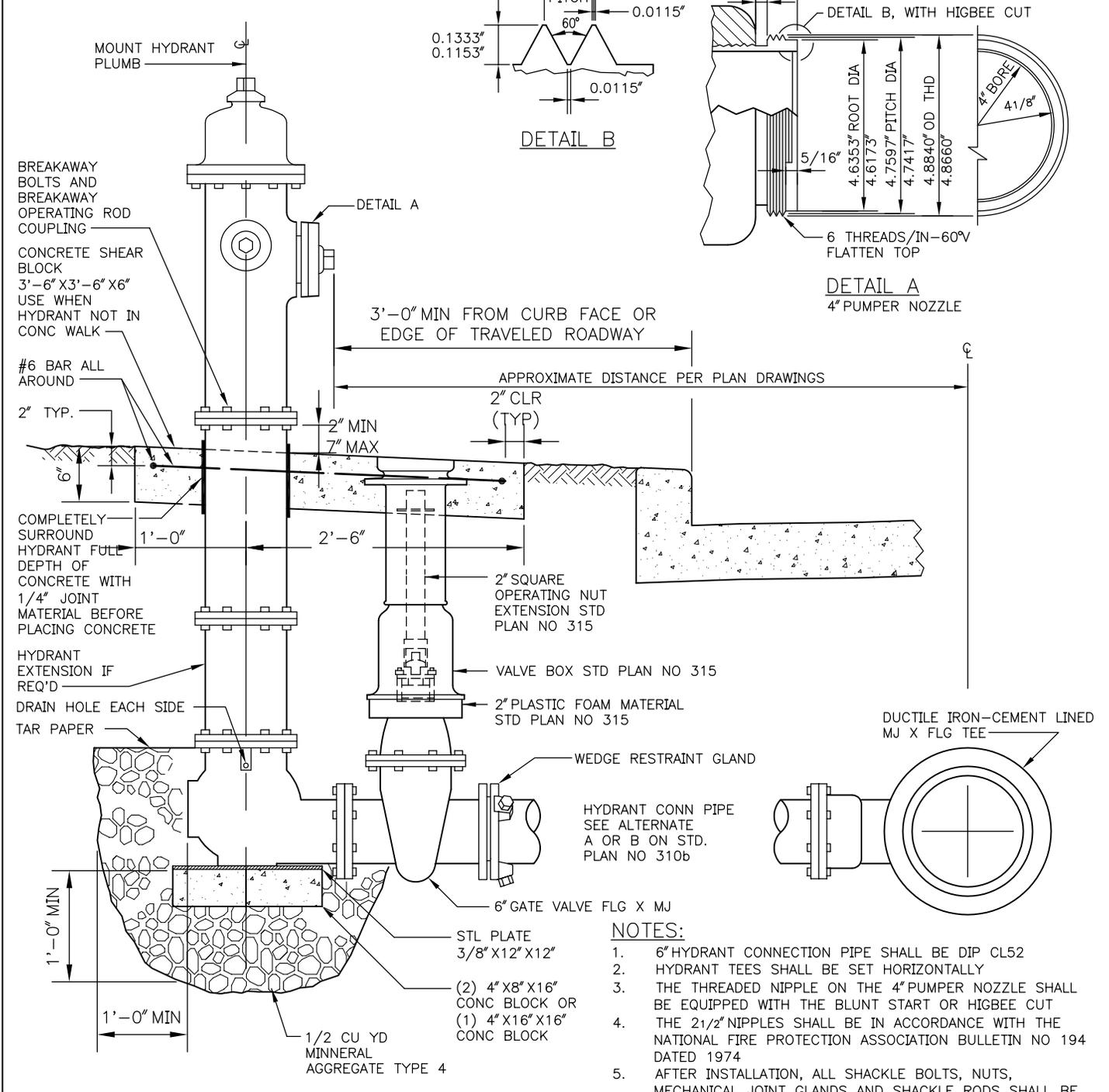
City of Seattle

NOT TO SCALE

CONNECTIONS TO EXISTING WATERMAINS

# STANDARD PLAN NO 310a

REV DATE: 2008



HYDRANT DETAIL

**NOTES:**

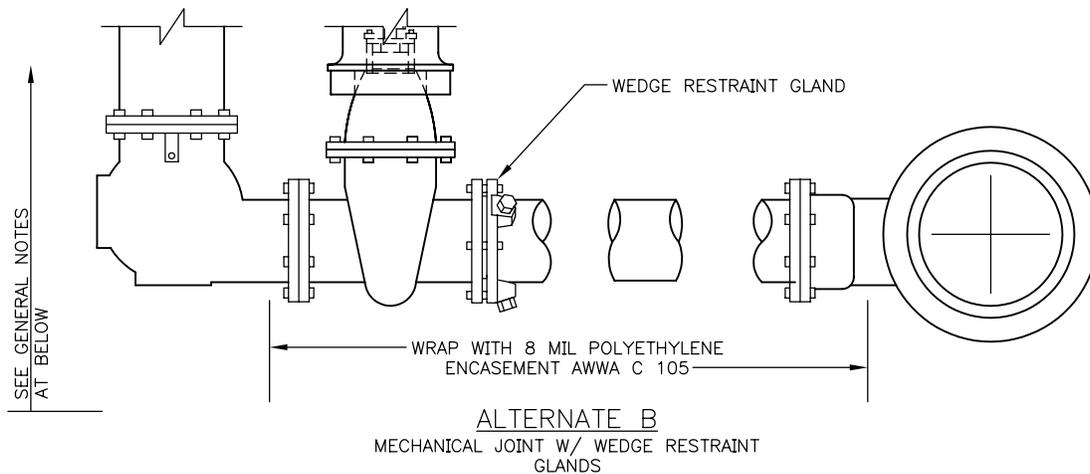
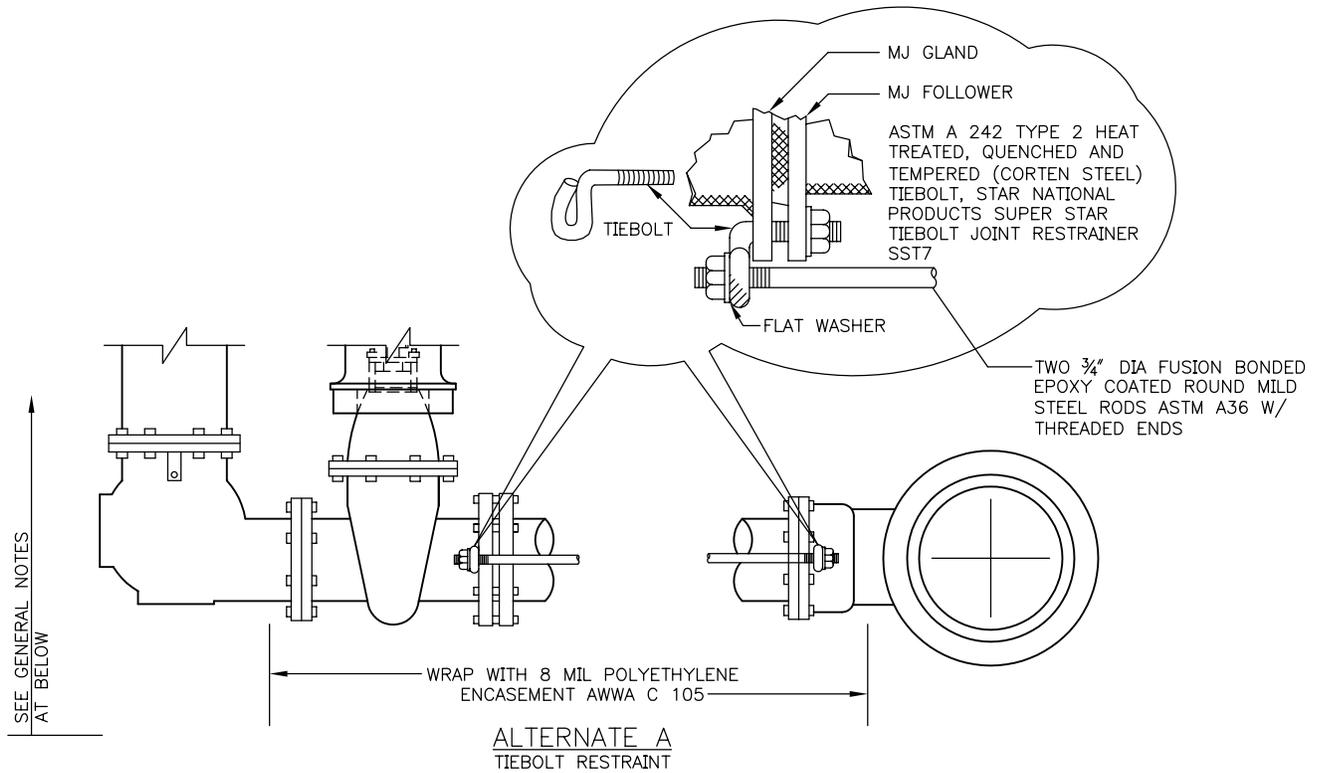
1. 6" HYDRANT CONNECTION PIPE SHALL BE DIP CL52
2. HYDRANT TEES SHALL BE SET HORIZONTALLY
3. THE THREADED NIPPLE ON THE 4" PUMPER NOZZLE SHALL BE EQUIPPED WITH THE BLUNT START OR HIGBEE CUT
4. THE 2 1/2" NIPPLES SHALL BE IN ACCORDANCE WITH THE NATIONAL FIRE PROTECTION ASSOCIATION BULLETIN NO 194 DATED 1974
5. AFTER INSTALLATION, ALL SHACKLE BOLTS, NUTS, MECHANICAL JOINT GLANDS AND SHACKLE RODS SHALL BE CLEANED AND COATED WITH TWO COATS OF ROYSTON R28 MASTIC.
6. AFTER BACKFILLING, THE OUTSIDE OF THE HYDRANT (ABOVE THE GROUND LINE) SHALL BE THOROUGHLY CLEANED AND PAINTED WITH TWO COATS OF KELLY-MOORE LUXLITE 43-616 CAT YELLOW
7. PUMPER PORT TO FACE CURB
8. RESTRAINT SHALL BE BY WEDGE RESTRAINT SYSTEM SUCH AS MEGALUG OR UNIFLANGE. SEE STD SPEC 9-30.5(5)



City of Seattle

NOT TO SCALE

TYPE 310 HYDRANT SETTING DETAIL



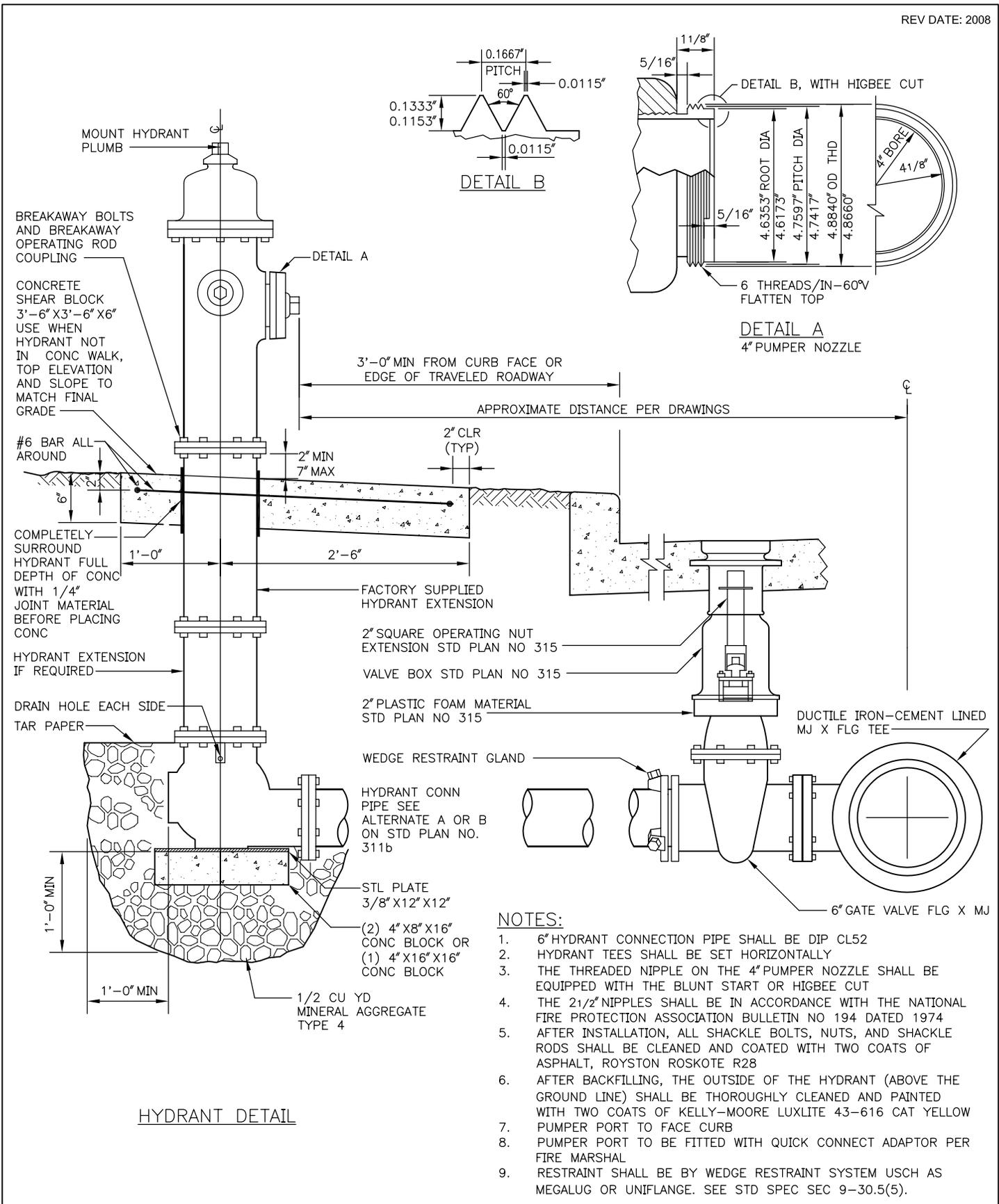
GENERAL NOTES:

1. WHERE WATERMANS ARE INSTALLED WITH POLYETHYLENE ENCASEMENT OR TAPE COATINGS, THE HYDRANT BARREL AND VALVE SHALL BE SIMILARLY ENCASED, COATED AND/OR JOINTS BONDED. WHERE WATERMAIN IS THERMOPLASTIC COATED, THE HYDRANT BARREL SHALL BE TAPE COATED
2. WHERE 6" GATE VALVE IS TO BE LOCATED WITHIN A PARKING-PERMITTED AREA, A SECOND 6" GATE VALVE SHALL BE INSTALLED AT THE HYDRANT ASSEMBLY PER STD PLAN NO 310a



# STANDARD PLAN NO 311a

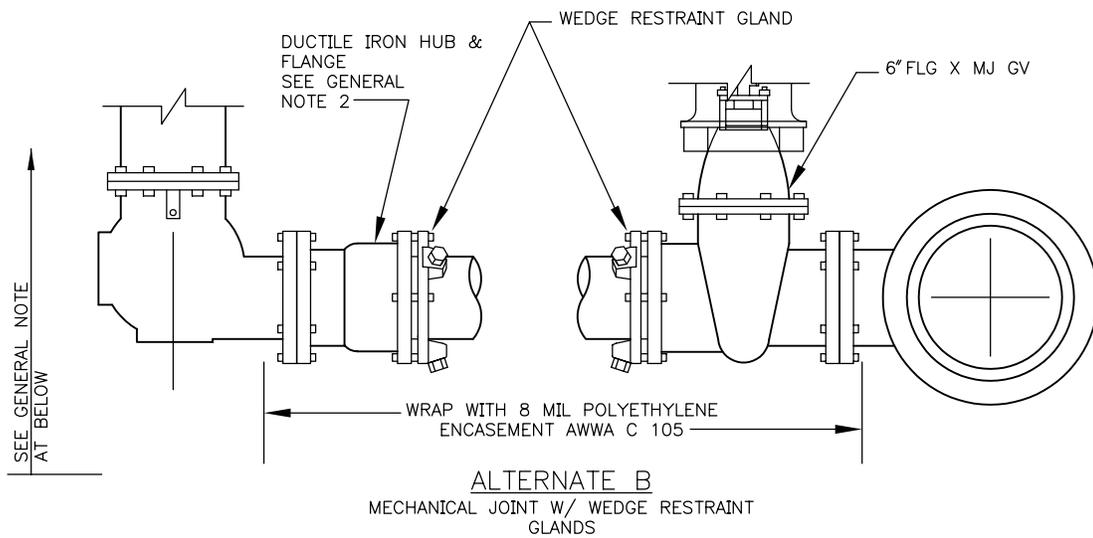
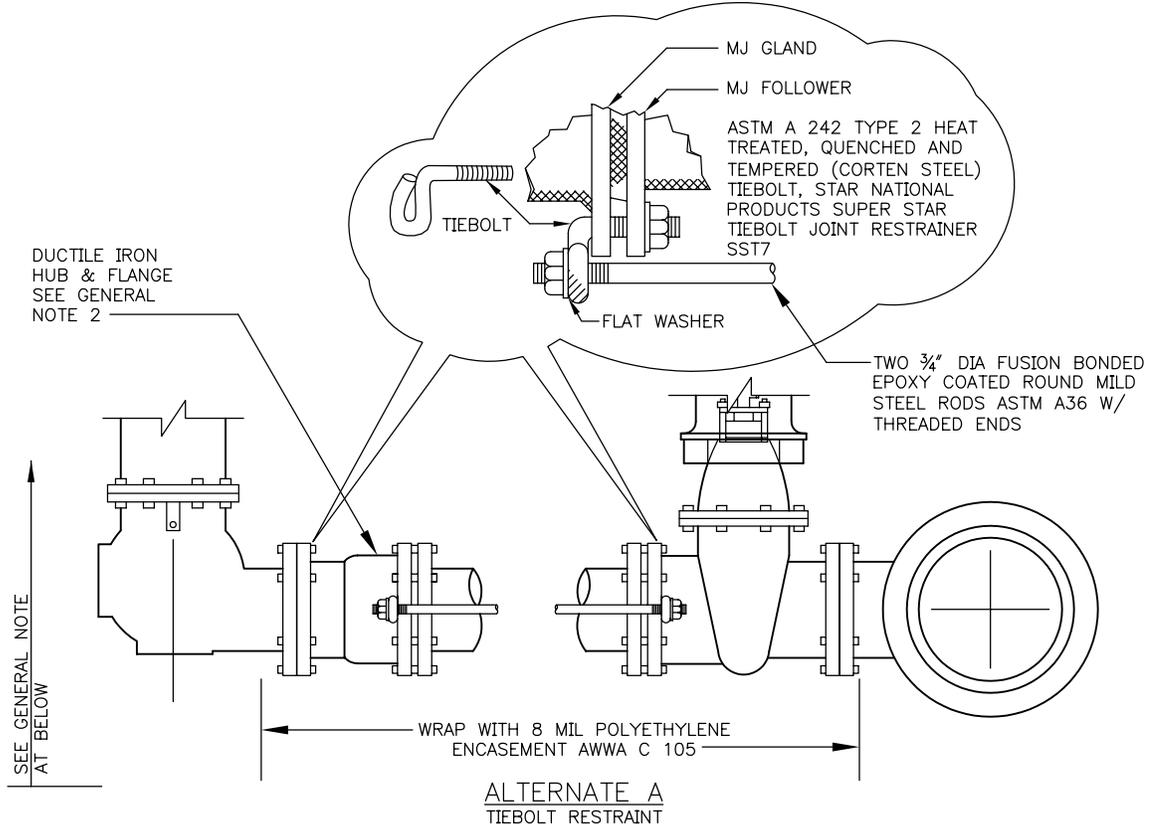
REV DATE: 2008



City of Seattle

NOT TO SCALE

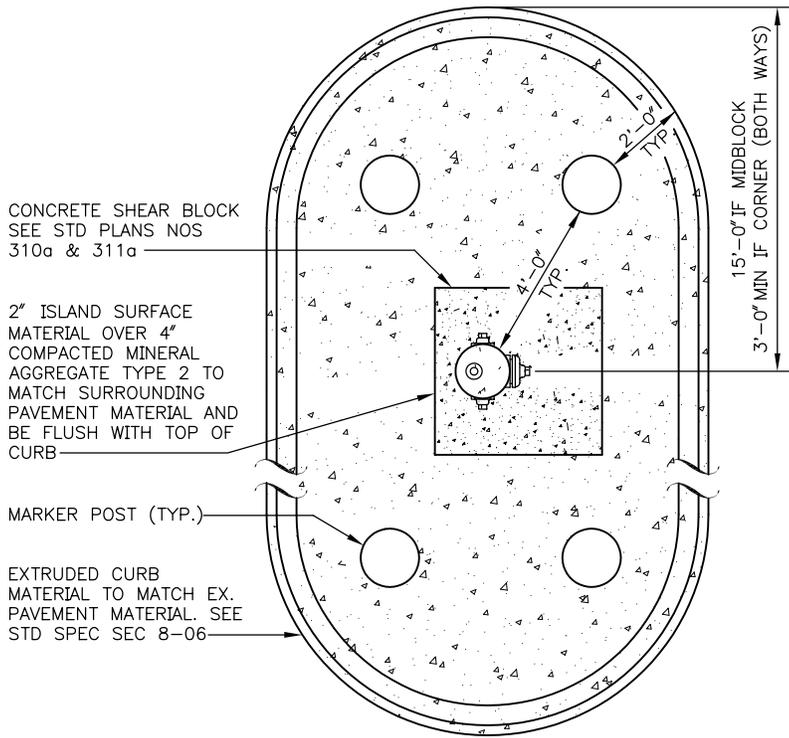
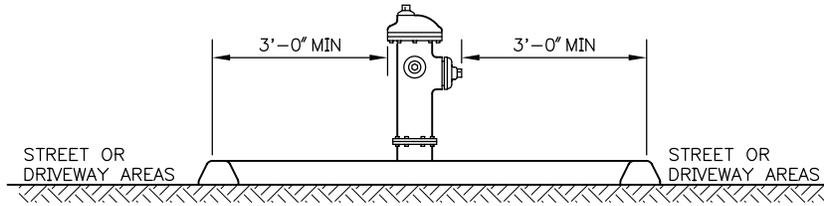
TYPE 311 HYDRANT SETTING DETAIL



**GENERAL NOTES:**

1. WHERE WATERMAINS ARE INSTALLED WITH POLYETHYLENE ENCASEMENT OR TAPE COATINGS, THE HYDRANT BARREL AND VALVE SHALL BE SIMILARLY ENCASED, COATED AND/OR JOINTS BONDED. WHERE WATERMAIN IS THERMOPLASTIC COATED, THE HYDRANT BARREL SHALL BE TAPE COATED
2. WHERE 6" GATE VALVE IS TO BE LOCATED WITHIN A PARKING-PERMITTED AREA, A SECOND 6" GATE VALVE SHALL BE INSTALLED AT THE HYDRANT ASSEMBLY PER STD PLAN NO 310g

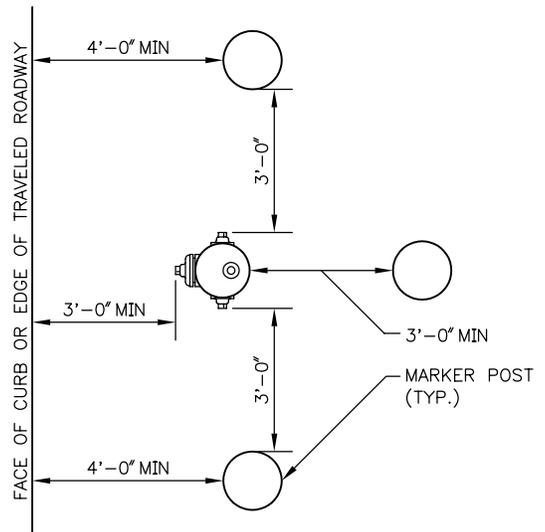




TRAFFIC ISLAND MARKER POST LAYOUT FOR FIRE HYDRANTS IN PARKING AREAS

NOTES

1. LAYOUT OF MARKER POST SHALL BE VERIFIED FIRST WITH SPU AND SDOT
2. MARKER POST WITH HIGH INTENSITY REFLECTORIZED BANDS PROVIDED BY SPU



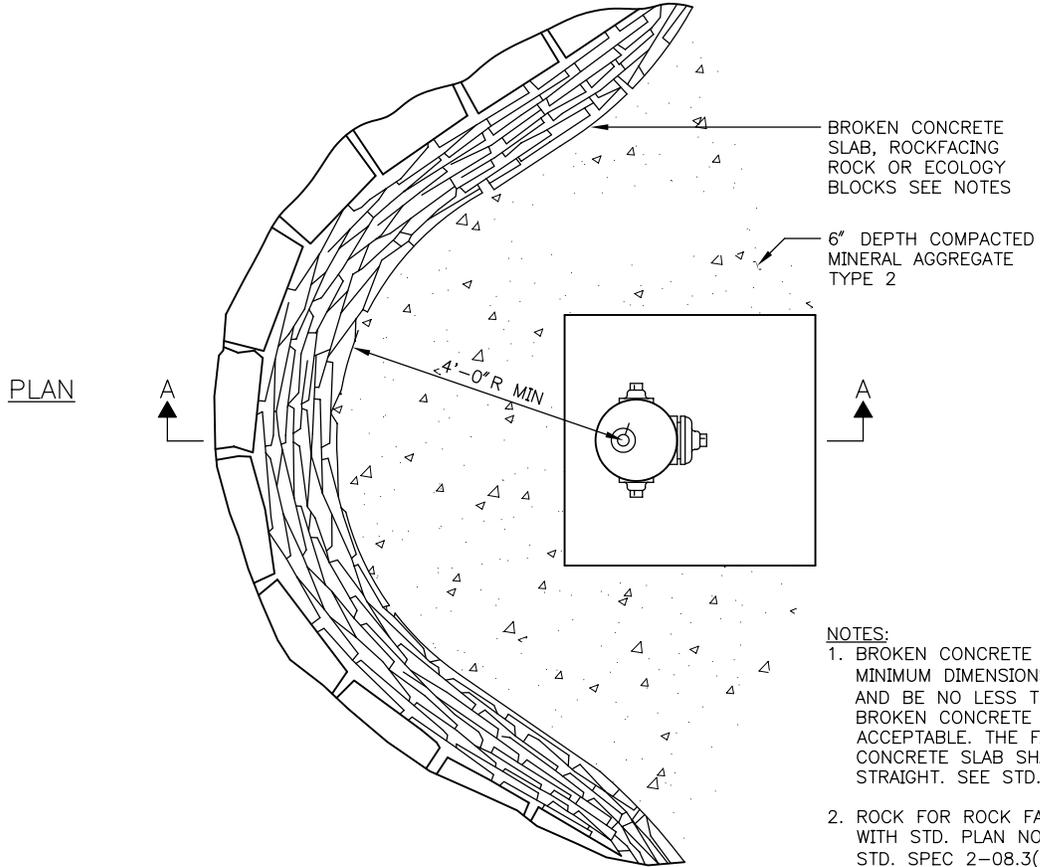
MARKER POST LAYOUT FOR FIRE HYDRANTS IN PARKING AREAS



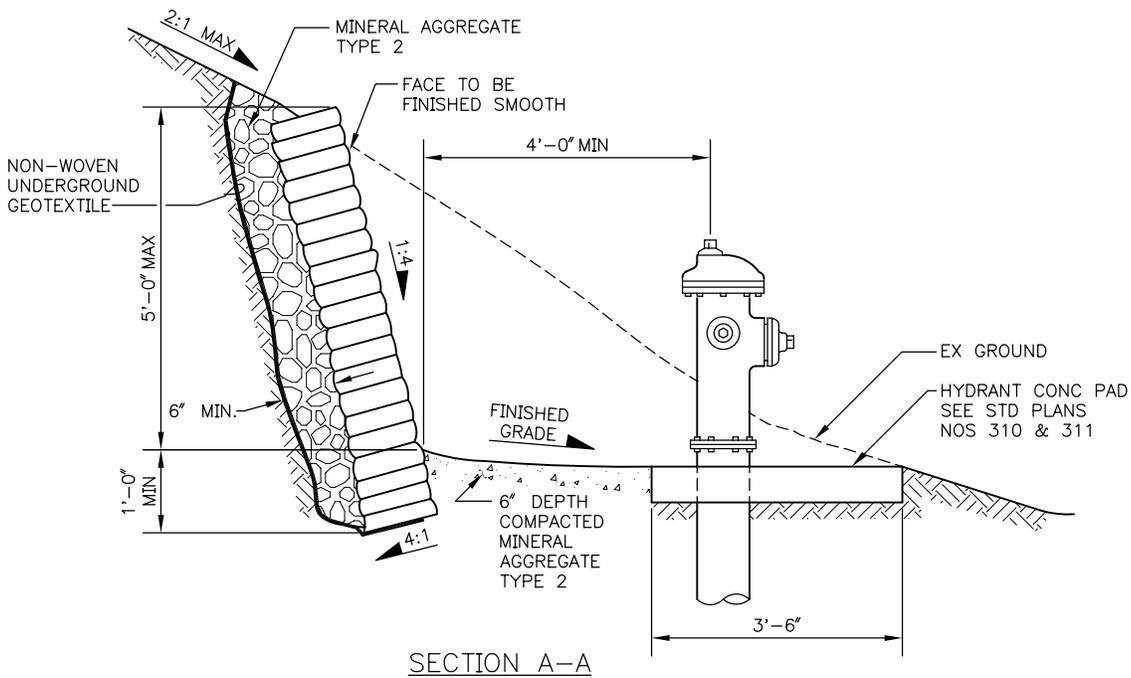
City of Seattle

NOT TO SCALE

FIRE HYDRANT MARKER LAYOUT



- NOTES:**
1. BROKEN CONCRETE SLABS SHALL HAVE MINIMUM DIMENSIONS OF 3'-0" x 1'-6" AND BE NO LESS THAN 3 1/2" THICK. BROKEN CONCRETE SIDEWALK IS ACCEPTABLE. THE FACE SIDE OF CONCRETE SLAB SHALL BE STRAIGHT. SEE STD. SPEC SEC 8-15.3(5)A
  2. ROCK FOR ROCK FACING SHALL COMPLY WITH STD. PLAN NO. 141 SEE STD. SPEC 2-08.3(5)



City of Seattle

NOT TO SCALE

WALL REQUIREMENTS FOR HYDRANTS

# STANDARD PLAN NO 314

REV DATE: 2003

3'-0" MIN, 15'-0" MAX ON CORNERS  
7'-0" MAX MIDBLOCK

CURB OR EDGE OF  
TRAVELED PORTION  
OF ROADWAY

CORNER

R/W MARGIN

5'-0" STD  
5'-0" MIN

DRIVEWAY

NOTES:

1. NO PARKING ZONE WITHIN 15'-0" RADIUS OF FIRE HYDRANT
2. MIN DISTANCE FROM BACK FACE OF HYDRANT TO FRONT EDGE OF CONCRETE WALK SHALL BE 2'-0"

R/W MARGIN

TREE

5'-0" MIN

MID-BLOCK

LOT LINE

3'-0" MIN (TYP)  
OTHERWISE EASEMENT IS REQUIRED

10'-0" MIN

SIDE SEWER

10'-0" STD  
N OR E

UTILITY POLE, GUARD POST, BUILDING WALL OR ANY OTHER FIXED STRUCTURE

3'-0" CLR MIN

5'-0" STD  
R/W MARGIN

SEE DETAIL A

FACE OF CURB

3'-0" MIN

1'-6"

2'-0"

2'-0"

EXPANSION JOINT

SCORED SECTION OF CURB RAMP

☉ STREET

CORNER

DETAIL A  
HYDRANT NEAR CURB RAMP



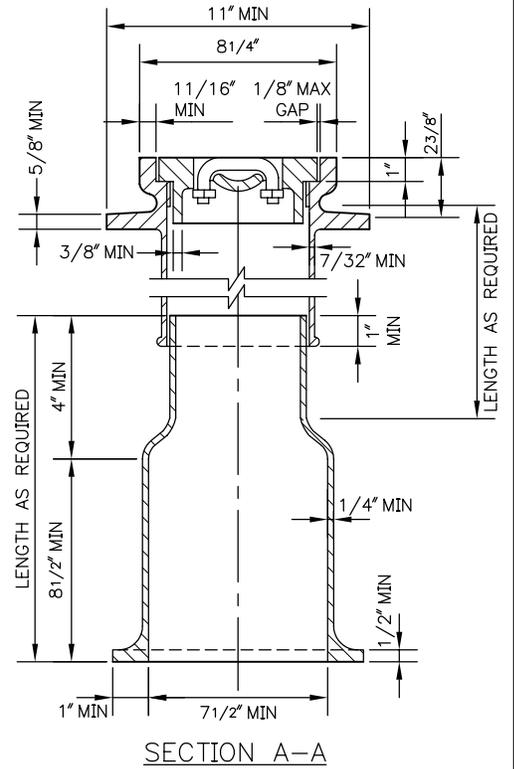
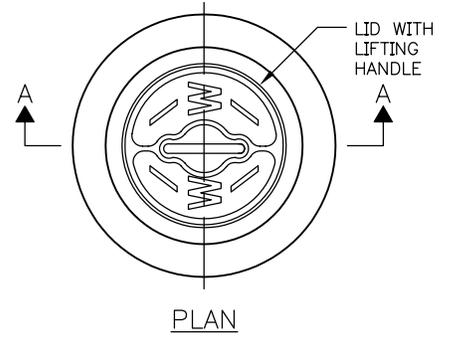
City of Seattle

NOT TO SCALE

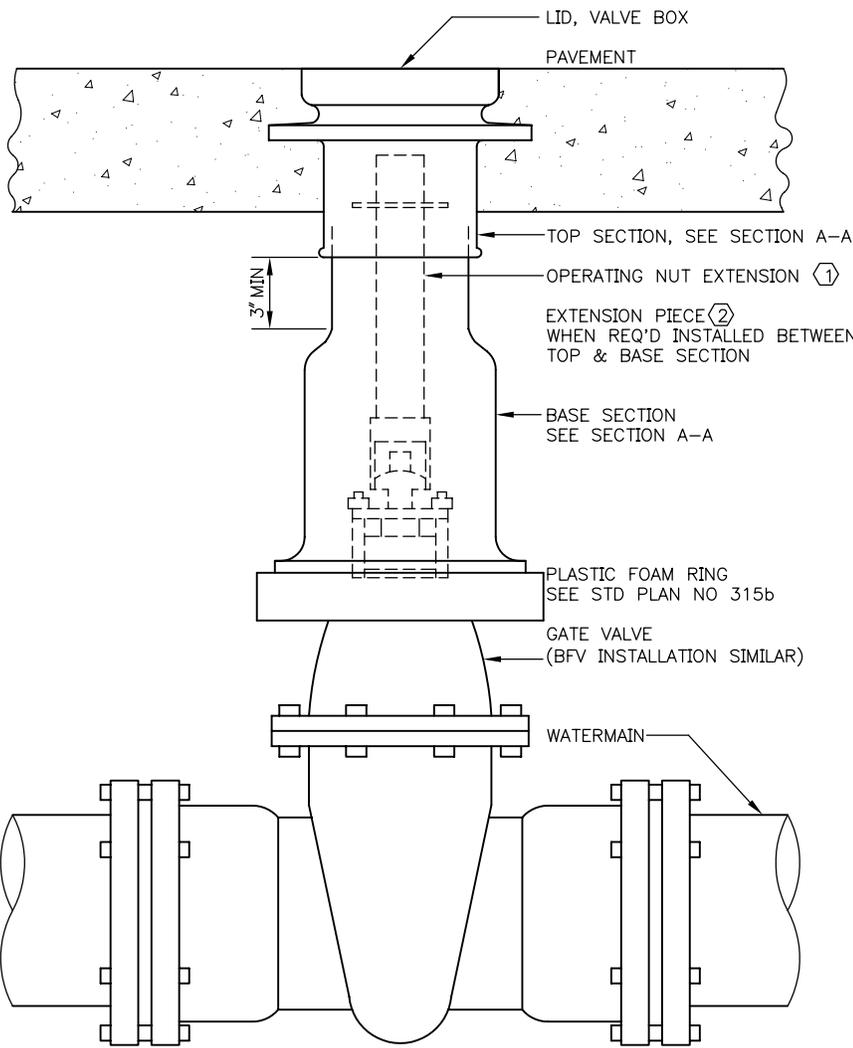
FIRE HYDRANT  
LOCATIONS & CLEARANCES

# STANDARD PLAN NO 315a

REV DATE: 2003



**NOTE:**  
VALVE BOX FOR USE ON 12" OR SMALLER VALVE INSTALLATIONS



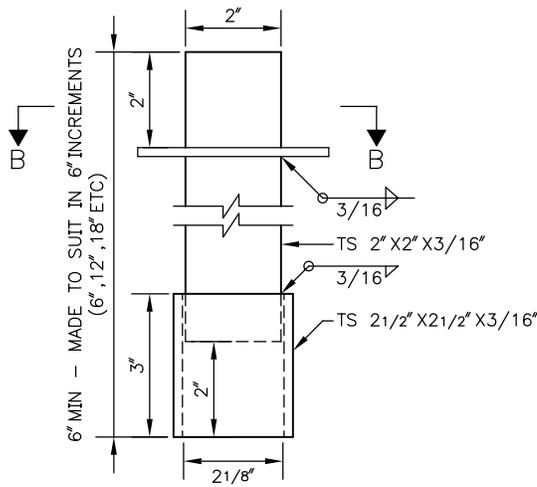
FOR LEGEND AND NOTES SEE STD PLAN NO 315b



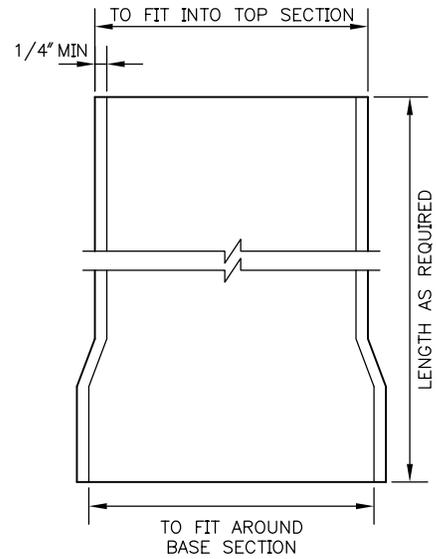
City of Seattle

NOT TO SCALE

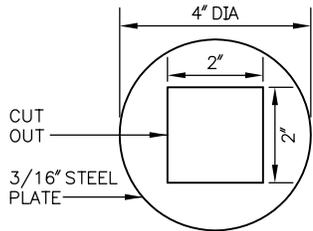
CAST IRON VALVE BOX & OPERATING NUT EXTENSION



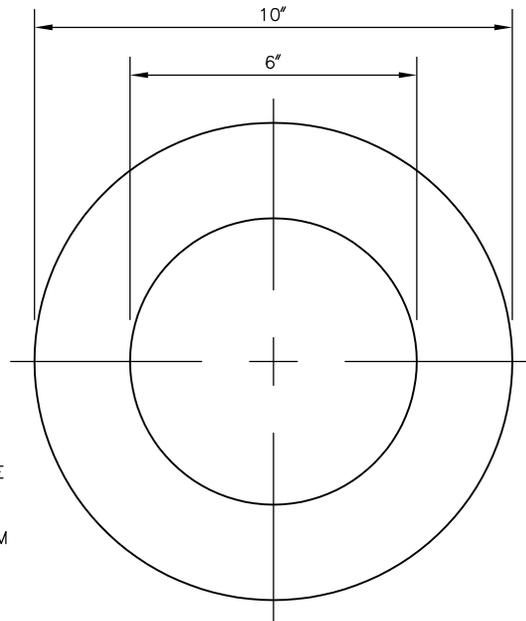
OPERATING NUT EXTENSION DETAIL 1



EXTENSION PIECE 2 WHEN REQUIRED



SECTION B-B



PLASTIC FOAM RING DETAIL

NOTES:

1. FRAME AND COVER SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS FOR DELIVERY
2. CASTINGS AND EXTENSIONS SHALL BE HOT-DIPPED IN ASPHALTIC VARNISH ROYSTON ROSKOTE #612XM OR 2 COATS OF MASTIC ROYSTON INSIDE AND OUT.
3. VALVE BOXES SHALL BE RICH #045: TOP SECTION, LID AND BASE; OR OLYMPIC FOUNDRY: LID #1908-33, TOP SECTION #1106-33, BASE SECTION #1301-33
4. ALL CASTINGS SHALL BE DUCTILE OR GREY CAST IRON

LEGEND:

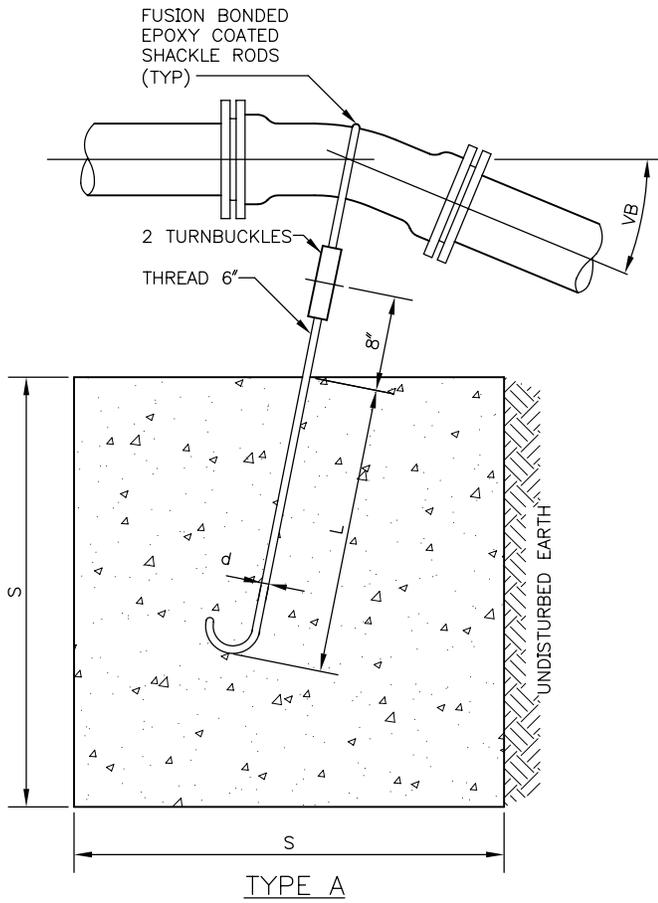
- 1 AN OPERATING NUT EXTENSION SHALL BE INSTALLED WHEN THE GROUND SURFACE IS MORE THAN 2'-6" ABOVE THE VALVE OPERATING NUT. THE OPERATING NUT EXTENSION SHALL EXTEND INTO THE TOP SECTION OF THE STANDARD VALVE BOX AND SHALL CLEAR THE BOTTOM OF THE LID BY 6" MIN
- 2 EXTENSION PIECES (WHEN USED) SHALL CONFORM TO MINIMUM THICKNESS REQUIREMENTS AND SHALL FIT INTO THE TOP SECTION AND OVER THE BOTTOM SECTION



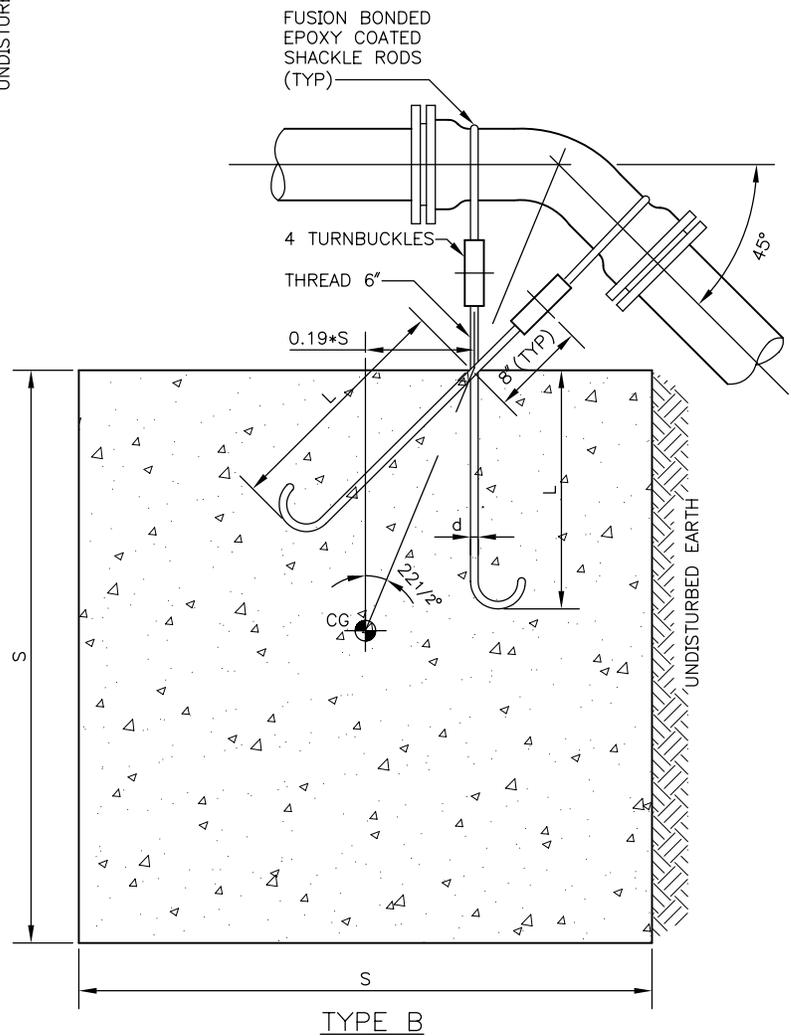
City of Seattle

NOT TO SCALE

CAST IRON VALVE BOX & OPERATING NUT EXTENSIONS



TYPE A BLOCKING FOR 11 1/4° & 22 1/2° VERTICAL BENDS						
PIPE SIZE NOM DIA INCHES	TEST PRESSURE PSI	VB	NO OF CU FT OF CONC BLOCKING	SIDE OF CUBE FEET	d	L
4"	300	11 1/4	8	2	3/4	18
		22 1/2	12	2 1/4		24
6"	300	11 1/4	12	2 1/4	3/4	24
		22 1/2	27	3		24
8"	300	11 1/4	16	2 1/2	3/4	24
		22 1/2	43	3 1/2		24
12"	300	11 1/4	64	4	-	24
		22 1/2	125	5		36



TYPE B BLOCKING FOR 45° VERTICAL BENDS						
PIPE SIZE NOM DIA INCHES	TEST PRESSURE PSI	VB	NO OF CU FT OF CONC BLOCKING	SIDE OF CUBE FEET	d	L
4"	300	45	27	3	3/4	20
6"			64	4		
8"			125	5		
12"			216	6		

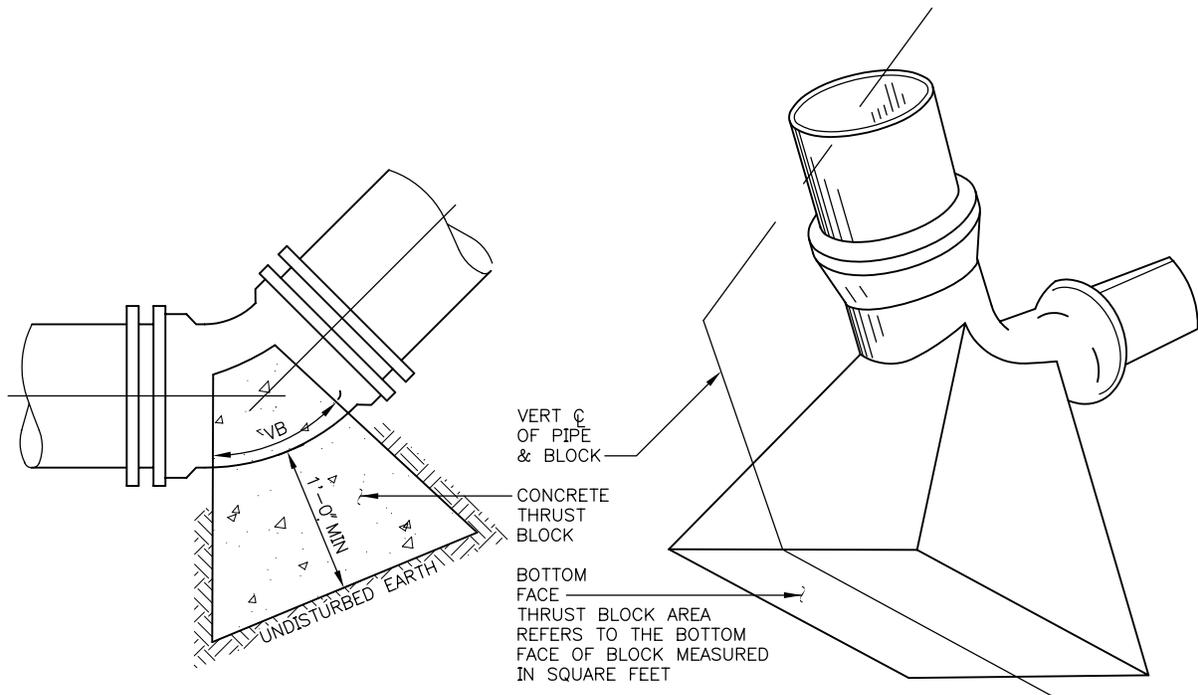
FOR NOTES SEE STD PLAN NO 330b



City of Seattle

NOT TO SCALE

WATERMAIN THRUST BLOCKING  
VERTICAL FITTINGS



TYPE C

TYPE "C" BLOCKING FOR 1 1/4", 2 1/2", 45° AND 90° VERTICAL BENDS										
THRUST BLOCK AREA IN SQUARE FEET										
PIPE SIZE	FITTING	FIRM SILT OR FIRM SILTY SAND			COMPACT SAND			COMPACT SAND & GRAVEL		
		90° BEND	TEE 45° BEND & DEAD END	1 1/4" & 2 1/2" BEND	90° BEND	TEE 45° BEND & DEAD END	1 1/4" & 2 1/2" BEND	90° BEND	TEE 45° BEND & DEAD END	1 1/4" & 2 1/2" BEND
4"		5.8	4.2	1.7	2.9	2.1	1.0	2.2	1.6	1.0
6"		13.3	9.4	3.8	6.7	4.7	1.9	5.0	3.5	1.4
8"		23.3	16.7	6.7	11.7	8.4	3.4	8.8	6.3	2.5
12"		53.0	37.5	15.0	26.5	18.8	7.5	20.0	14.0	5.6

AREAS CALCULATED ON 300 PSI TEST PRESSURE AND 3'-0" MIN COVER OVER WATERMAIN

NOTES:

1. LOCATION AND SIZE OF BLOCKING FOR PIPE LARGER THAN 12" DIAMETER AND FOR SOIL TYPES DIFFERENT THAN SHOWN SHALL BE DETERMINED BY THE ENGINEER
2. ALL BLOCKING FOR VERTICAL FITTINGS (POURED IN PLACE) SHALL BEAR AGAINST UNDISTURBED NATIVE GROUND
3. ALL POURED THRUST BLOCKS SHALL BE BACKFILLED AFTER MIN. 1 DAY. PRESSURE TESTING SHALL OCCUR AFTER CONCRETE HAS REACHED f'c
4. ALL BLOCKING SHALL BE CONCRETE CL 5 (1 1/2)
5. AFTER INSTALLATION, SHACKLE RODS & TURNBUCKLES SHALL BE CLEANED AND COATED WITH 2 COATS OF ASPHALTIC VARNISH, ROYSTON ROYKOTE #612M OR APPROVED EQUAL
6. SHACKLE RODS SHALL BE FUSION BONDED EPOXY COATED ROUND MILD STEEL, ASTM A 36, WITH THREADS ON ENDS ONLY
7. BLOCKING AGAINST FITTINGS SHALL BEAR AGAINST THE GREATEST FITTING SURFACE AREA POSSIBLE, BUT SHALL NOT COVER OR ENCLOSE BELL ENDS, JOINT BOLTS OR GLANDS. REASONABLE ACCESS TO BOLTS AND GLANDS SHALL BE PROVIDED



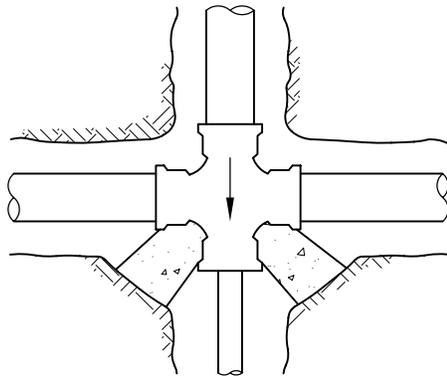
City of Seattle

NOT TO SCALE

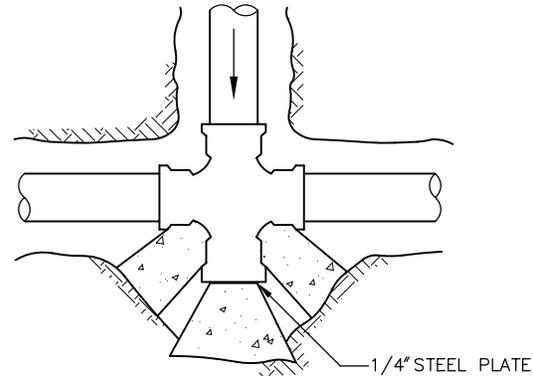
WATERMAIN THRUST BLOCKING  
VERTICAL FITTINGS

# STANDARD PLAN NO 331a

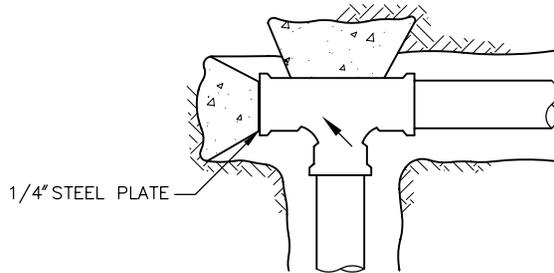
REV DATE: 2003



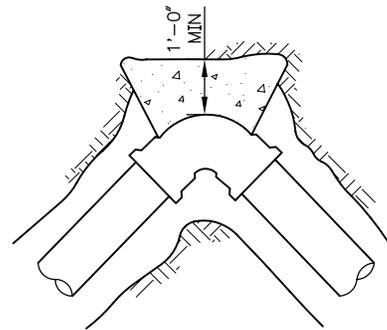
UNBALANCED CROSS



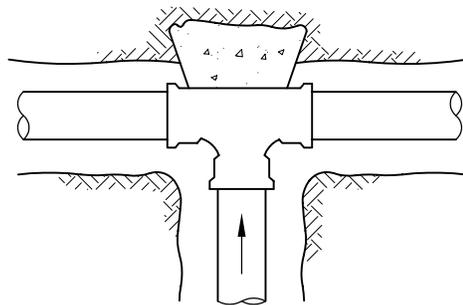
CROSS WITH PLUG



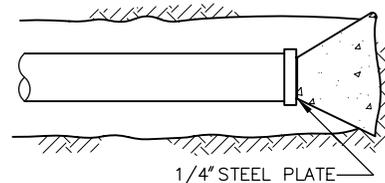
PLUGGED TEE



HORIZONTAL BEND



TEE



PIPE & CAP

THRUST BLOCK AREA IN SQUARE FEET (SEE STD PLAN NO 331b)												
PIPE SIZE	FIRM SILT OR FIRM SILTY SAND				COMPACT SAND				COMPACT SAND & GRAVEL			
	90° BEND	TEE	45° BEND CAP OR PLUG	11 1/4° & 22 1/2° BEND	90° BEND	TEE	45° BEND CAP OR PLUG	11 1/4° & 22 1/2° BEND	90° BEND	TEE	45° BEND CAP OR PLUG	11 1/4° & 22 1/2° BEND
4"	7.0	4.2	4.2	1.7	2.9	2.1	2.1	1.0	2.2	1.6	1.6	1.0
6"	13.3	9.4	9.4	3.8	6.7	4.7	4.7	1.9	5.0	3.5	3.5	1.4
8"	23.3	16.7	16.7	6.7	11.7	8.4	8.4	3.4	8.8	6.3	6.3	2.5
12"	53.0	37.5	37.5	15.0	26.5	18.8	18.8	7.5	20.0	14.0	14.0	5.6

AREAS CALCULATED ON 300 PSI TEST PRESSURE AND 3'-0" MIN COVER OVER WATERMAIN

 ECOLOGY BLOCKS, PER STD PLAN NO 460, MAY BE USED IN LIEU OF POURED-IN-PLACE BLOCKING FOR FITTINGS IN SHADED PORTION OF TABLE

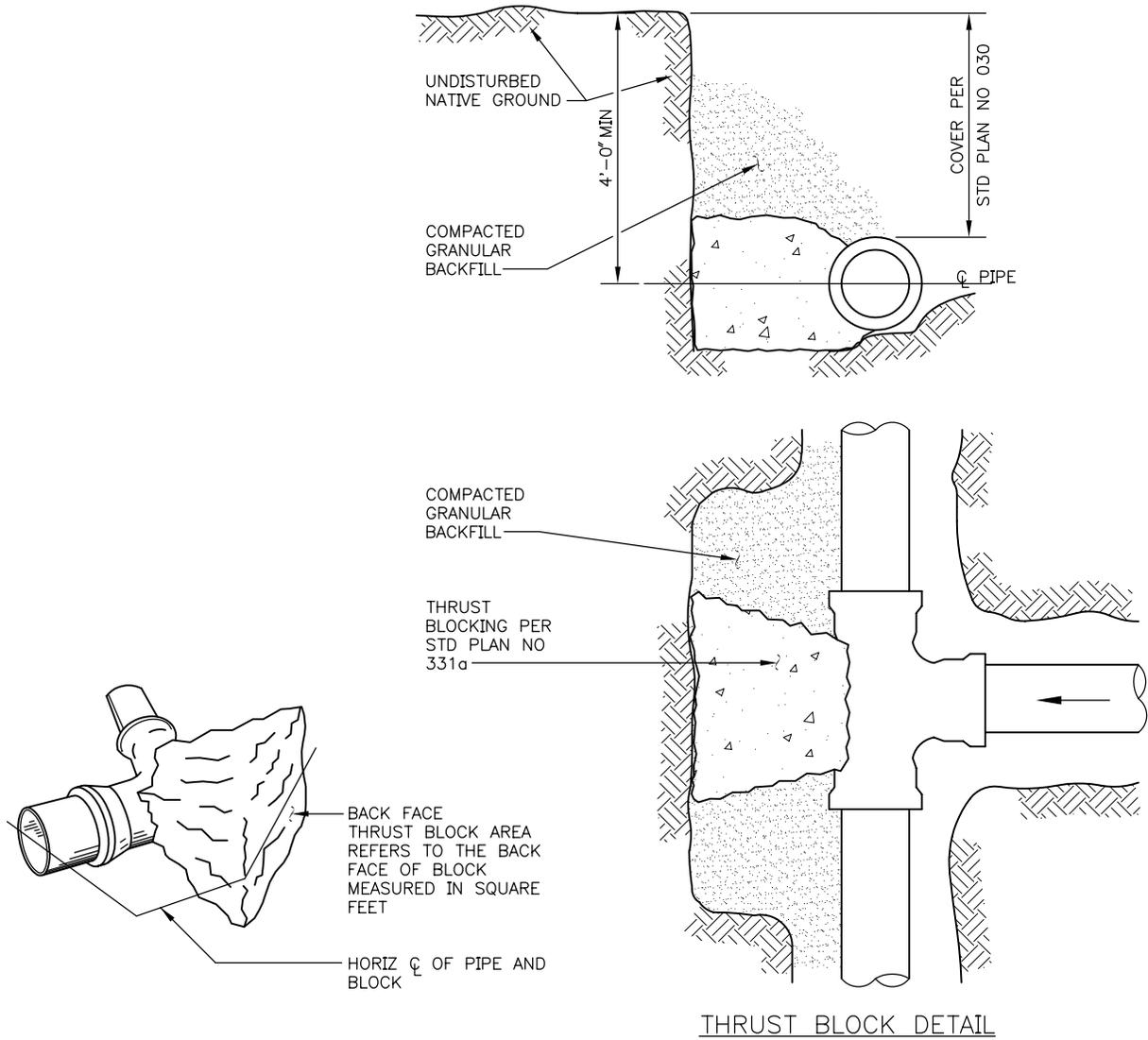
FOR NOTES SEE STD PLAN NO 331b



City of Seattle

NOT TO SCALE

WATERMAIN THRUST BLOCKING HORIZONTAL FITTINGS



NOTES:

1. LOCATION AND SIZE OF BLOCKING FOR PIPE LARGER THAN 12" DIAMETER AND FOR SOIL TYPES DIFFERENT THAN SHOWN SHALL BE DETERMINED BY THE ENGINEER.
2. ALL BLOCKING FOR HORIZONTAL FITTINGS (POURED IN PLACE) SHALL BEAR AGAINST UNDISTURBED NATIVE GROUND.
3. ALL POURED THRUST BLOCKS SHALL BE BACKFILLED AFTER MIN. 1 DAY. PRESSURE TESTING SHALL OCCUR AFTER CONCRETE HAS REACHED f'c.
4. ALL BLOCKING TO BE CONCRETE CL 5 (1 1/2).
5. BLOCKING AGAINST FITTINGS SHALL BEAR AGAINST THE GREATEST FITTING SURFACE AREA POSSIBLE, BUT SHALL NOT COVER OR ENCLOSE BELL ENDS, JOINT BOLTS OR GLANDS. ACCESS TO BOLTS AND GLANDS SHALL BE PROVIDED.
6. ALL HORIZONTAL BLOCKING THRUST AREAS SHALL BE CENTERED ON PIPE.
7. WHERE POURED-IN-PLACE BLOCKING IS REQUIRED AT A POINT OF CONNECTION TO AN EXISTING WATERMAIN, THE BLOCKING SHALL BE INSTALLED PRIOR TO CONNECTION.
8. TEMPORARY BLOCKING, IF USED, SHALL BE APPROVED BY ENGINEER.



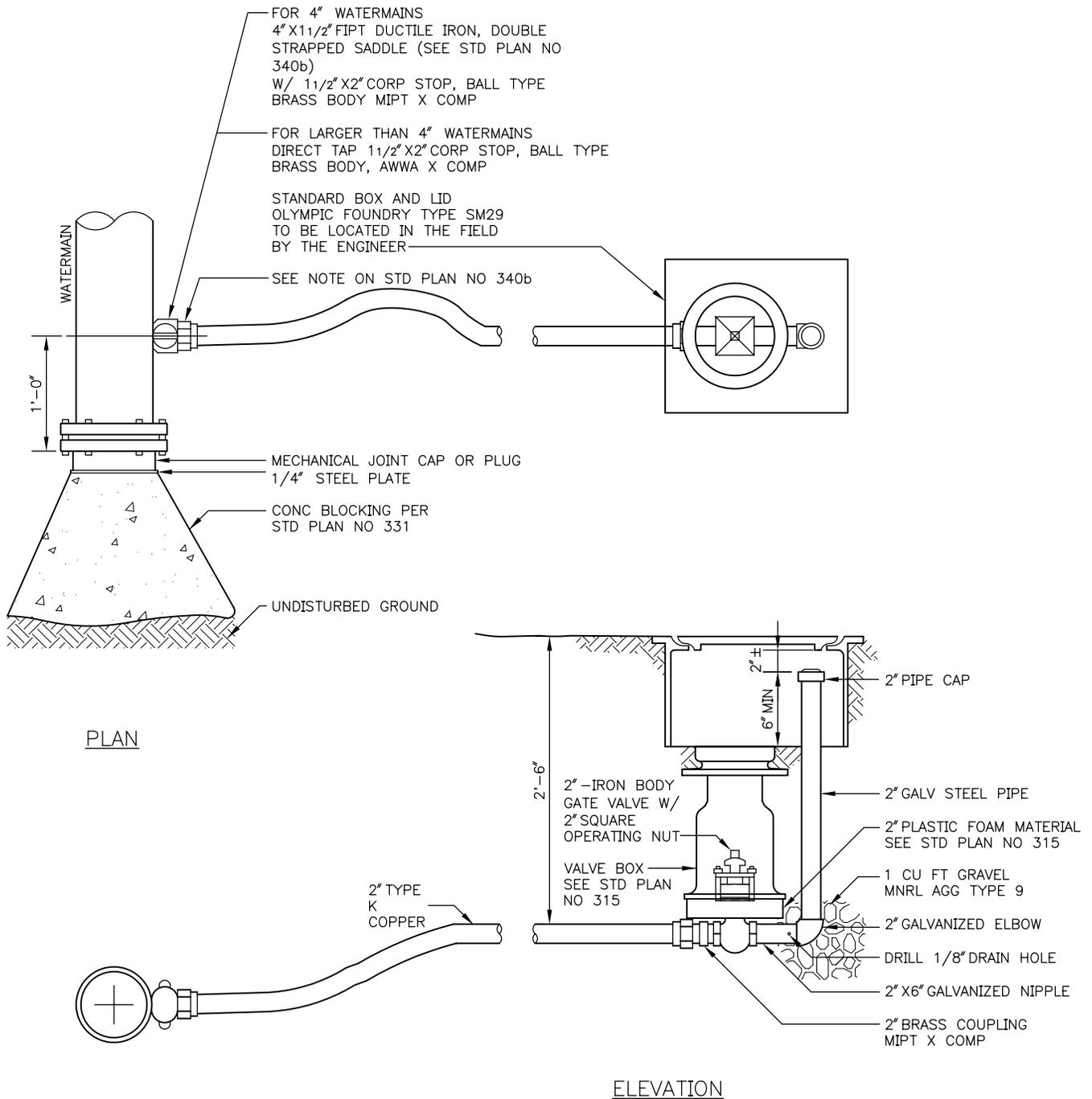
City of Seattle

NOT TO SCALE

WATERMAIN THRUST BLOCKING  
HORIZONTAL FITTINGS

# STANDARD PLAN NO 340a

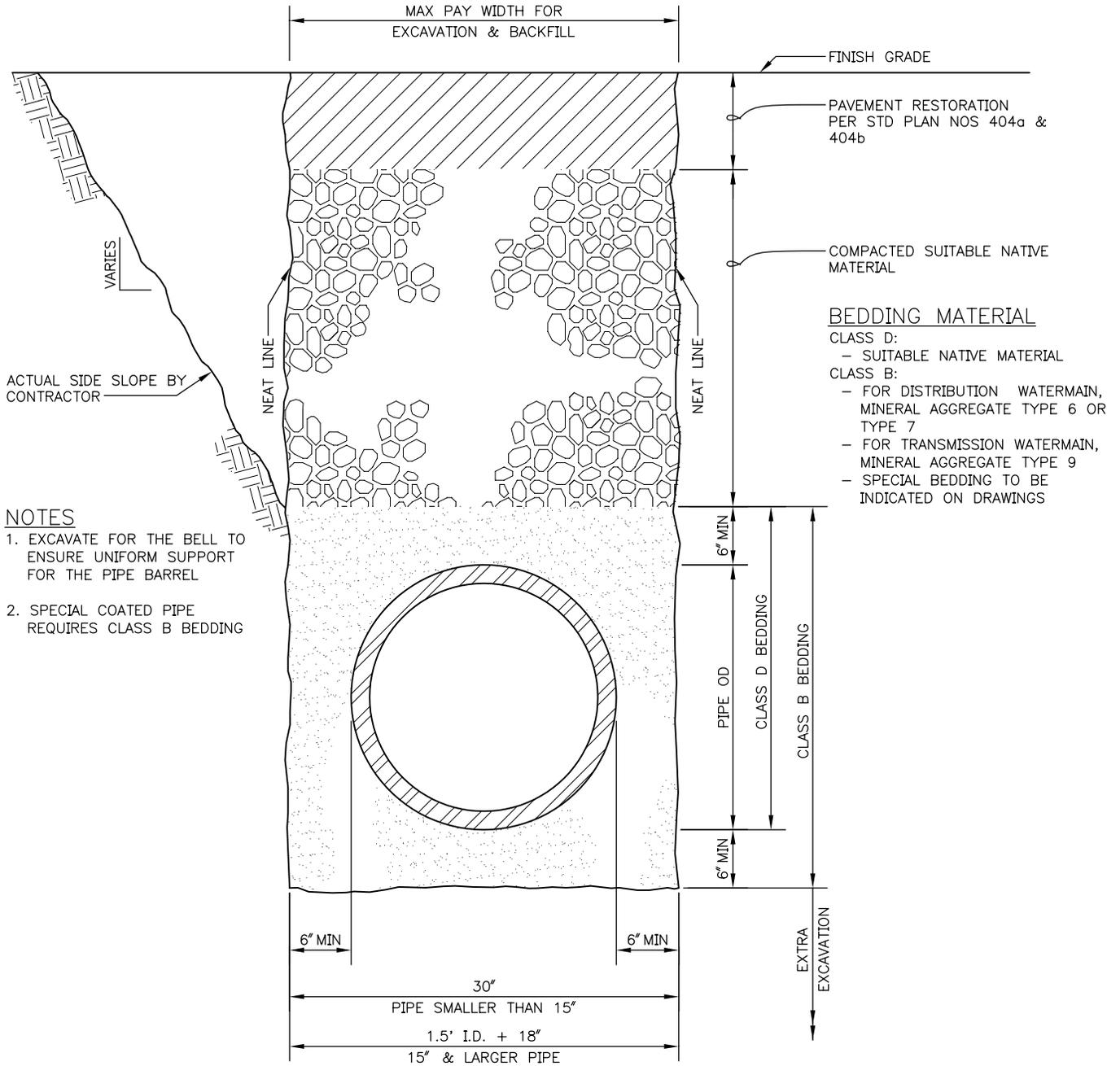
REV DATE: 2003

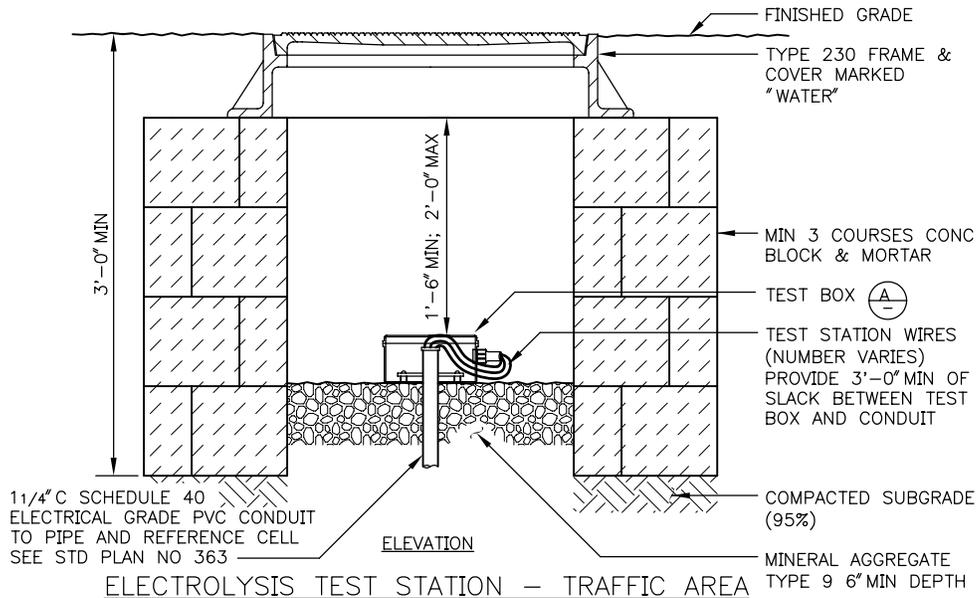


City of Seattle

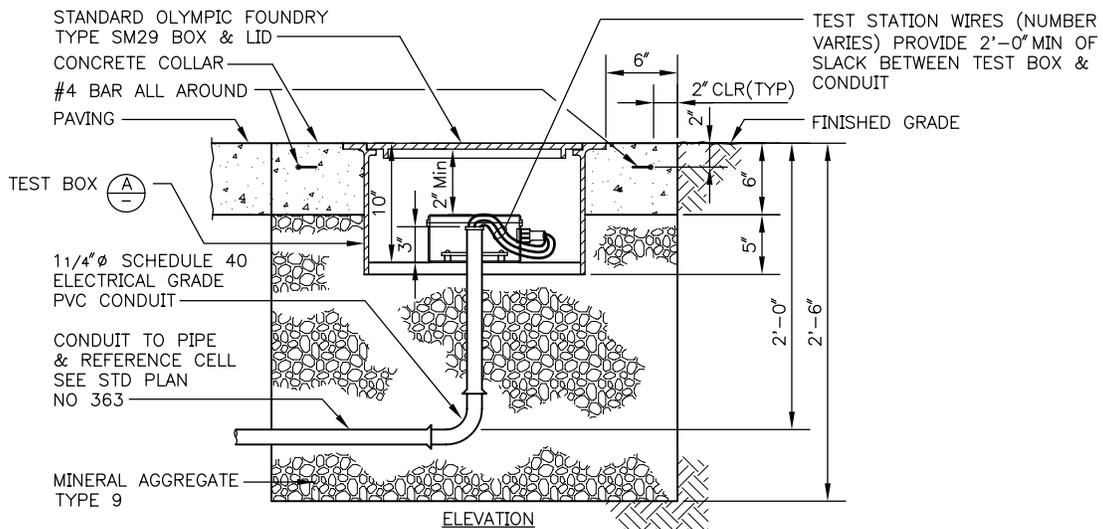
NOT TO SCALE

2" BLOW OFF TYPE A  
NON TRAFFIC INSTALLATION

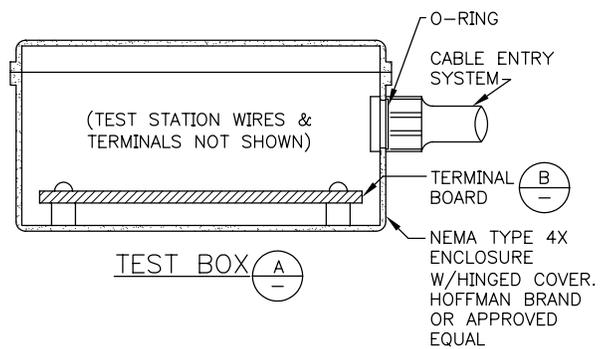
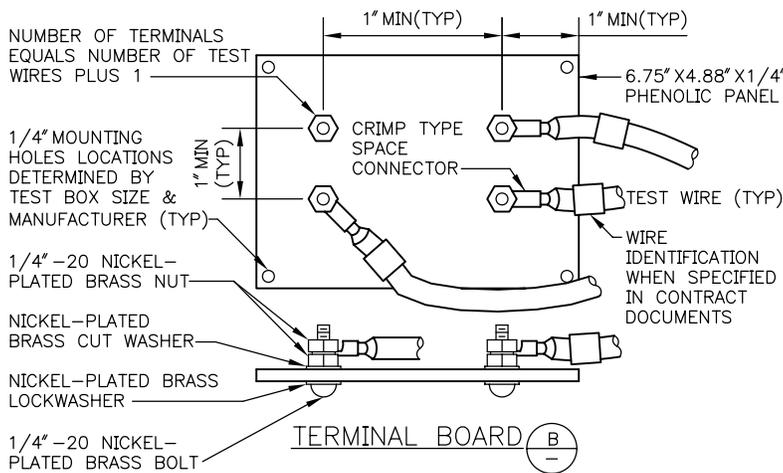




ELECTROLYSIS TEST STATION - TRAFFIC AREA

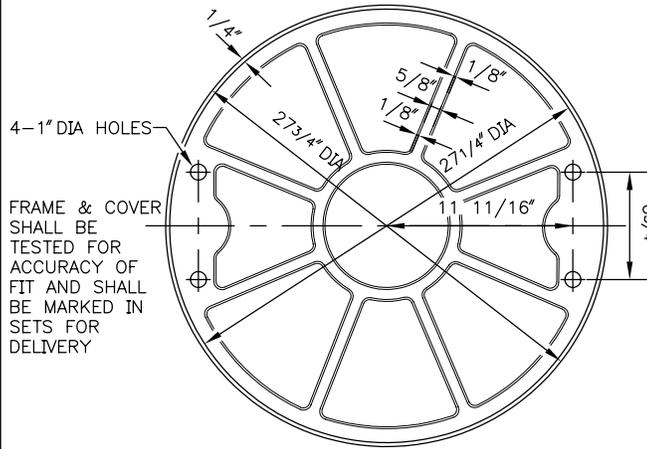


ELECTROLYSIS TEST STATION - NON-TRAFFIC AREA

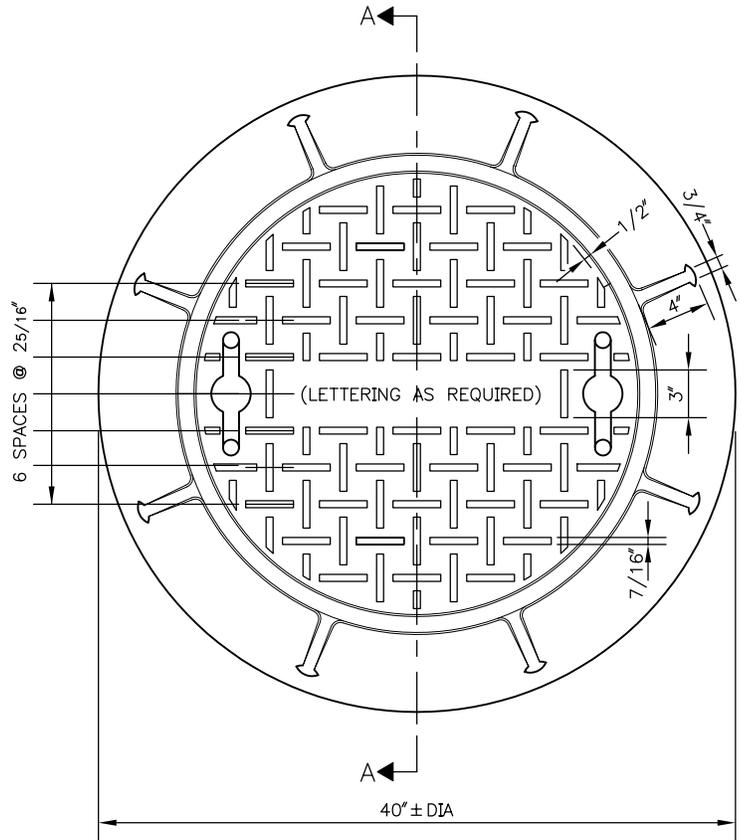


# STANDARD PLAN NO 361

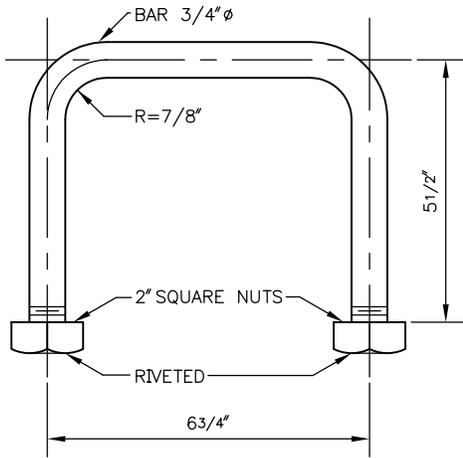
REV DATE: 2003



**BOTTOM VIEW**

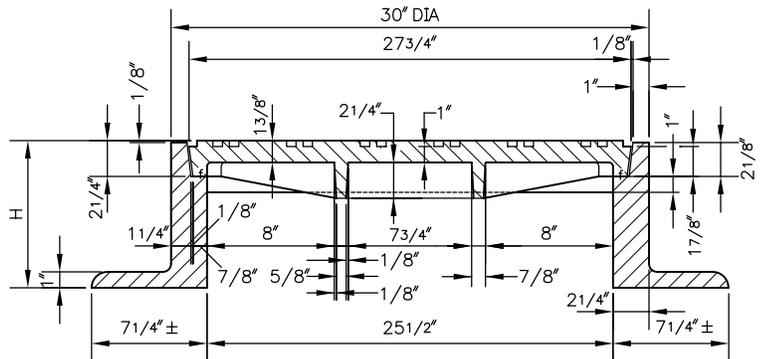


**TOP VIEW**



**LIFTING HANDLE**  
(2 REQUIRED)

TYPE 361  
H=9 1/4"  
DESIGNATE  
SHALLOW  
FRAME AS  
TYPE 361S  
H=4 1/4"  
f=MACHINED  
FINISH



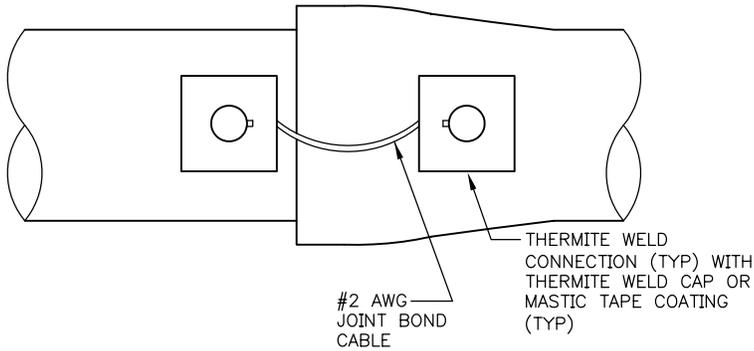
**SECTION A-A**



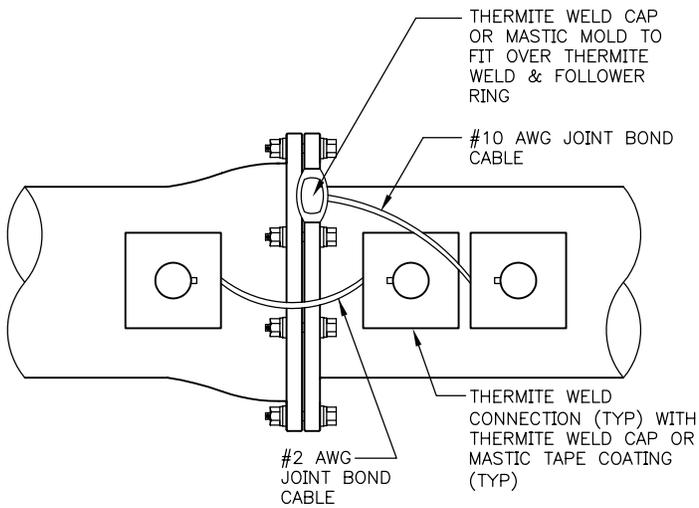
City of Seattle

NOT TO SCALE

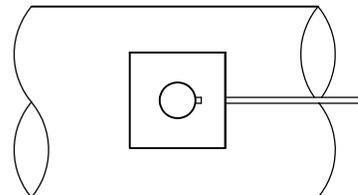
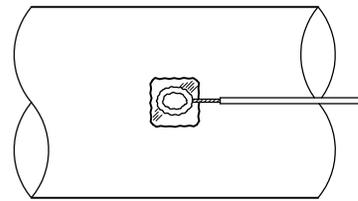
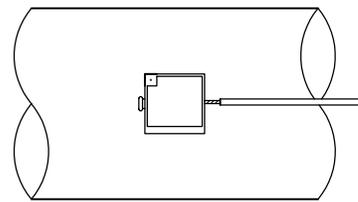
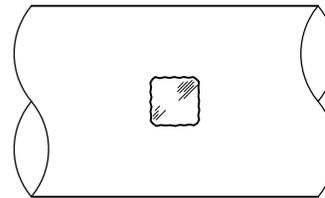
TYPE 361 VALVE CHAMBER  
FRAME & COVER



SLIP JOINT BOND CONNECTION



MECHANICAL JOINT BOND CONNECTION



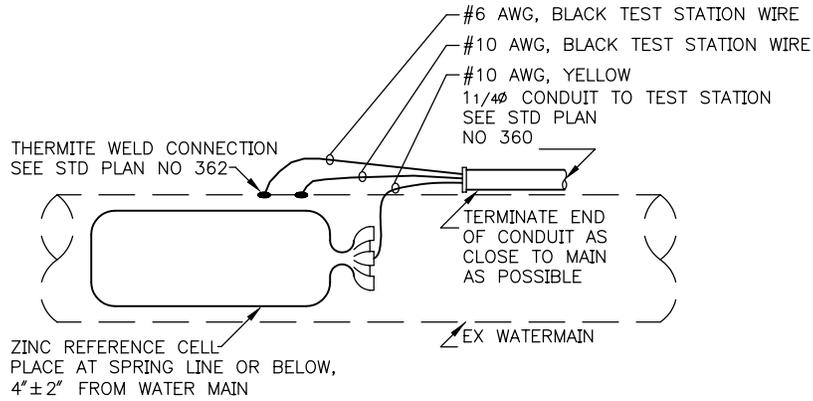
CONNECTION SEQUENCE:

1. REMOVE PIPE COATING TO BRIGHT & CLEAN METAL
2. STRIP INSULATION FROM TEST STATION WIRE, INSTALL ADAPTER SLEEVE
3. HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR AND IGNITE
4. REMOVE SLAG AND ALLOW TO COOL
5. 16 OUNCE HAMMER TEST PER STD. SPEC SEC 7- 11.3(15)01
6. FINAL CONNECTION TO BE MADE WATERTIGHT WITH MASTIC COATING OR PREFORMED THERMITE WELD CAP

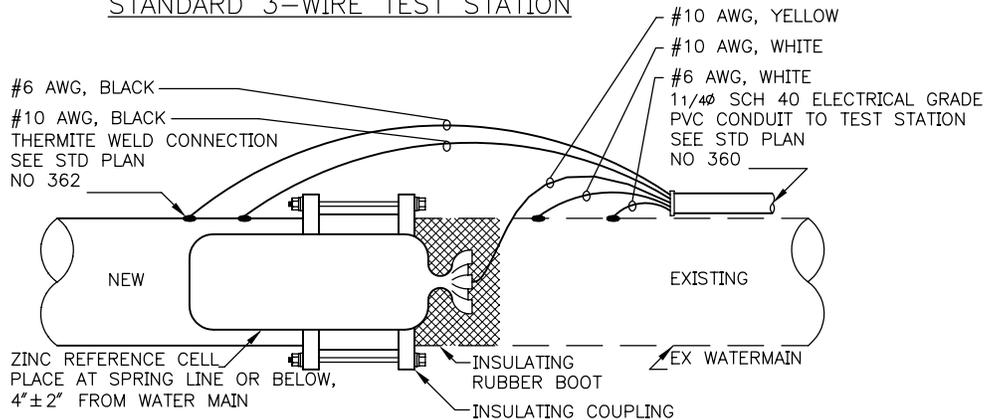
THERMITE WELD CONNECTION



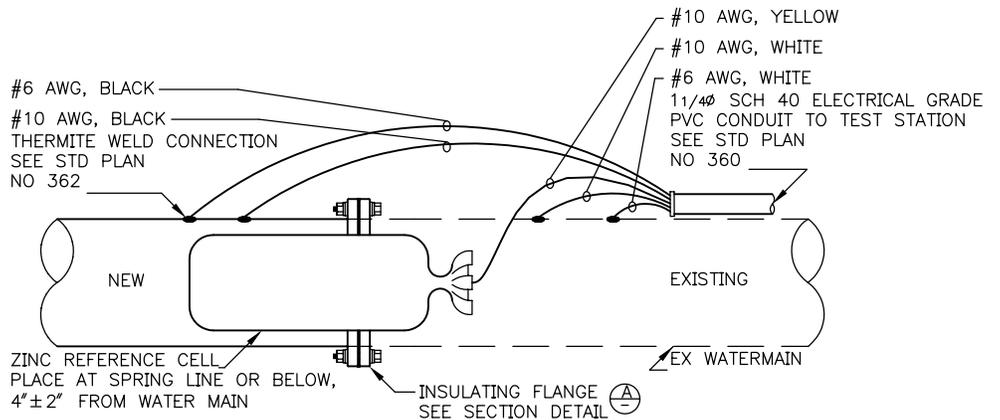
NOTE:  
WIRE INSTALLATION PER  
STD SPEC SEC 9-30.12(3)



STANDARD 3-WIRE TEST STATION



INSULATING COUPLING 5-WIRE TEST STATION



INSULATING FLANGE 5-WIRE TEST STATION

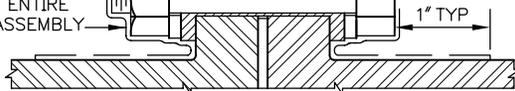
TYPE E NEOPRENE  
FACED PHENOLIC  
INSULATING GASKET

PHENOLIC OR SPIRAL  
WOUND MYLAR  
INSULATING SLEEVE  
(LENGTH OF SLEEVE  
TO BE 1/16" LESS  
THAN SPACING  
BETWEEN STEEL  
WASHERS)

PHENOLIC INSULATING  
WASHER

STEEL WASHER

PETROLATUM TAPE  
ENCLOSE ENTIRE  
FLANGE ASSEMBLY



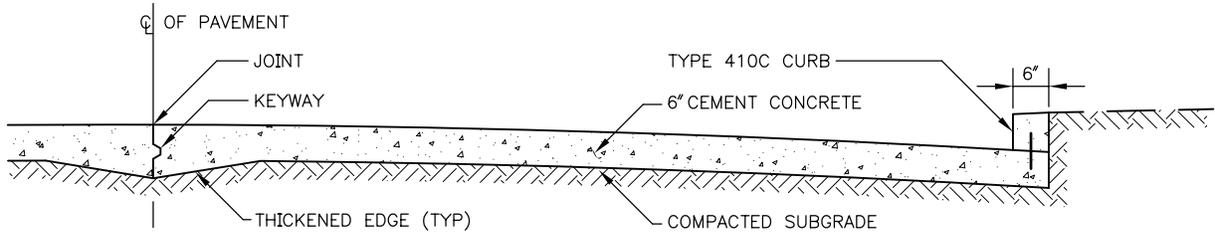
A  
INSULATING FLANGE SECTION DETAIL



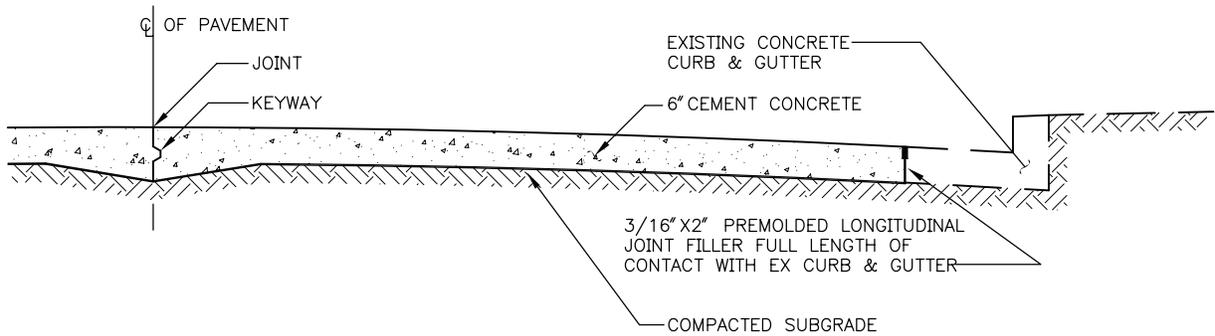
City of Seattle

NOT TO SCALE

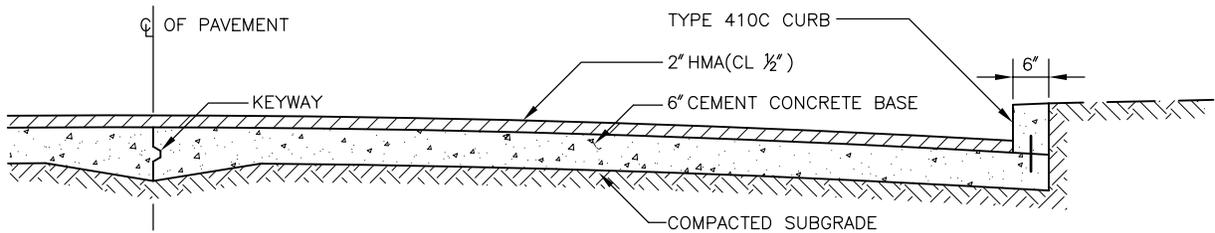
ELECTROLYSIS TEST STATION  
WIRE INSTALLATION DETAILS



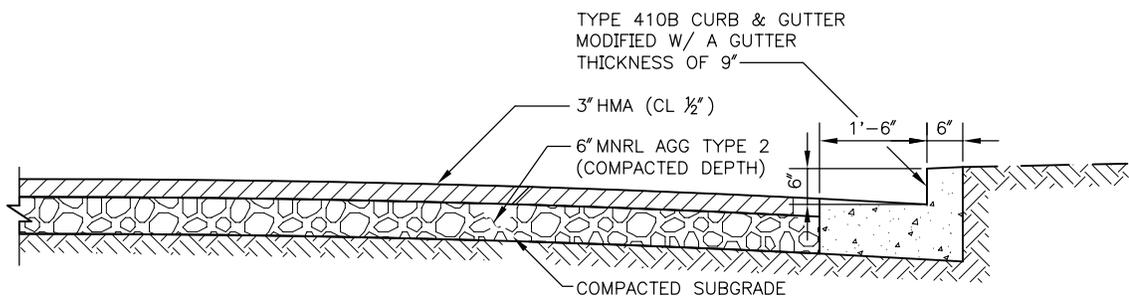
401A-CEMENT CONCRETE PAVEMENT WITH INTEGRAL CURB



401B-CEMENT CONCRETE PAVEMENT WITH EXISTING CURB & GUTTER



401C-HOT MIX ASPHALT ON CEMENT CONCRETE BASE



401D-HOT MIX ASPHALT OVER CRUSHED ROCK BASE

NOTES:

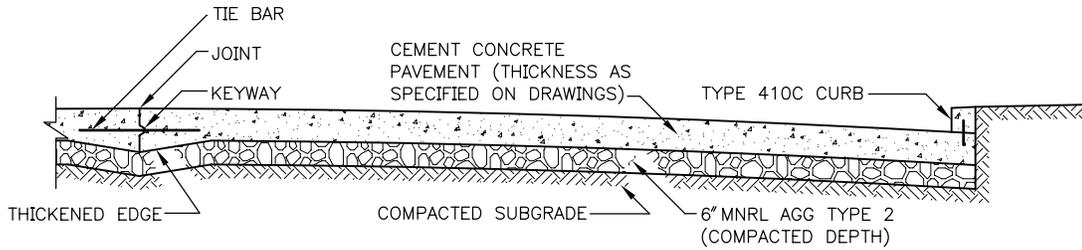
1. CONC CL 6 (1 1/2) UNLESS OTHERWISE SPECIFIED ON DRAWINGS
2. FOR JOINT DETAILS, SEE STD PLAN NO 405
3. 3 MILLION EASL'S UNLESS OTHERWISE SPECIFIED ON DRAWINGS
4. USE ASPHALT PG 64-22 UNLESS OTHERWISE SPECIFIED ON DRAWINGS



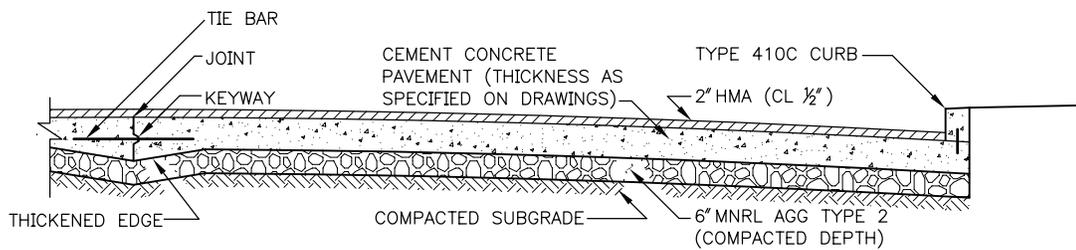
City of Seattle

NOT TO SCALE

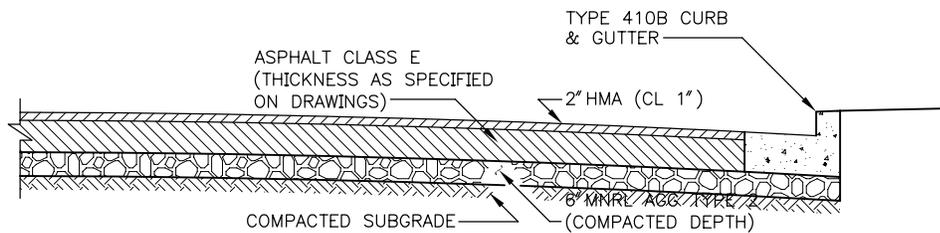
RESIDENTIAL PAVEMENT SECTIONS



402A—CEMENT CONCRETE PAVEMENT ON CRUSHED ROCK



402B—HOT MIX ASPHALT ON CEMENT CONCRETE ON CRUSHED ROCK



402D—HOT MIX ASPHALT ON CRUSHED ROCK BASE

NOTES:

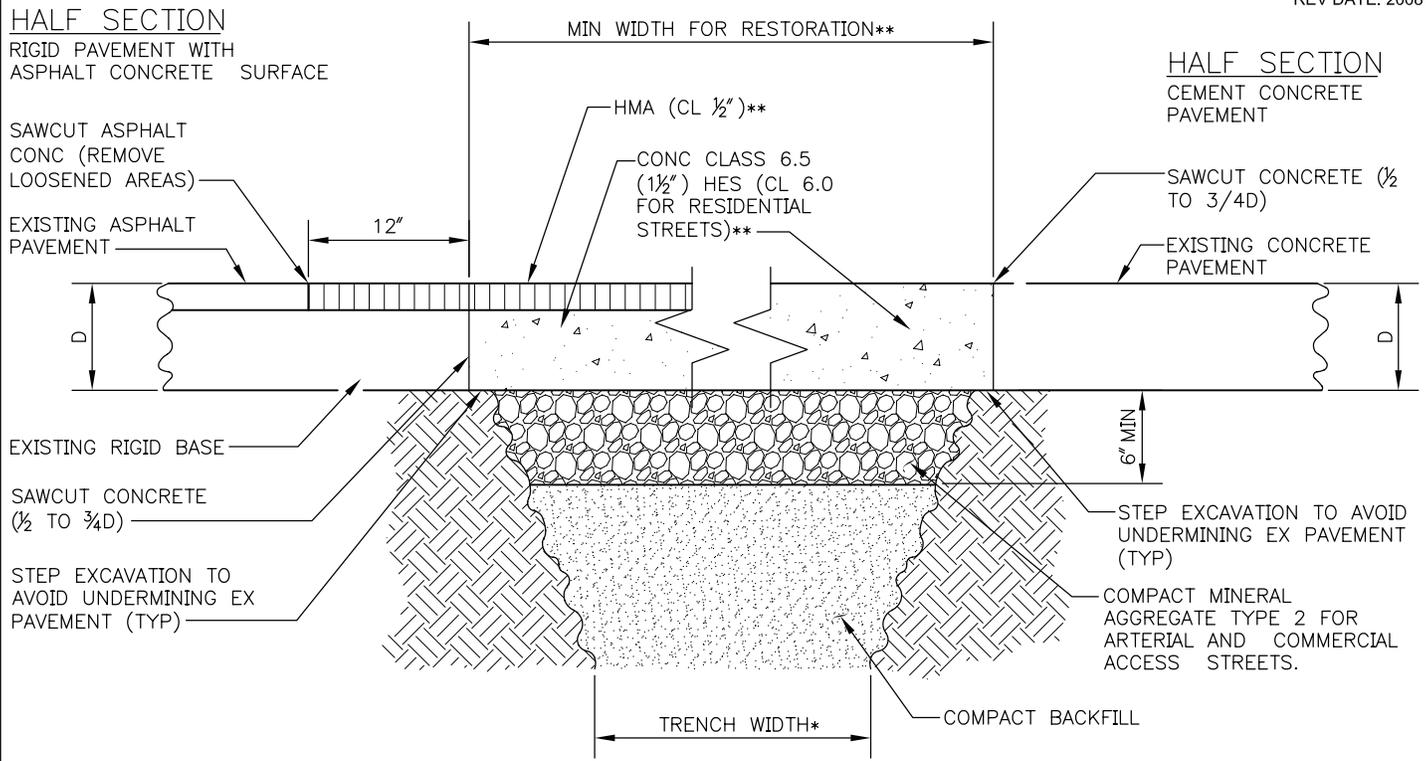
1. PAVEMENT WIDTH AND THICKNESS AS SPECIFIED ON DRAWINGS
2. CONC CL 6.5 (1 1/2) UNLESS OTHERWISE SPECIFIED ON DRAWINGS
3. TIE BARS AND DOWELL BARS ARE REQUIRED FOR CEMENT CONCRETE PAVEMENT AND BASE (SEE STD PLAN NO 405)
4. FOR THICKENED EDGE AND JOINT DETAILS, SEE STD PLAN NO 405
5. 10 MILLION ESAL'S UNLESS OTHERWISE SPECIFIED ON DRAWINGS
6. USE ASPHALT PG 64-22 UNLESS OTHERWISE SPECIFIED ON DRAWINGS



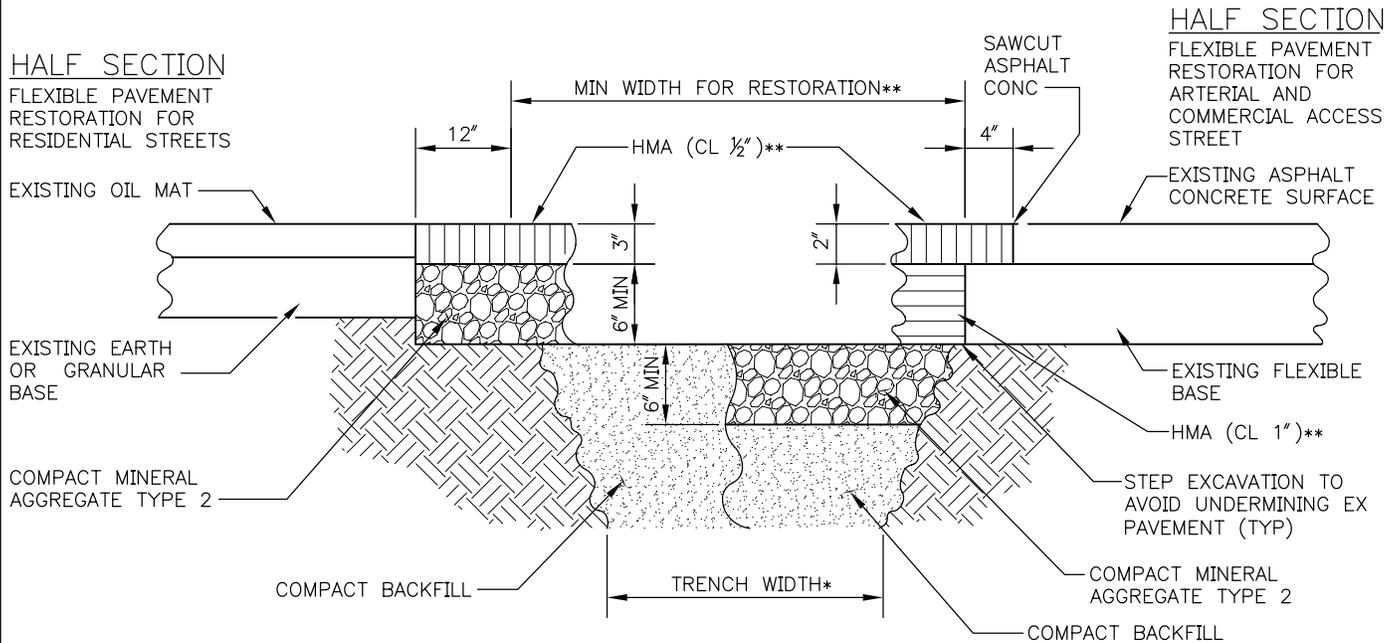
City of Seattle

NOT TO SCALE

COMMERCIAL AND  
ARTERIAL PAVEMENT  
SECTIONS



TYPICAL PATCH FOR RIGID PAVEMENT



TYPICAL PATCH FOR FLEXIBLE PAVEMENT

\* TRENCH WIDTH SHALL MEET THE MAX PAY TRENCH WIDTH AS CALLED OUT ON STD PLAN NOS 284 & 350

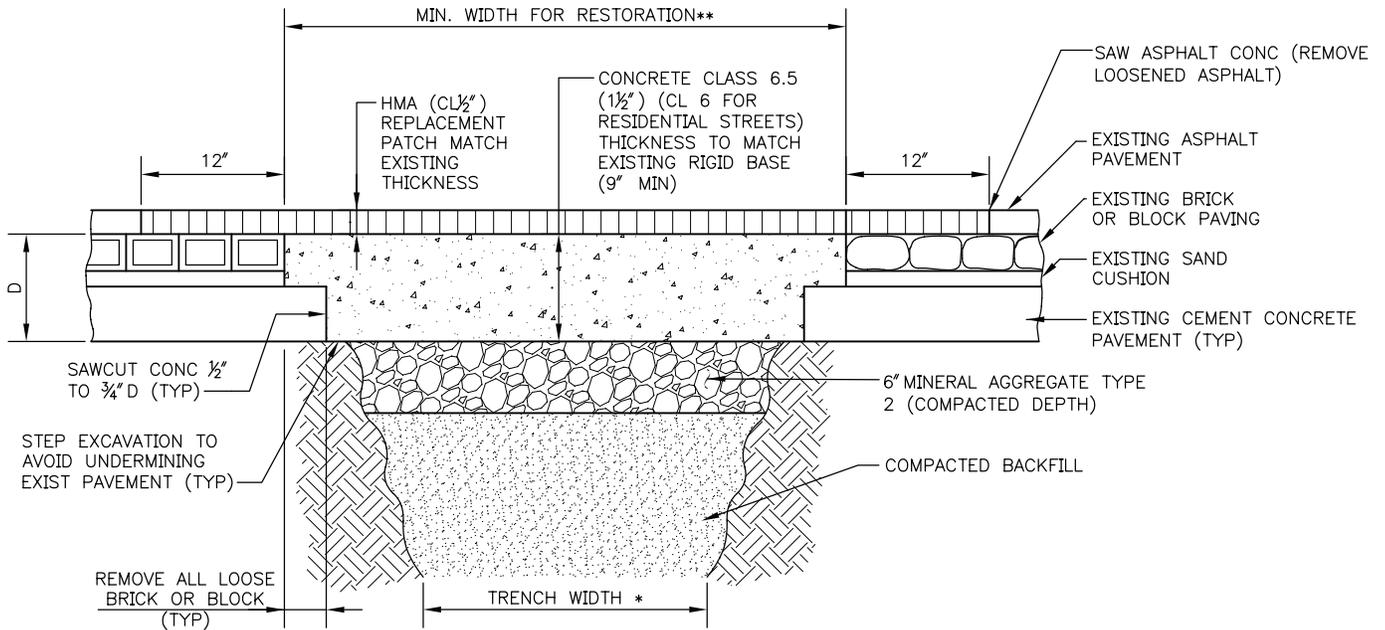
\*\* MIN WIDTH AND DEPTH OF RESTORATION SHALL BE INCREASED TO MEET THE REQUIREMENTS OF "STREET AND SIDEWALK PAVEMENT OPENING AND RESTORATION RULES"



City of Seattle

NOT TO SCALE

PAVEMENT PATCHING



ASPHALT OVER RIGID BASE OF BRICK OR STONE BLOCK PAVEMENT

NOTES:

1. WHEN A STONE OR BRICK PAVEMENT IS OVERLAYED WITH HMA, THE STREET SURFACE PAVEMENT BECOMES AN ASPHALT CONC STREET OVER RIGID BASE
2. IF A STONE OR BRICK PAVEMENT IS NOT OVERLAYED, THE METHOD OF RESTORATION IS IN KIND

\* MIN. TRENCH WIDTH SHALL MEET THE MAX PAY TRENCH WIDTH AS CALLED OUT ON STD PLAN NOS. 284 & 350

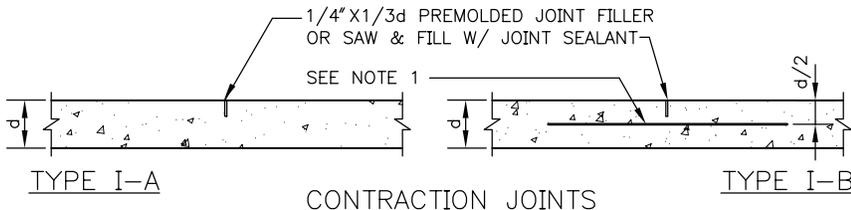
\*\* ACTUAL WIDTH AND DEPTH OF RESTORATION SHALL MEET REQUIREMENTS OF "STREET AND SIDEWALK PAVEMENT OPENING AND RESTORATION RULES"



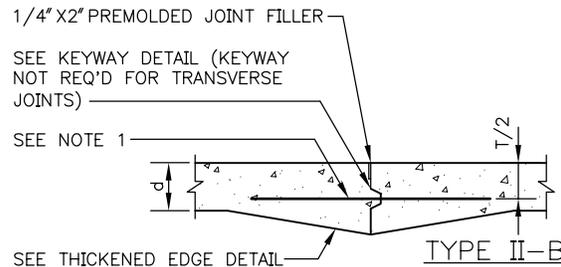
City of Seattle

NOT TO SCALE

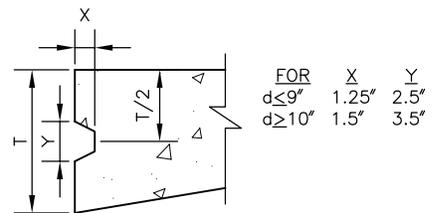
PAVEMENT PATCHING



CONTRACTION JOINTS

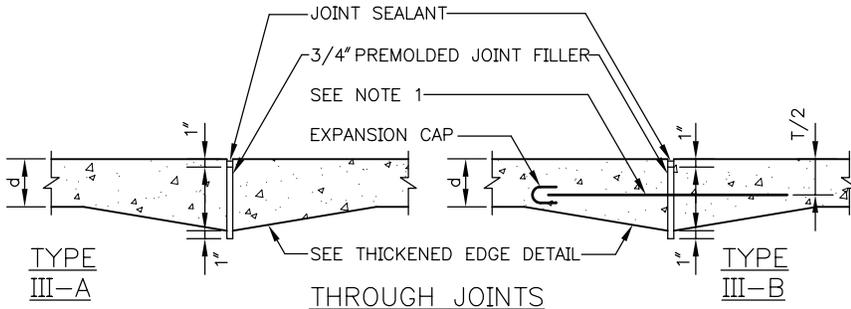


CONSTRUCTION JOINTS

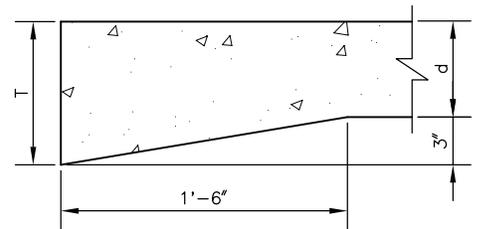


KEYWAY DETAIL  
FOR JOINTS WITH THICKENED EDGE T=d+3"  
OTHERWISE T=d

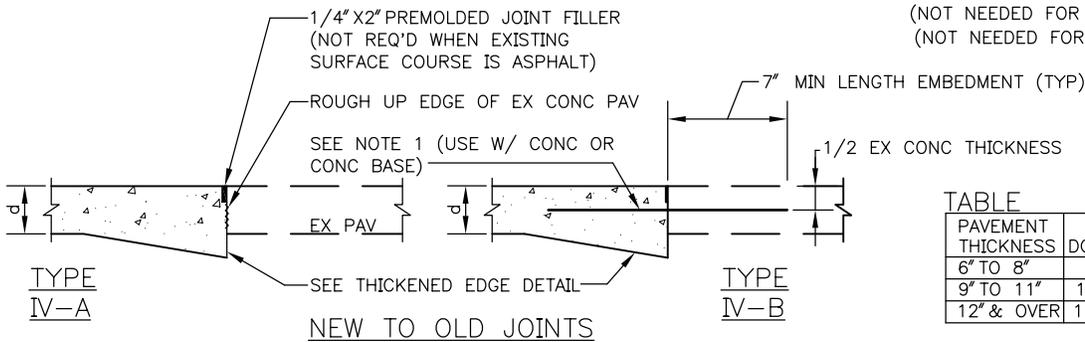
FOR	X	Y
d ≤ 9"	1.25"	2.5"
d ≥ 10"	1.5"	3.5"



THROUGH JOINTS



THICKENED EDGE DETAIL  
(NOT NEEDED FOR TYPE A JOINTS WIDTH d ≥ 10")  
(NOT NEEDED FOR TYPE B JOINTS WIDTH d ≥ 9")



NEW TO OLD JOINTS

TABLE

PAVEMENT THICKNESS	DOWEL BAR SIZE
6" TO 8"	1" X 18" @ 12"
9" TO 11"	1 1/4" X 18" @ 12"
12" & OVER	1 1/2" X 18" @ 12"

NOTES:

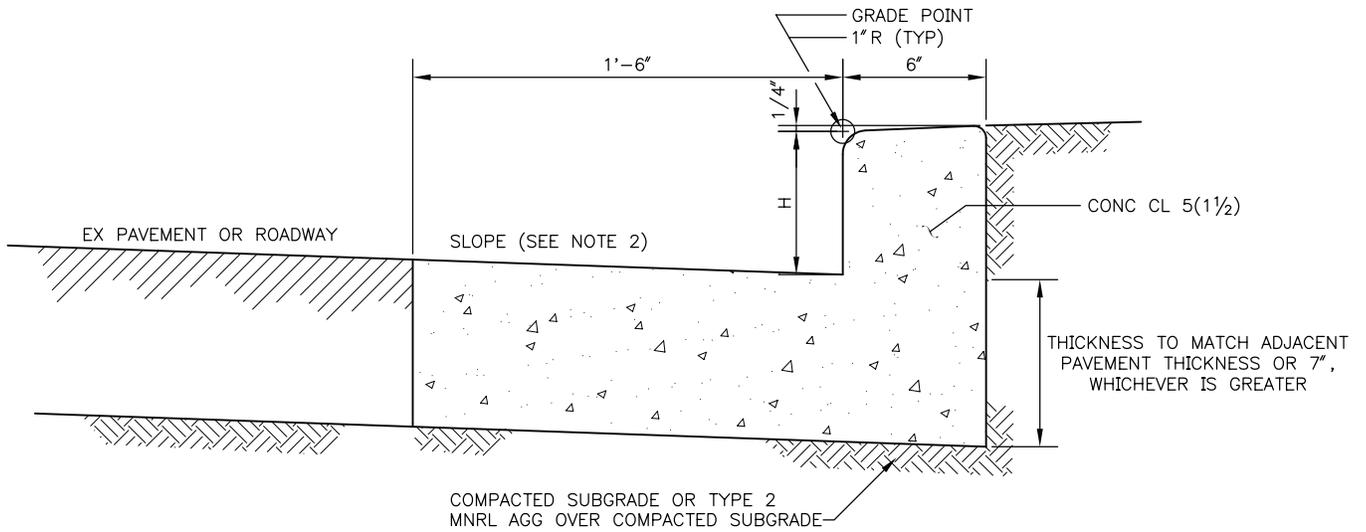
- WHERE REQUIRED AT LONGITUDINAL JOINTS, TIE BARS SHALL BE 5/8" X 2'-6" @ 3'-0", DEFORMED GRADE 40 OR BETTER, EPOXY COATED. WHERE REQUIRED AT TRANSVERSE JOINTS, DOWEL BARS SHALL BE SIZED AS SHOWN IN THE TABLE, SMOOTH ROUND GRADE 60 OR BETTER, EPOXY COATED AND GREASED
- LONGITUDINAL JOINT SPACING SHOULD NOT EXCEED 15'-6" (TO BACK OF CURB). TRANSVERSE JOINT SPACE SHALL NOT EXCEED 15'-0". THE AREA OF THE PANEL SHALL NOT EXCEED 225 SQUARE FEET
- JOINT OFFSETS AT RADIUS POINTS SHOULD BE AT LEAST 1'-6" LONG
- JOINT INTERSECTION ANGLES OF LESS THAN 60 DEGREES SHALL BE USED
- WHEN A JOINT IS CLOSER THAN 1'-0" TO A CASTING, THEN A MINOR ADJUSTMENT IN THE JOINT LOCATION SHOULD BE MADE BY SKEWING OR SHIFTING THE JOINT ALIGNMENT TO MEET THE CASTING AT 90° OR NORMAL TO THE CASTING.
- WHERE POSSIBLE, LONGITUDINAL JOINTS SHOULD MATCH LANE MARKINGS
- LONGITUDINAL JOINTS ARE TO BE CONSTRUCTION JOINTS UNLESS PAVED BY MACHINE CAPABLE OF PLACING AND FINISHING CONCRETE FOR TWO OR MORE PANEL WIDTHS (IN WHICH CASE A CONTRACTION JOINT IS ALLOWED)
- DOWEL BARS SHALL NOT BE PLACED WITHIN 1'-0" OF THE EDGE OF PAVEMENT OR A PARALLEL JOINT



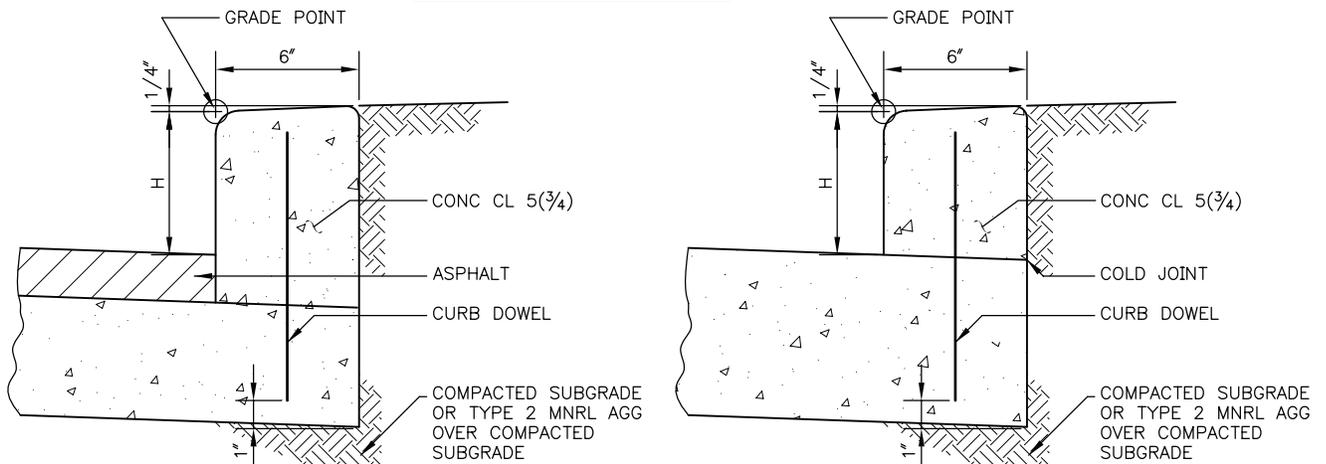
City of Seattle

NOT TO SCALE

TYPES OF JOINTS FOR  
CONCRETE PAVEMENT



410B CURB & GUTTER



410C CURB

NOTES:

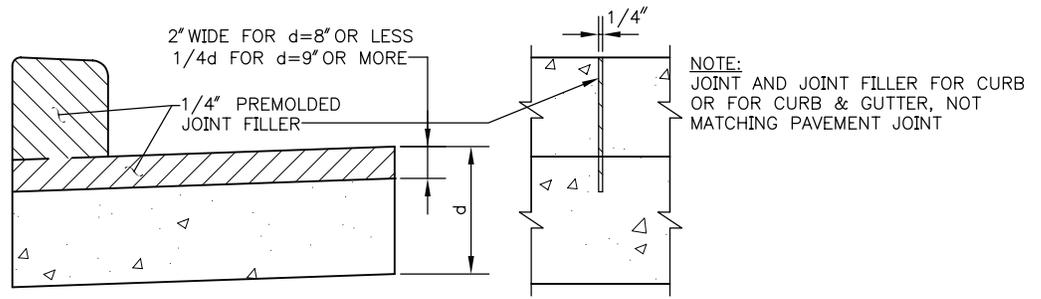
1. "H" SHALL BE 6" FROM FINISHED ROADWAY GRADE UNLESS OTHERWISE SHOWN ON DRAWINGS
2. GUTTER SHALL BE SLOPED THE SAME AS ADJACENT PAVEMENT OR 2% MIN, WHICHEVER IS GREATER.
3. SEE STD PLAN NO 411 FOR CURB DOWELS



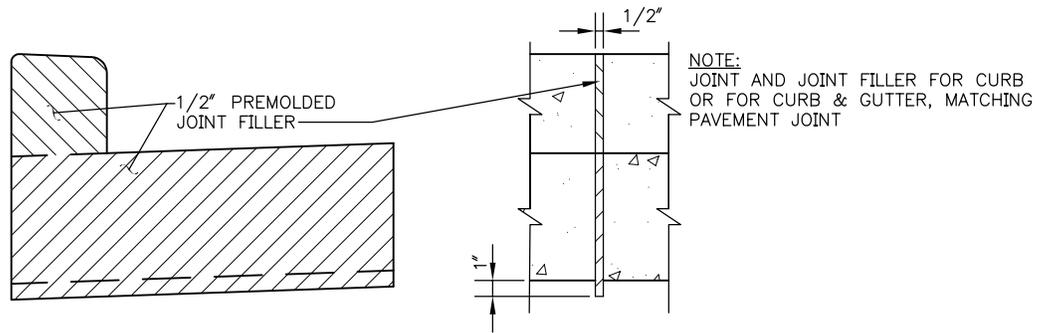
City of Seattle

NOT TO SCALE

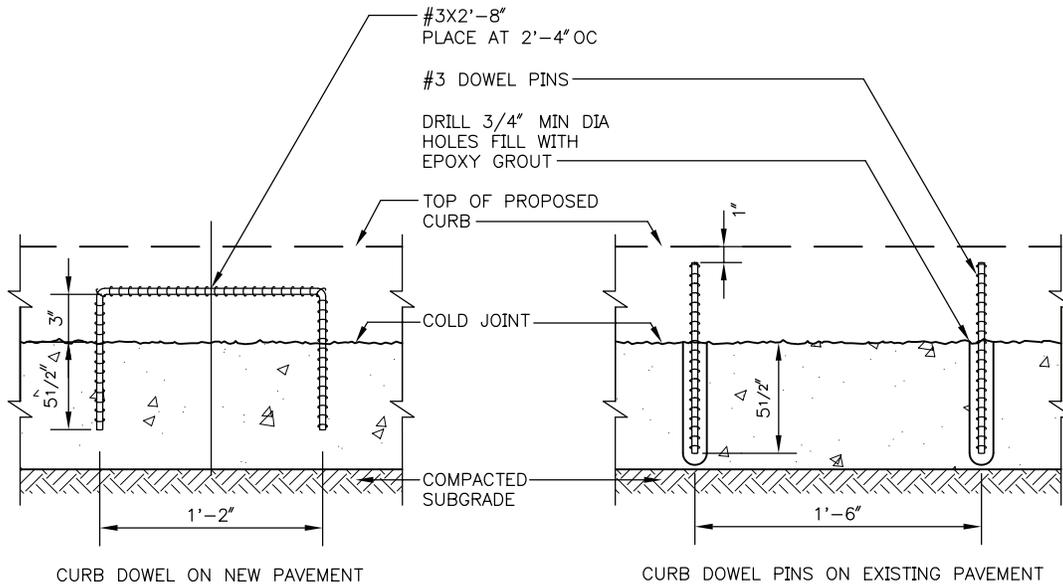
TYPE 410 CURB



CONTRACTION JOINT FOR CURB OR CURB & GUTTER



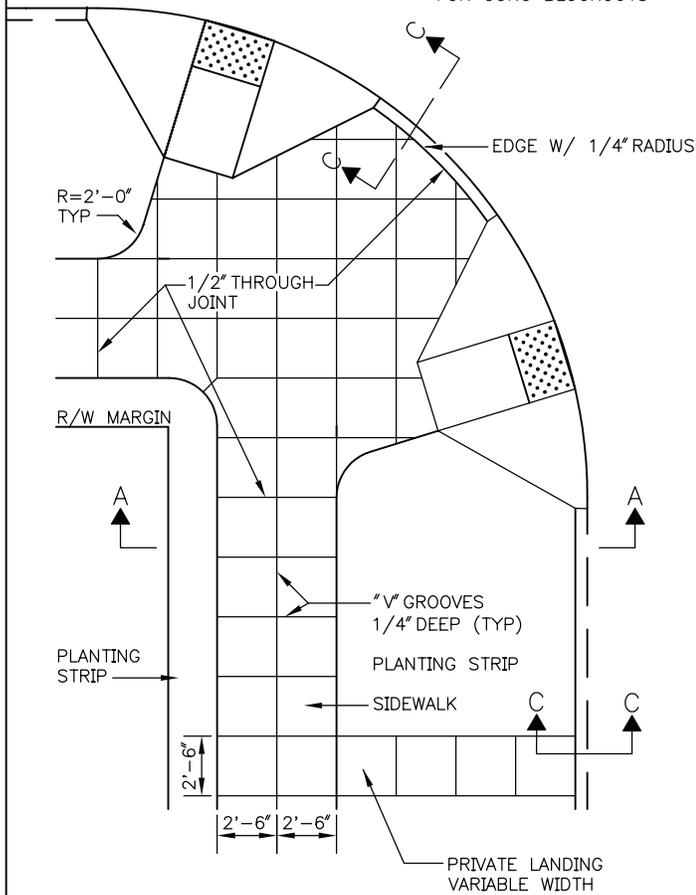
THROUGH JOINT FOR CURB OR CURB & GUTTER



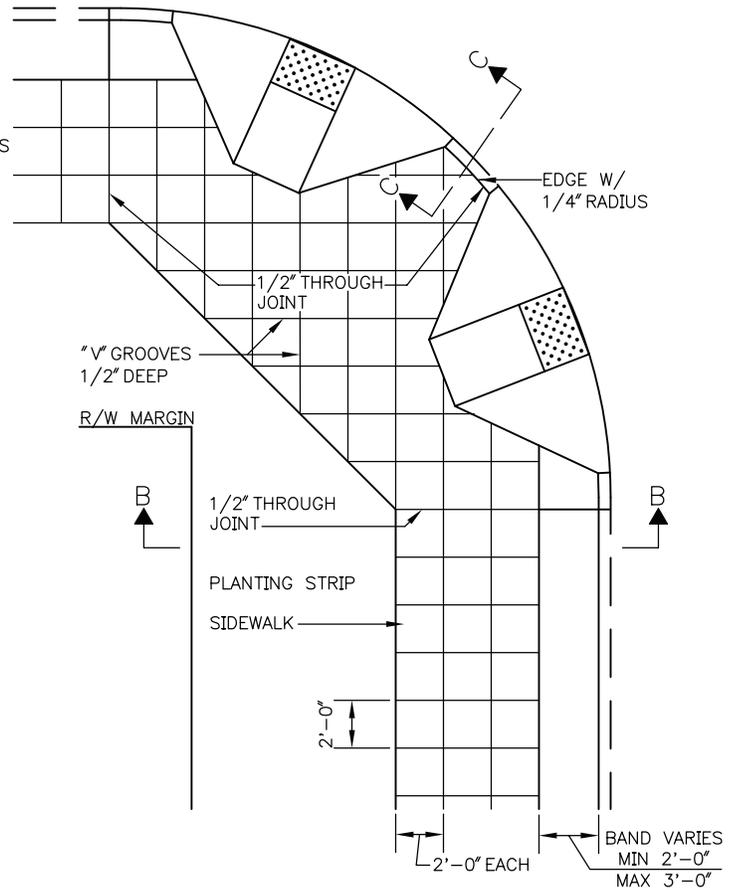
DOWELS FOR DOWELLED CURB CONSTRUCTION



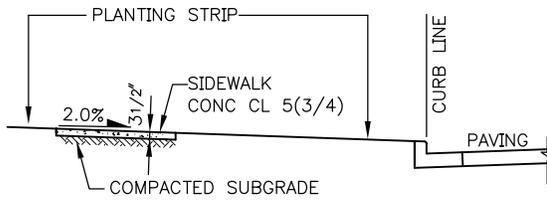
SEE STD PLAN NO 624  
FOR CONC BLOCKOUTS



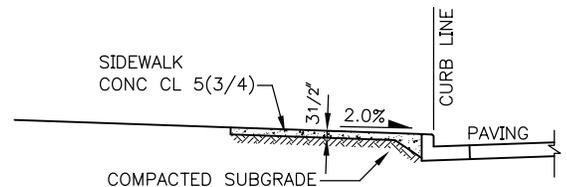
SIDEWALK  
5'-0" WIDE



SIDEWALK  
GREATER THAN  
5'-0" WIDE



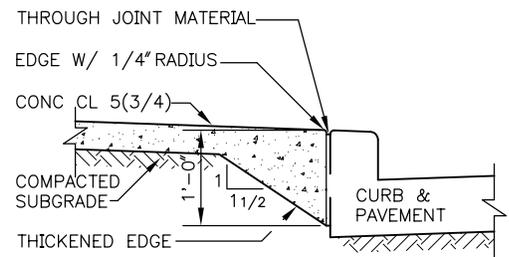
SECTION A-A



SECTION B-B

NOTES:

1. WHEN PLANTING STRIP PAVEMENT IS APPROVED, JOINT MATERIAL WILL BE REQUIRED AT THE PERIMETER OF THE PLANTING STRIP PAVEMENT
2. WHEN EXISTING PARKING METERS ARE TO BE REMOVED FOR NEW SIDEWALK CONSTRUCTION, CONTACT SEATTLE DEPARTMENT OF TRANSPORTATION A MINIMUM OF 2 WORKING DAYS PRIOR TO SCHEDULED WORK TO COORDINATE REMOVAL OF METER HEADS



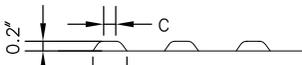
SECTION C-C



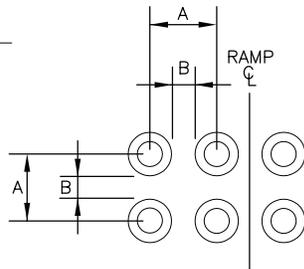
City of Seattle

NOT TO SCALE

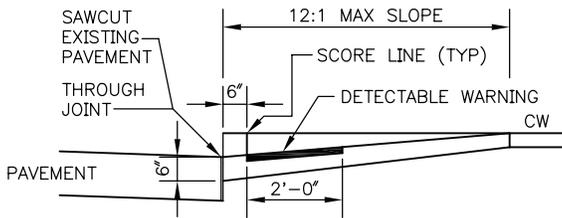
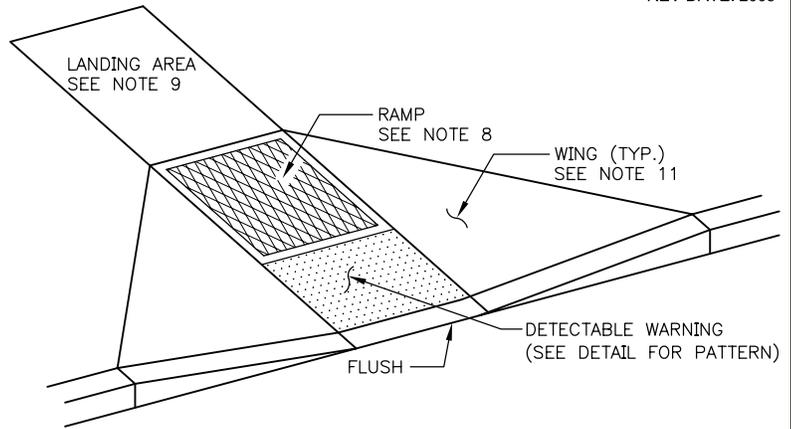
CONCRETE SIDEWALK DETAILS



	MIN.	MAX.
A	1.6 "	2.4 "
B	0.65 "	1.5 "
C	50% TO 65% OF D	
D	0.9 "	1.4 "

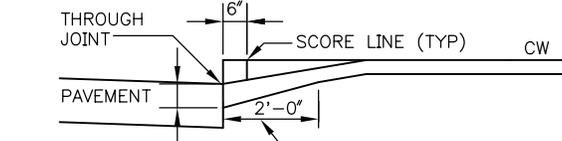


TRUNCATED DOMES PATTERN -DETECTABLE WARNING

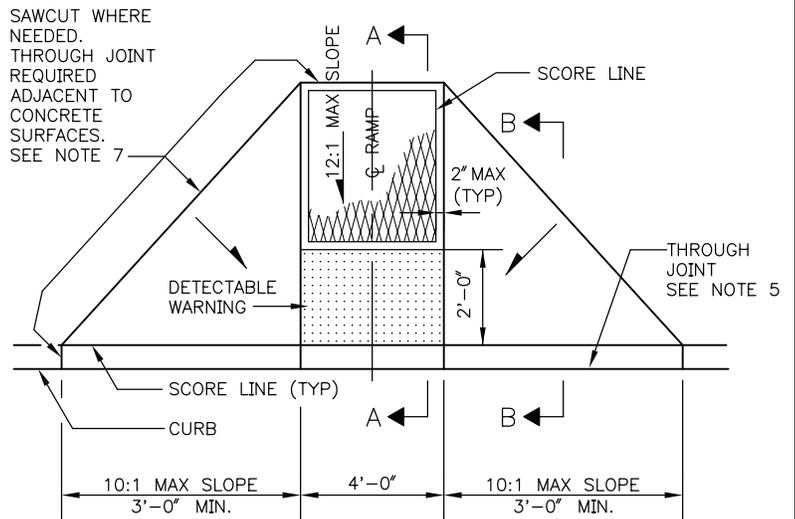


SECTION A-A

CURB MONOLITHIC WITH RAMP.  
NEW PAVEMENT BLOCKED OUT FULL DEPTH.  
EXISTING PAVEMENT REMOVED AT FACE OF CURB



SECTION B-B



NOTES:

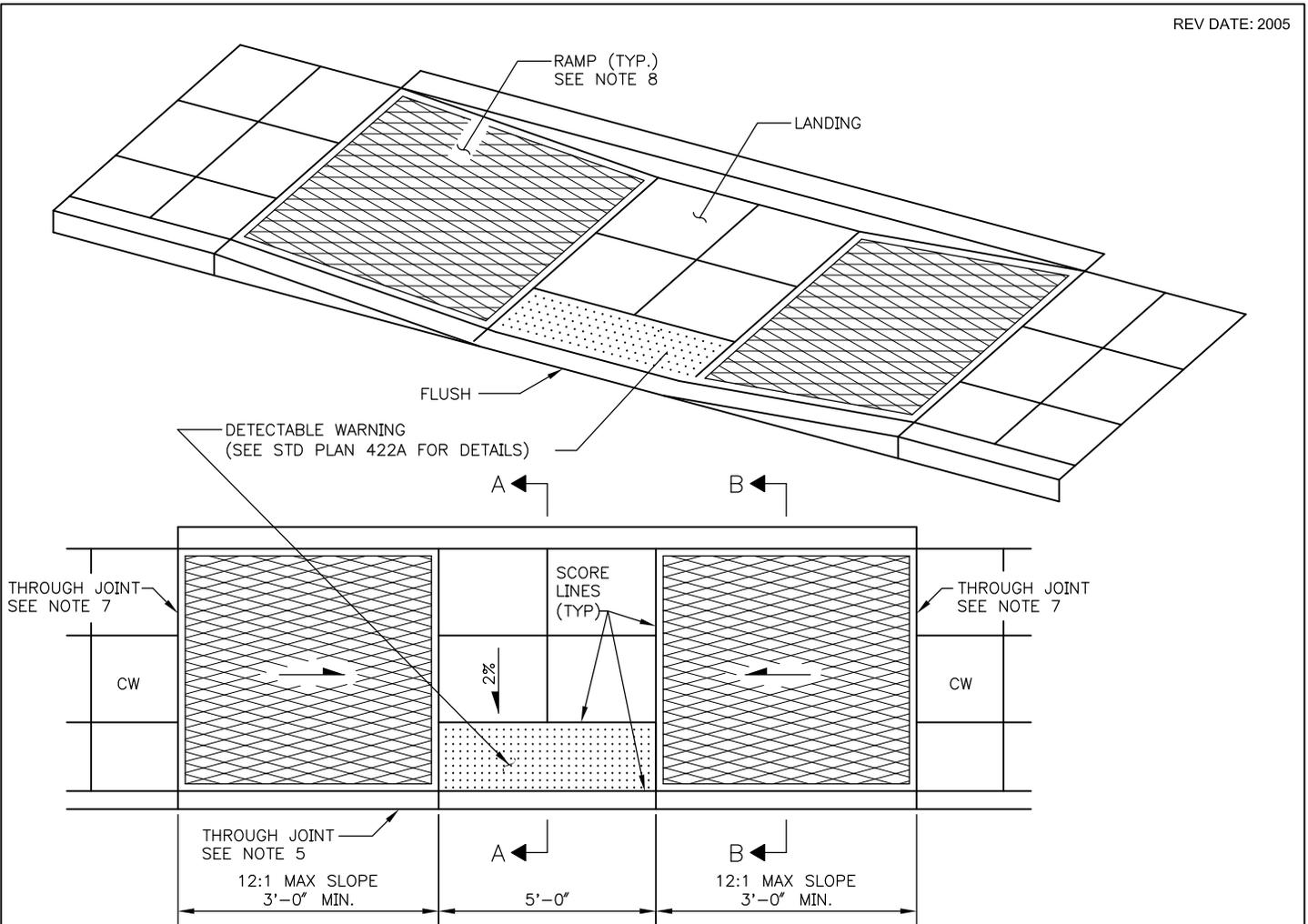
- TWO CURB RAMPS SHALL BE INSTALLED AT EACH CORNER UNLESS DIRECTED OTHERWISE BY SDOT. SEE STD PLAN NO 422b.
- CURB RAMPS SHALL BE CONSTRUCTED WITH COMPANION RAMPS ON OPPOSITE SIDES OF THE STREET UNLESS DIRECTED OTHERWISE BY SDOT
- WHERE CURB IS INSTALLED AT A LOCATION WITH NO SIDEWALK, CURB SHALL BE DEPRESSED FOR FUTURE CURB RAMP INSTALLATION.
- TYPE 422a CURB RAMP SHALL BE USED. HOWEVER IF NOT FEASIBLE, THEN TYPE 422b CURB RAMP MAY BE INSTALLED WITH THE APPROVAL OF SDOT
- NEW PAVEMENT SHALL BE BLOCKED OUT FULL DEPTH. EXISTING PAVEMENT SHALL BE REMOVED AT THE FACE OF THE CURB.
- MIN DISTANCE BETWEEN ADJACENT CURB RAMPS SHOULD BE 3'-0".
- CURB RAMPS SHALL BE ISOLATED FROM ALL OTHER CONCRETE BY THROUGH JOINTS.
- RAMPS SHALL HAVE A COARSE TEXTURED SURFACE OBTAINED WITH A 3/4" 9-11 FLATTENED EXPANDED METAL MESH BEING PRESSED INTO THE STILL FRESH CONCRETE. THE LONG AXIS OF THE DIAMOND PATTERN SHALL BE ALIGNED WITH THE SLOPE OF THE RAMP.
- ADDITIONAL SIDEWALK PAVING MAY BE NECESSARY IN THE PLANTING STRIP OR AT THE BACK OF SIDEWALK TO ACCOMMODATE ACCESS TO THE RAMP. A MINIMUM 4'-0" x 4'-0" 2% GRADE LANDING SHALL BE PROVIDED AT THE TOP OF RAMP ON TYPE 422a.
- THE SIDEWALK THICKENED EDGE SHALL BE CONTINUED THROUGH BOTH WINGS ON TYPE 422a AND BOTH RAMPS ON TYPE 422b. SEE STD. PLAN NO 420.
- THE WINGS ON TYPE 422a SHALL HAVE A SLIGHTLY BRUSHED FINISH PARALLEL TO THE CURB.
- MIN LATERAL CLEARANCE FROM INLETS, POLES, HYDRANTS AND OTHER ABOVE GROUND OBSTACLES SHALL BE 1'-0" MINIMUM FROM THE SCORED AND THE DETECTABLE WARNING PORTIONS OF THE CURB RAMP.
- INLETS SHALL BE SO LOCATED THAT GUTTER FLOW DOES NOT FLOW PAST THE CURB RAMP.
- DETECTABLE WARNING SURFACE SHALL BE "CITY OF SEATTLE SAFETY YELLOW", AND SHALL BE LOCATED 6 INCHES OFF THE CURB FACE. SEE STD SPEC SEC 8-3(7)A.
- CURB RAMP SHALL BE PERPENDICULAR TO THE CURB.
- THE RAMP PORTION OF THE TYPE 422a CURB RAMP SHALL BE WHOLLY CONTAINED WITHIN THE MARKED CROSSING (SEE STD PLAN NO. 422b)



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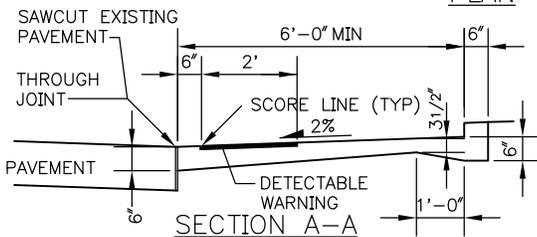
NOT TO SCALE

CURB RAMP DETAILS

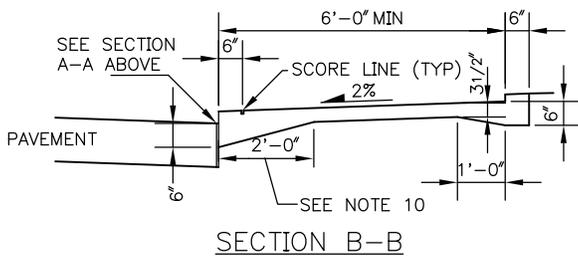


THE LANDING PORTION OF THE TYPE 422b CURB RAMP SHALL BE WHOLLY CONTAINED WITHIN THE MARKED CROSSING

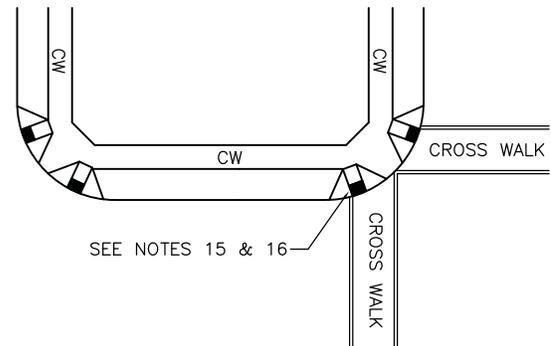
PLAN



CURB MONOLITHIC WITH RAMP. NEW PAVEMENT BLOCKED OUT FULL DEPTH. EXISTING PAVEMENT REMOVED AT FACE OF CURB



SEE STD PLAN NO 422a FOR NOTES



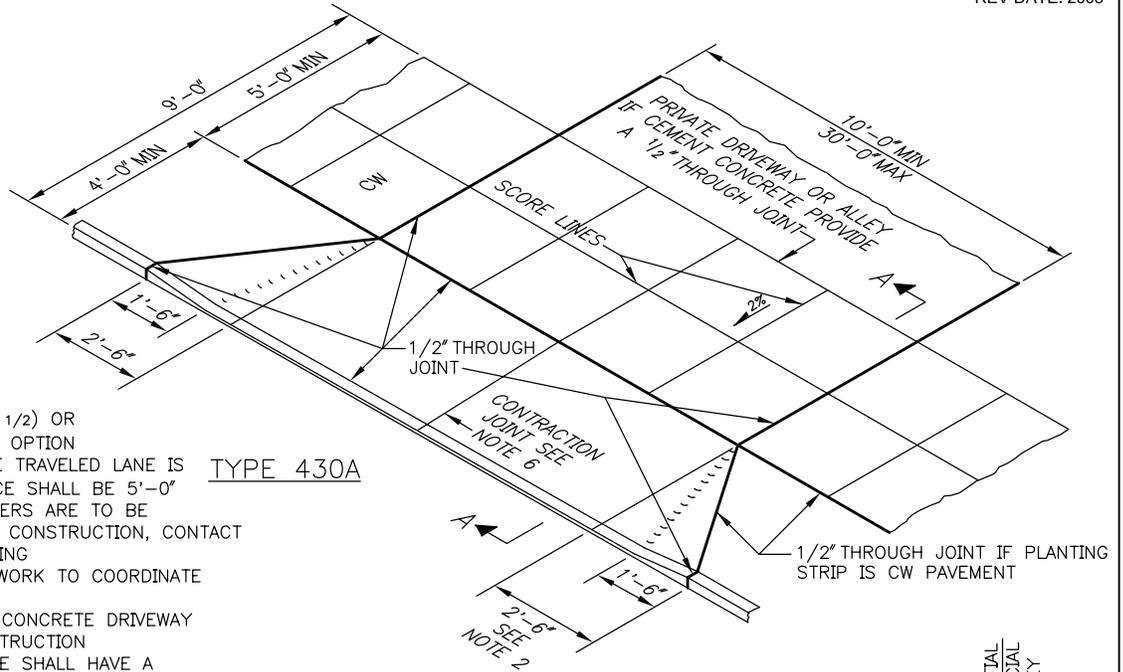
TYPICAL CURB RAMP LOCATIONS



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NOT TO SCALE

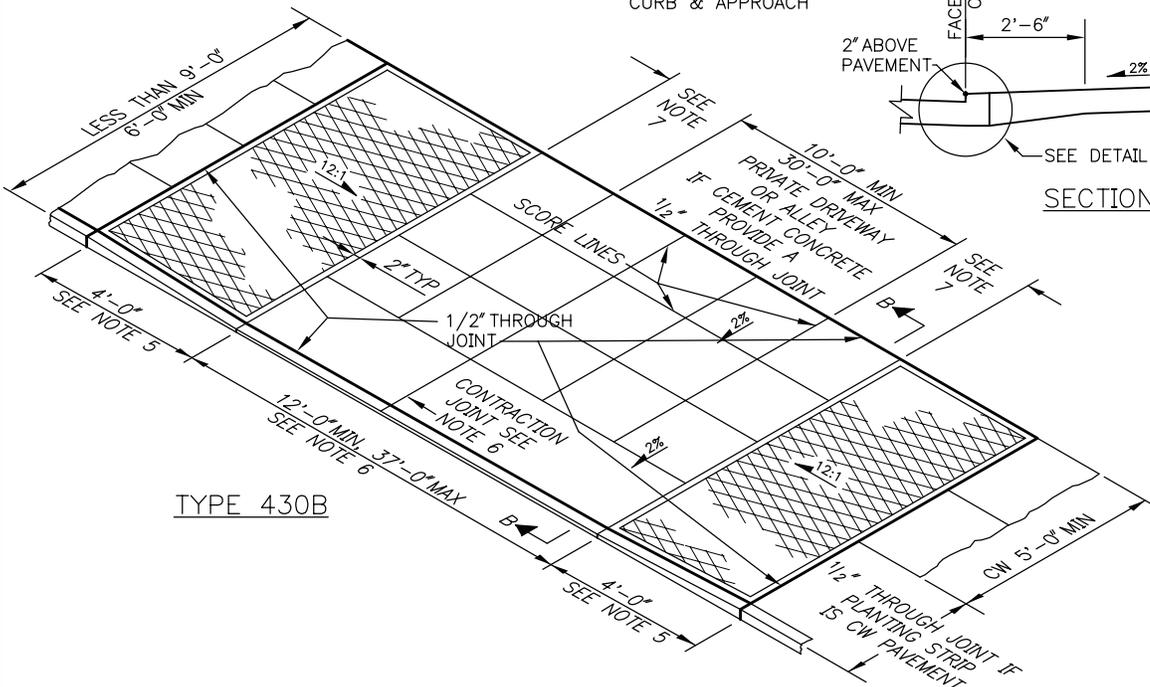
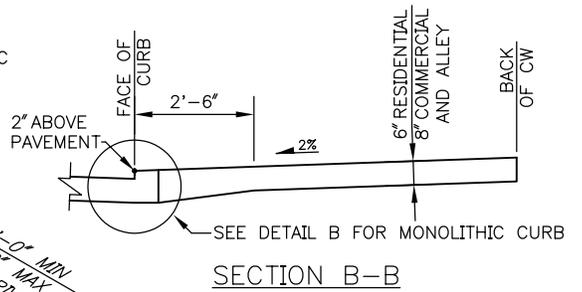
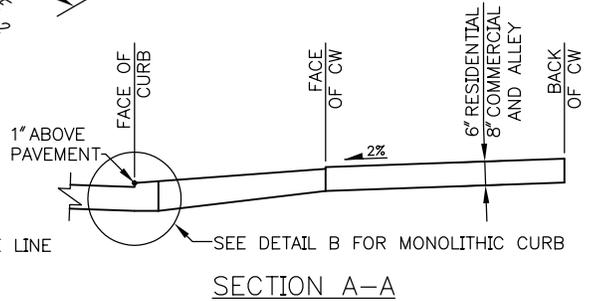
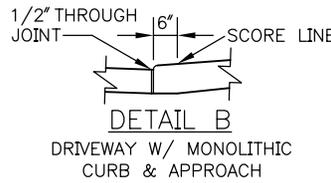
CURB RAMP DETAILS



NOTES:

1. CONCRETE SHALL BE CL 6 (1 1/2) OR CL 6 (3/4) AT CONTRACTOR'S OPTION
2. ON ARTERIAL STREETS WHERE TRAVELED LANE IS NEXT TO CURB, THIS DISTANCE SHALL BE 5'-0"
3. WHEN EXISTING PARKING METERS ARE TO BE REMOVED FOR NEW DRIVEWAY CONSTRUCTION, CONTACT SDOT A MINIMUM OF 2 WORKING DAYS PRIOR TO SCHEDULED WORK TO COORDINATE REMOVAL OF METER HEADS
4. REF STD PLAN NO 431 FOR CONCRETE DRIVEWAY PLACED WITH SIDEWALK CONSTRUCTION
5. THE RAMP SECTION CONCRETE SHALL HAVE A COARSE TEXTURED SURFACE OBTAINED BY A 3/4" 9-11 FLATTENED EXPANDED METAL MESH BEING PRESSED INTO THE STILL FRESH CONCRETE. THE LONG AXIS OF THE DIAMOND PATTERN SHALL BE ALIGNED WITH THE SLOPE OF THE RAMP
6. DRIVEWAY WIDTH GREATER THAN 15'-0" SHALL HAVE A TRANSVERSE CONTRACTION JOINT AT OR NEAR CENTER
7. THIS DISTANCE IS 1'-0", HOWEVER ON ARTERIALS AND COMMERCIAL STREETS WHERE THE LANE OF TRAVEL IS ADJACENT TO CURB THIS DISTANCE SHALL BE 3'-6"

TYPE 430A



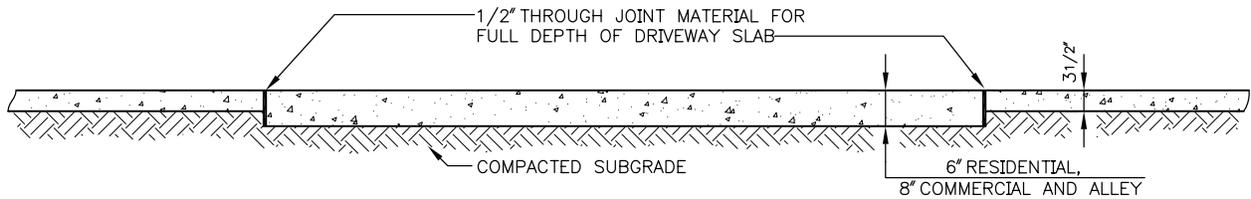
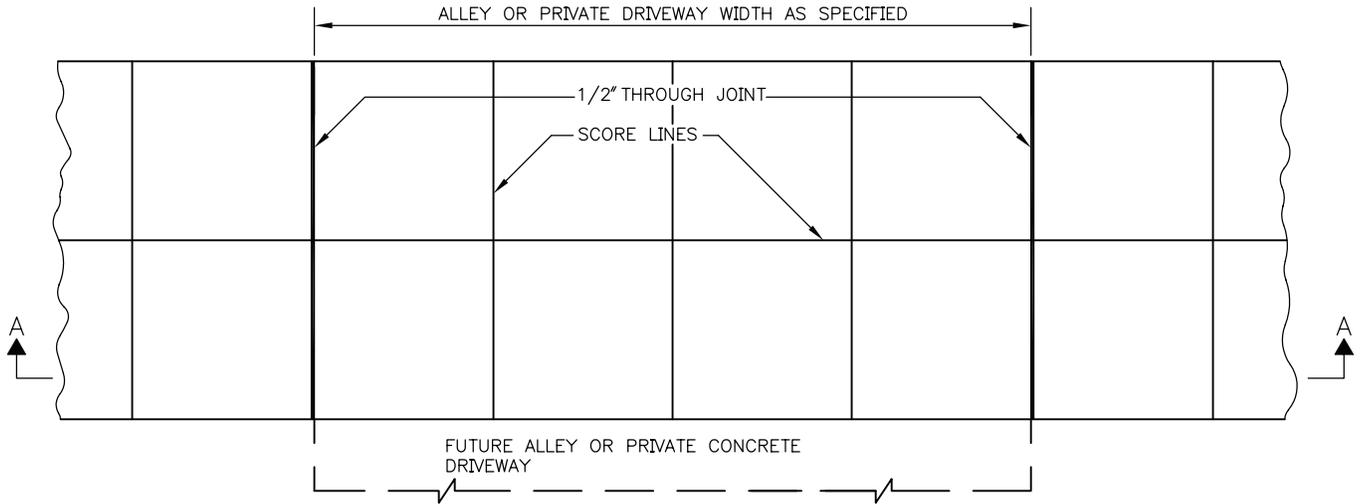
TYPE 430B



City of Seattle

NOT TO SCALE

TYPE 430 DRIVEWAY



SECTION A-A

NOTES:

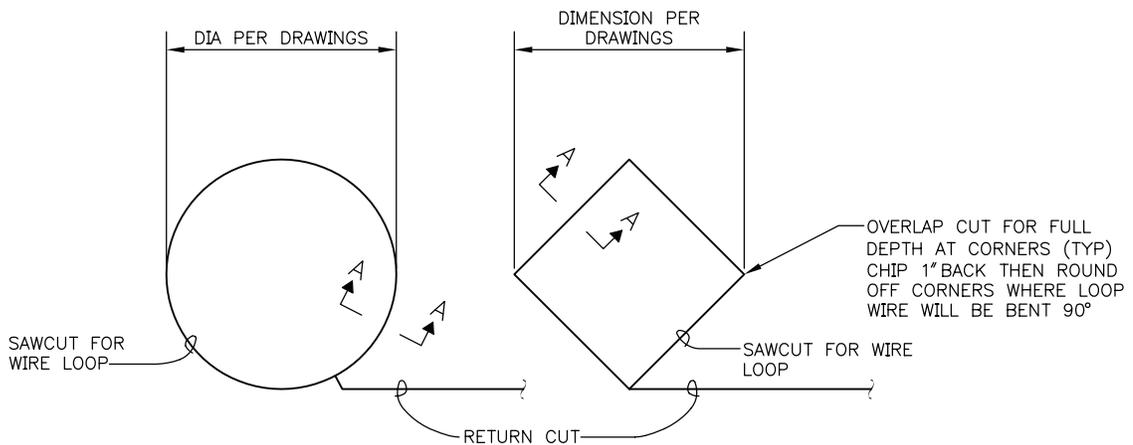
1. DRIVEWAY WIDTH GREATER THAN 15'-0" SHALL HAVE TRANSVERSE CONTRACTION JOINT AT ITS CENTER
2. DRIVEWAY CONCRETE SHALL BE CLASS 6(3/4) OR 6(1 1/2) AT CONTRACTOR'S OPTION
3. SIDEWALK CONCRETE SHALL BE CLASS 5(3/4)



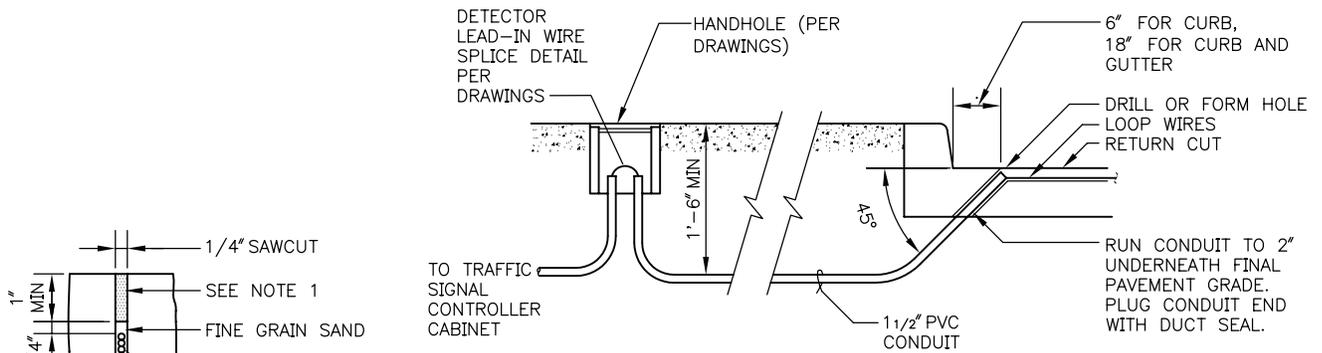
City of Seattle

NOT TO SCALE

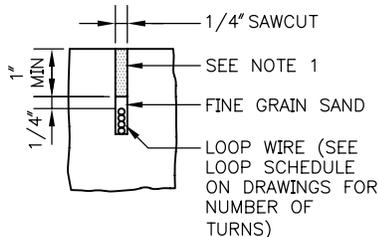
CONCRETE DRIVEWAY PLACED WITH SIDEWALK CONSTRUCTION



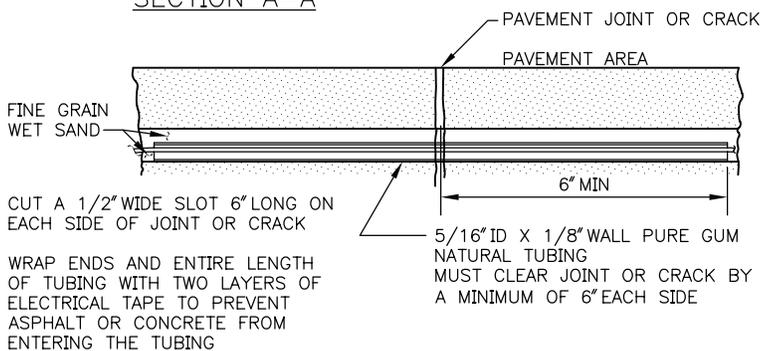
DIPOLE LOOP DETECTORS



CURB/PAVEMENT ENTRANCE FOR DETECTOR LOOP WIRES



SECTION A-A

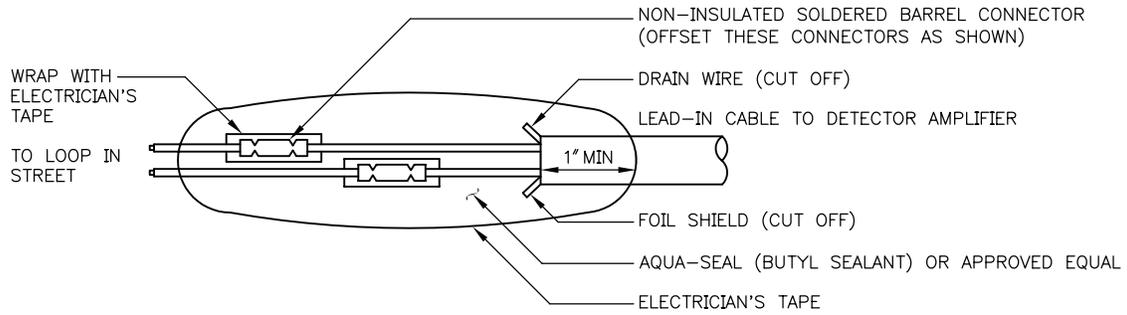


PAVEMENT JOINT OR CRACK DETAIL

NOTES:

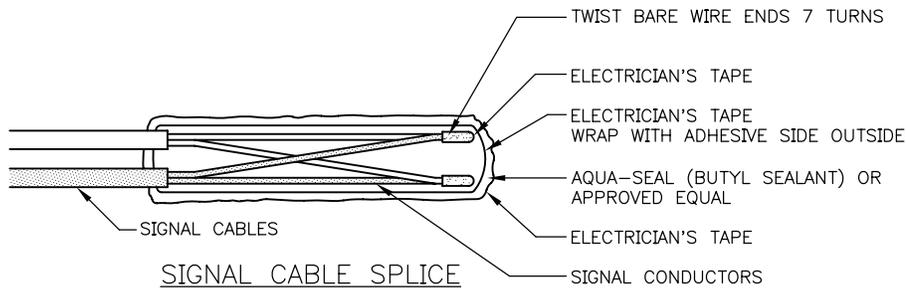
1. FILL CUT AFTER VERTICAL PLACEMENT AND TESTING WITH HOT PAVING GRADE LIQUID ASPHALT ASTM D 312 TYPE III OR QUICK SETTING HIGH STRENGTH GROUT
2. SHARP EDGE TOOLS SHALL NOT BE USED IN PLACING CONDUCTORS IN SAW CUTS
3. EACH PAIR OF LOOP WIRES IN THE RETURN CUT SHALL BE TWISTED A MINIMUM OF 3 TURNS PER FOOT AND MAY SHARE COMMON RETURN CUTS WITH OTHER TWISTED PAIRS
4. TAPE LOOP WIRE A MINIMUM OF 2 TURNS AT EACH CORNER
5. REMOVE SHARP CORNER EDGES IN SAW CUTS WHERE LOOP WIRE WILL BE BENT AROUND
6. PERFORM RESISTANCE AND CONTINUITY TESTS PRIOR TO SEALING LOOP WIRES
7. COIL 5'-0" OF LOOP WIRE IN HANDHOLE





DETECTOR LEAD-IN WIRE SPLICE DETAIL

NOTE:  
SOLDER CONNECTION AFTER CRIMPING



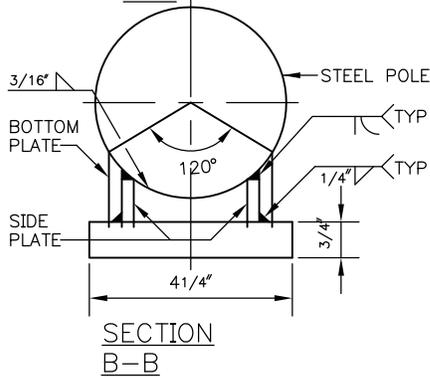
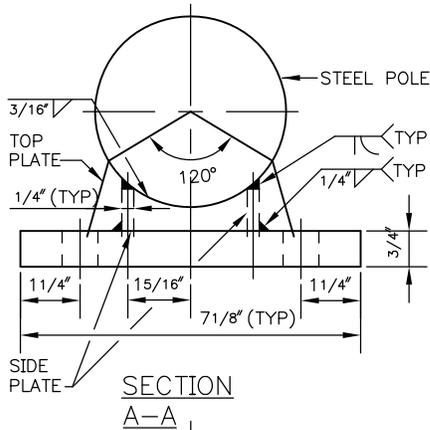
SIGNAL CABLE SPLICE



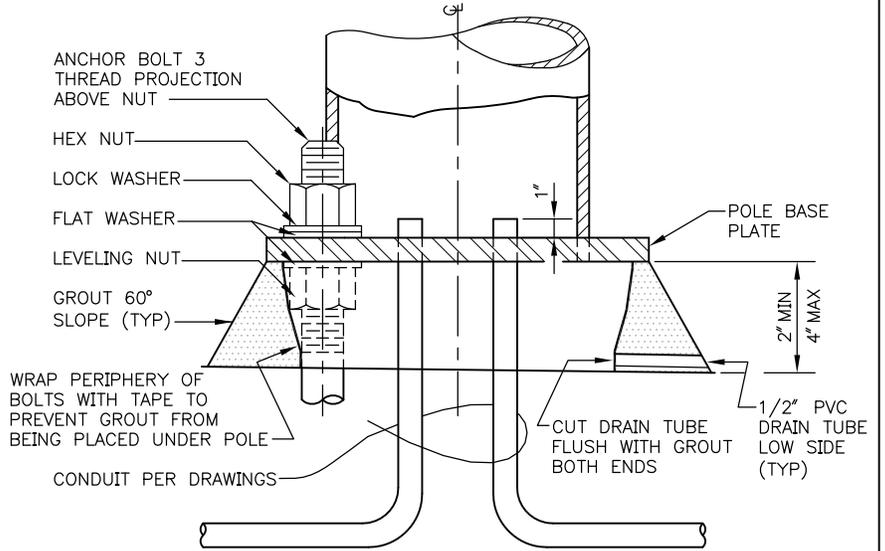
City of Seattle

NOT TO SCALE

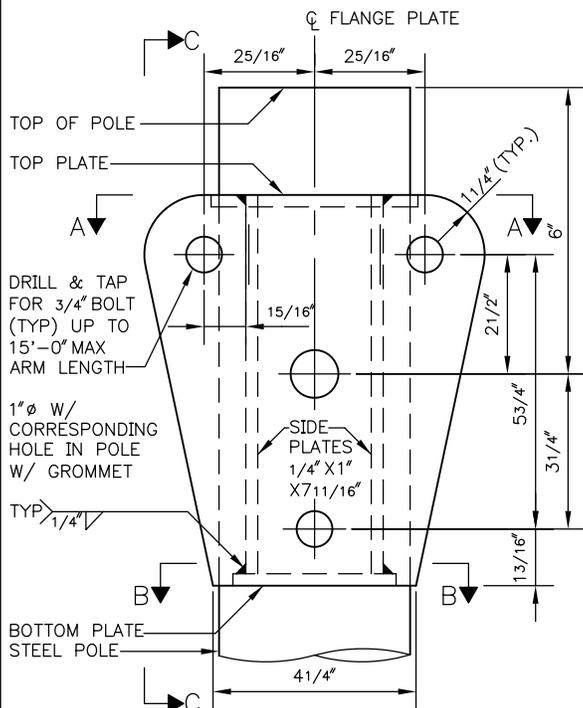
DETECTOR LOOP WIRE AND  
SIGNAL CABLE SPLICE



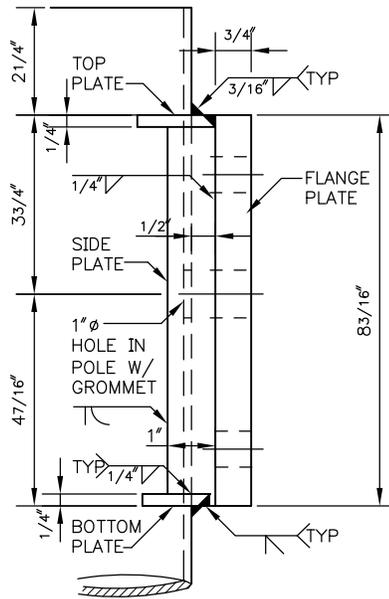
NOTE:  
GROUT SHALL BE PREMIXED,  
NON-SHRINK AND NON-METALLIC



POLE MOUNTING & GROUT DETAIL  
(EXCEPT FOR POLES W/ CHIEF SEATTLE BASE  
SEE STANDARD PLAN NO 542a)



BRACKET ARM FLANGE PLATE ON POLE



SECTION C-C  
STRUCTURAL CARBON STEEL  
PLATES SHALL BE ASTM A36



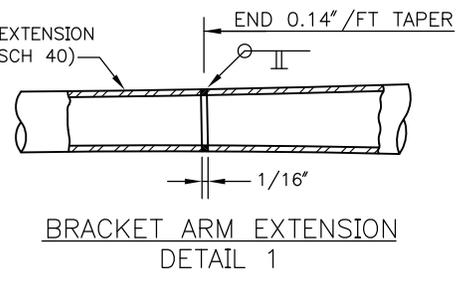
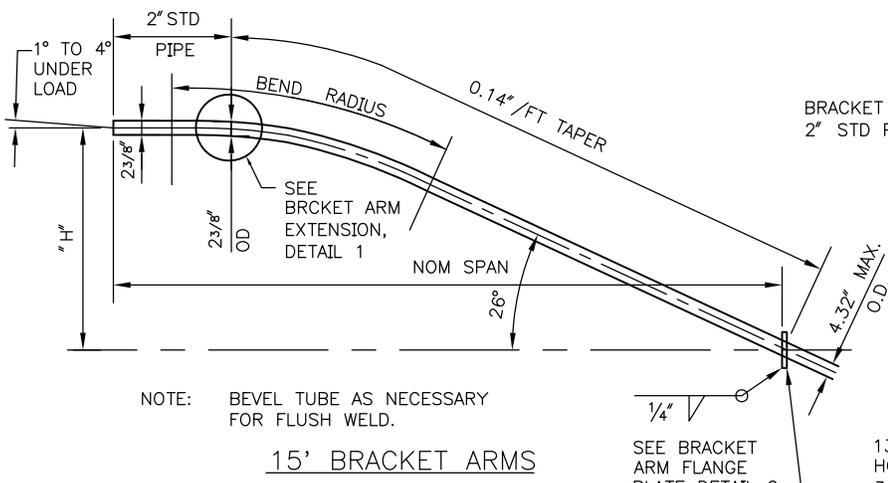
City of Seattle

NOT TO SCALE

MISCELLANEOUS STEEL  
POLE DETAILS

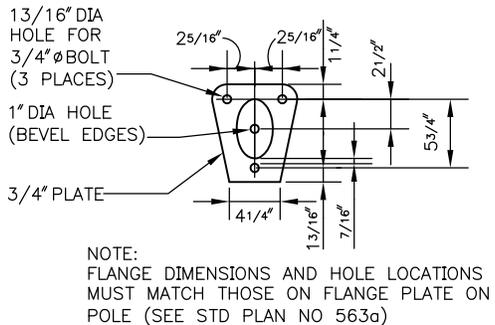
# STANDARD PLAN NO 572

REV DATE: 2008



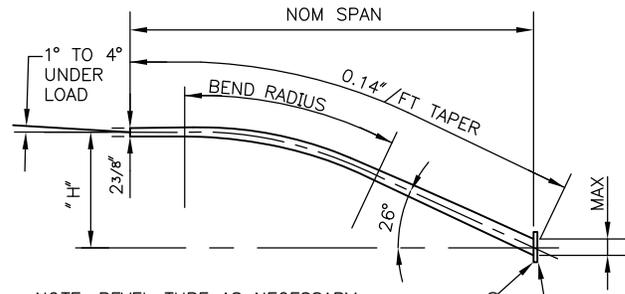
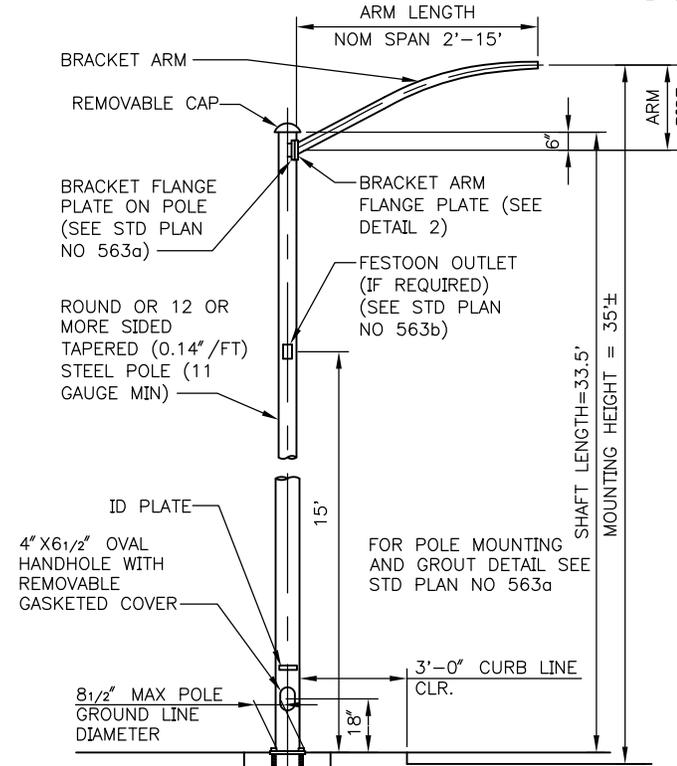
NOTE: BEVEL TUBE AS NECESSARY FOR FLUSH WELD.

## 15' BRACKET ARMS



NOTE: FLANGE DIMENSIONS AND HOLE LOCATIONS MUST MATCH THOSE ON FLANGE PLATE ON POLE (SEE STD PLAN NO 563a)

## BRACKET ARM FLANGE PLATE DETAIL 2



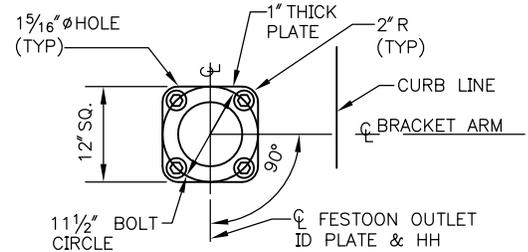
NOTE: BEVEL TUBE AS NECESSARY FOR FLUSH WELD

SEE BRACKET ARM FLANGE PLATE DETAIL 2

## 2' THRU 12' BRACKET ARMS

(4) 1" X 36" X 4" ANCHOR BOLTS (SEE STD. PLAN NO 543 FOR POLE FOUNDATION)

## STEEL STREET LIGHT POLE



## POLE BASE PLATE

NOM. SPAN	H*	BEND RADIUS	TUBE REQUIREMENT
2'	5 1/4"	—	2" STD PIPE
4'	12"	6'	11 GAUGE
6'	18"	9'	11 GAUGE
8'	24"	13'	11 GAUGE
10'	30"	15'	11 GAUGE
12'	33"	17'	11 GAUGE
15'	36"	17'	11 GAUGE

## MATERIAL SPECIFICATION

- PLATE AND SHAPES: ASTM A36
- POLE SHAFTS: ASTM A570 GR 40 MIN.
- ANCHOR BOLTS: ASTM A307
- BRACKET ARM FLANGE PLATE BOLT: ASTM A325

\* THESE DIMENSIONS ARE ONLY ILLUSTRATIVE OF THE GENERAL OUTLINE AND MATERIALS USED IN THE CONSTRUCTION OF THESE ARMS AND ARE NOT INTENDED TO EXCLUDE MANUFACTURER'S STANDARD PRODUCTS.



City of Seattle

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STEEL STREET LIGHT POLE WITH BRACKET ARM

**SOUTH PARK BRIDGE NO. 3179**  
(14<sup>th</sup>/16<sup>th</sup> Avenue South over Duwamish Waterway)

**APPENDIX C**  
to the  
**SPECIAL PROVISIONS**

**Seattle City Light Applicable Construction Guidelines**

**MATERIAL STANDARD**

**GROUND RODS, COPPER-COVERED, SECTIONAL**



1. **Ground Rods** shall be fabricated from cold-finished carbon steel shafting in accordance with ASTM Specification A 108, as it applies to Grade 1018.
2. **Construction:** The covering of the steel core shall be a molecularly-bonded sheath of electrolytic-grade copper having a minimum thickness of 0.010". The rods shall have rolled threads at each end for joining together with couplings. The rods shall conform to the applicable requirements of Underwriters' Laboratories UL-467, except as modified herein.
3. **Couplings** for sectional rods shall be made of high-strength, corrosion-resistant bronze, internally threaded to fit standard rods.
4. **Driving Studs** shall be made of high-strength, hardened steel of SAE 1045 or equal quality.
5. **Packaging:** The threaded rod ends shall be protected to prevent thread damage during shipment.
6. **Reference Specifications:**  
 ASTM A 108, SAE 1045, latest revisions  
 NEMA Standard Publication GR 1-2001  
 Underwriters' Laboratories UL-467
7. **Stock Unit:** EA
8. **Approved Manufacturers:**

		Approved Manufacturers			
Stock Number	Description	Chance	Eritech	Southern Grounding Products	Wilcor
564235	5/8" x 5' ground rod	C635850	635850	CS 586	WA 585CT
564238	5/8" x 8' ground rod	C635880	635880	CS 588	WA 588CT
564260	3/4" x 10' ground rod	C633400	633400	CS 3410	WA 3410CT
564074	5/8" coupling	CTC58	CR-58	58C	C 158
564075	3/4" coupling	CTC34	CR-34	34C	C 134
564604	5/8" driving stud	CTDH58	DS58	DS 58	D 358

standards coordinator

John Shipek

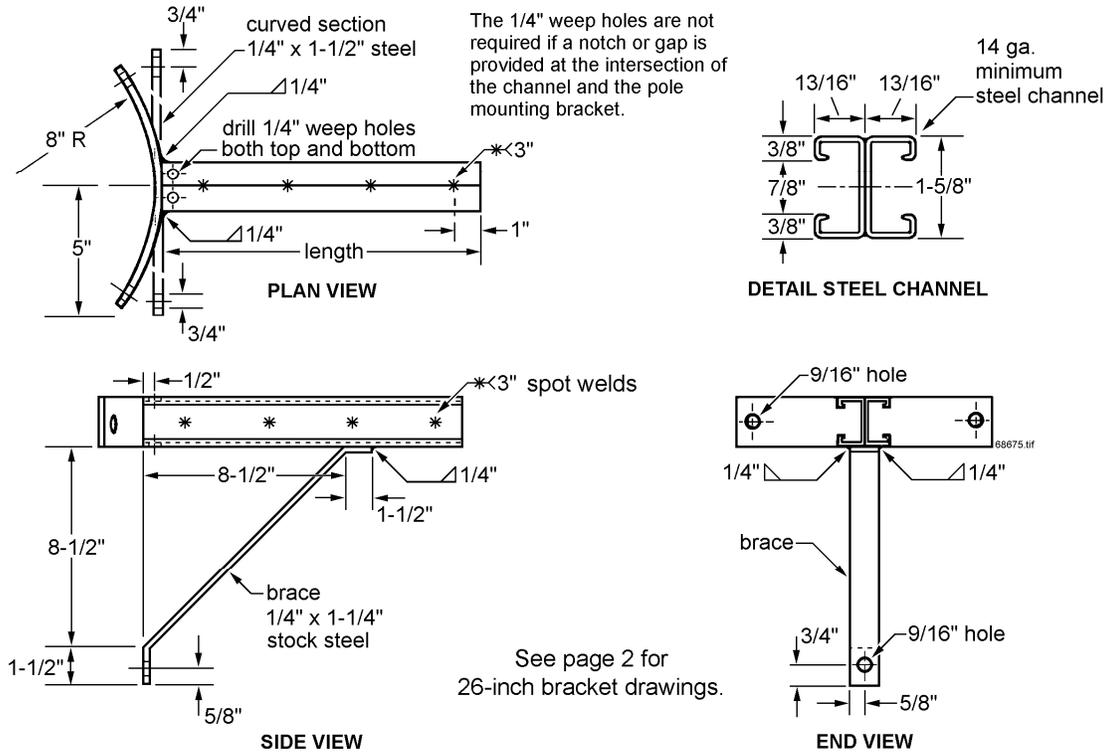
standards manager

John Shipek

unit director

Pamela S. Johnson

**BRACKET, FOR POLE RISER CONDUIT**



See page 2 for 26-inch bracket drawings.

**Figure 1, Conduit bracket (not to scale)**

**1. Scope**

Conduit Bracket shall be of the configuration and dimensions shown, free of rough or uneven surfaces and edges.

This standard applies to the following Seattle City Light Stock Numbers:

Without Brace		With Brace	
Stock No.	Length, in	Stock No.	Length, in
686784	10-1/2	686792	10-1/2
686786	10-1/2	686794	12-1/2
686790	18	686796	18
		012330	26

**2. Industry Standards**

**ASTM A109**, Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled, latest revisions

**ASTM A123**, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products, latest revisions

**3. Galvanizing**

The bracket shall be galvanized, after fabrication, in accordance with ASTM A123.

**4. Material**

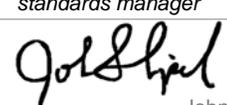
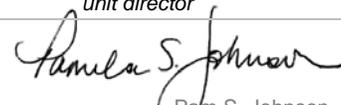
The bracket shall be made of cold-rolled steel strip in accordance with ASTM A109. The channel shall be Power Strut PS-501, Unistrut P-4101, Super Strut B1402, Speed Strut 800-2, or equal.

**5. Packaging**

Brackets shall be packaged in boxes that will fit on a standard wood pallet. Boxes shall be suitable for inside storage. Individual boxes shall not exceed 500 pounds in weight.

**6. Issuance**

Stock Unit: EA

standards coordinator	standards manager	unit director
 Quan Wang	 John Shipek	 Pam S. Johnson

**MATERIAL STANDARD**

Bracket, for Pole Riser Conduit

standard number: **6867.5**

superseding: April 1, 2005  
 effective date: December 23, 2009  
 page: 2 of 2

**7. Approved Manufacturers**

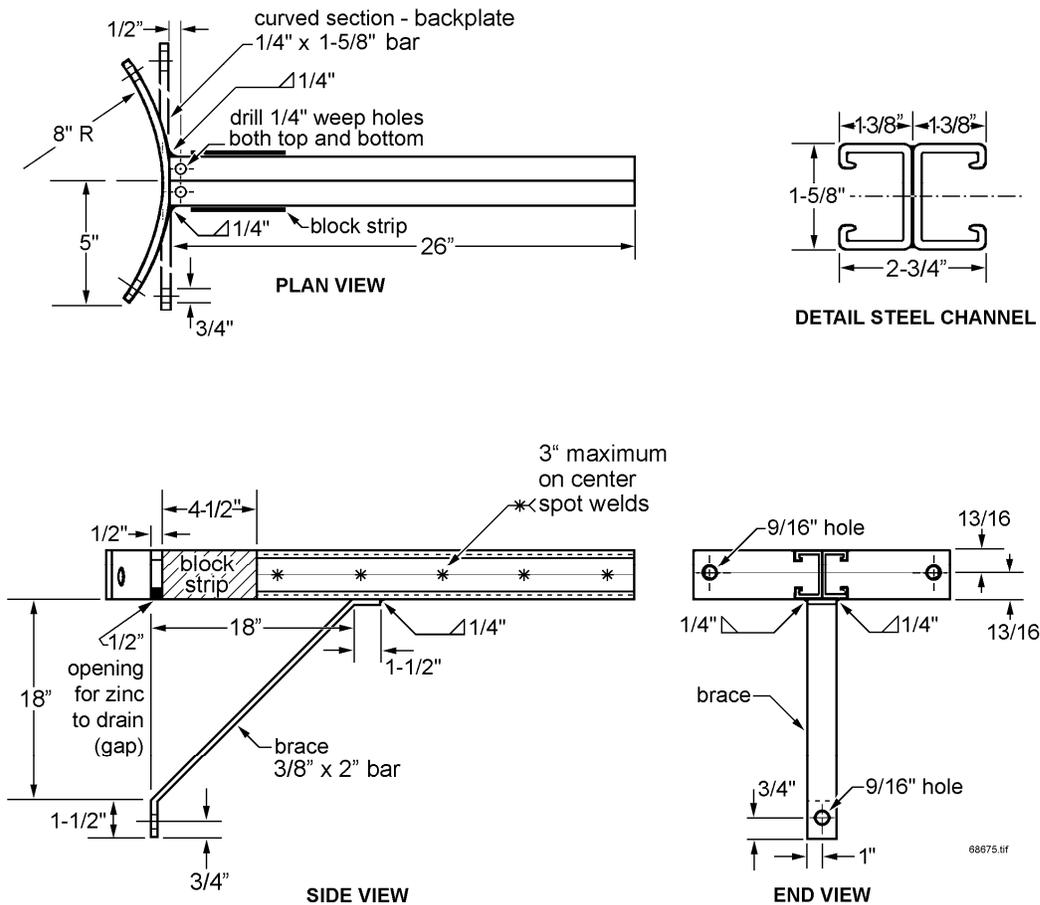
**Bracket Without Brace**

Stock Number	Length, in.	Morfab Co.	Wesanco	Wilcor
686784	10-1/2	105S0SMC	W-1012-10.5 WH	WA10SB
686786	12-1/2	125S0SMC	W-1012-12.5 WH	WA12SB
686790	18	18S0SMC	W-1012-18 WH	WA18SB

**Bracket With Brace**

Stock Number	Length, in.	Morfab Co.	Wesanco	Wilcor
686792	10-1/2	105S0SMCB	W-1013-10.5 WH	WA10SB-S
686794	12-1/2	125S0SMCB	W-1013-12.5 WH	WA12SB-S
686796	18	18S0SMCB	W-1013-18 WH	WA18SB-S
012330	26	-	WSF 101663 WHHD	-

**Figure 2, 26-inch bracket with brace (not to scale)**



68675.tr

## SCHEDULE 40 PVC CONDUIT AND FITTINGS



### 1. Scope

This material standard covers the requirements for Schedule 40 extruded rigid PVC (polyvinyl chloride) conduit and fittings consisting of elbows, couplings, adapters.

The requirements for Schedule 80 PVC conduit and fittings are located in Material Standard 7020.05.

### 2. Application

Schedule 40 PVC conduit and fittings are used to construct smooth raceways for the pulling in of cable installed in a variety of looped radial and network system applications:

- Service
- Secondary
- Primary
- Communication
- Control

Schedule 40 PVC conduit is not appropriate for riser pole applications.

Design engineers should be aware that different types of conduit have widely different physical properties that affect their application.

For new construction, design engineers are directed to utilize the following standard trade sizes, Iron Pipe Standard (IPS):

For new construction, design engineers are directed to utilize the following standard trade sizes (IPS):

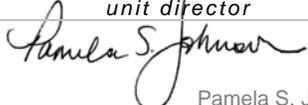
- 1/2 in
- 3/4 in
- 2 in
- 3 in
- 4 in

Design engineers should gravitate away from utilizing these trade sizes (IPS):

- 1 in
- 1-1/4 in
- 1-1/2 in
- 2-1/2 in
- 3-1/2 in
- 6 in

Five inch (IPS) size conduit is a special case. Historically, at Seattle City Light, it has been widely used for new, primary construction, however, recently, 5 inch IPS fiberglass conduit, Material Standard 7025.05, has been selected to be the new standard for this application.

Five inch (IPS) size conduit is specified with both ends straight cut to minimize the gap at the conduit joints. Minimized gaps are less likely to catch debris during construction and lead to damaged cable.

<i>standards coordinator</i>  John Shipek	<i>standards manager</i>  John Shipek	<i>unit director</i>  Pamela S. Johnson
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**MATERIAL STANDARD**

Schedule 40 PVC Conduit and Fittings

standard number: **7015.05**

superseding: December 23, 2009

effective date: September 2, 2010

page: 2 of 6

**2. Application, continued**

Elbows are also known as bends. Large radius elbows are also known as sweeps.

For the purpose of this standard, 5 degree angle couplings shall be considered elbows.

The straight cut end of a section of conduit or elbow is also known as the spigot end.

**3. Industry Standards**

Schedule 40 PVC conduit and fittings shall meet the requirements of the following industry standard:

**UL 651** - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings, 7th Edition, dated October 4, 2005

The following clarifications apply:

- Five inch (IPS) size shall meet the requirements for specific applications, Section 4.5 (straight cut, without couplings or adapters).
- All other (IPS) sizes shall meet the requirements for *general use*, Section 4.6 (one bell end).

**4. Detailed Requirements**

**4.1 General**

Conduit and fittings shall be suitable for above ground use indoors or outdoors exposed to sunlight and weather, and for underground use by direct burial or encasement in concrete.

Conduit and fitting dimensions shall conform to UL 651 and the Iron Pipe Standard (IPS), where dimensions are based on outside diameters of iron pipe sizes.

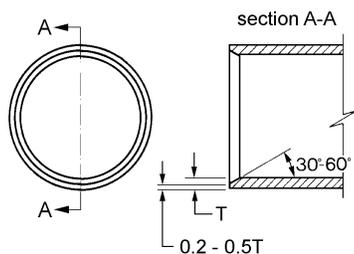
Conduit and fitting color shall be medium to dark gray.

Conduit and fittings shall not have any features that can abrade or otherwise damage cable.

All conduit and elbow straight cut ends, 2 inch (IPS) and larger, shall be chamfered according to Figure 4.1.

Conduit, elbows, and fittings shall be designed and manufactured to be a system intended to guarantee complete interchangeability and compatibility between components.

**Figure 4.1**



**4.2 Conduit**

Conduit shall be certified by Underwriters Laboratories or one of the following NRTLs (Nationally Recognized Testing Laboratories) as meeting the minimum requirements of Standard UL 651:

- CSA (Canadian Standards Association)
- ETL
- NSF International

Manufacturer shall inform Seattle City Light in writing of all design changes that could affect the product's understood or published capabilities or attributes.

Dimensional information cited in Sections 4.2, 4.3, and 4.4 should be consistent with UL requirements and is provided for the convenience of Seattle City Light design engineers, construction crews, inspectors, and quality assurance personnel who do not have ready access to UL 651.

Conduit shall meet the following performance requirements: hierarchy

**Table 4.2a**, Conduit performance requirements

Description	UL 651 Section
Tensile strength	7
Deflection under heat and load	8
Extrusion process	9
Low-temperature handling	10
Water absorption	11
Resistance to crushing	12
Resistance to impact	13
Flame	14
Conduit for use with 90 degree C wire	17
Resistance to specific reagents	18
Sunlight resistance	19
Pipe stiffness	20
Pull-joint separation	21
Bending and pull-joint separation	22
Joint water tightness	23
Elastomeric materials accelerated aging	24
Permanency of printing	25

**MATERIAL STANDARD**

Schedule 40 PVC Conduit and Fittings

standard number: **7015.05**

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**4. Detailed Requirements, continued**

**4.2 Conduit, continued**



**Table 4.2b**, Conduit dimensions, straight (str)

Stock Number	Trade Size, IPS, in	End #1	End #2	Outside Diameter, Min., in	Outside Diameter, Average, in	Outside Diameter, Max., in	Inside Diameter, Minimum, Average, in	Wall Thickness, Min., in	Weight, Nominal, lbs / ft
734525	1/2	bell	str cut	0.832	0.840	0.848	0.578	0.109	0.16
734526	3/4	"	"	1.040	1.050	1.060	0.780	0.113	0.22
734527	1	"	"	1.305	1.315	1.325	1.004	0.133	0.32
734528	1-1/4	"	"	1.648	1.660	1.672	1.335	0.140	0.43
734529	1-1/2	"	"	1.888	1.900	1.912	1.564	0.145	0.52
734530	2	"	"	2.363	2.375	2.387	2.021	0.154	0.70
734531	2-1/2	"	"	2.860	2.875	2.890	2.414	0.203	1.11
734532	3	"	"	3.485	3.500	3.515	3.008	0.216	1.45
734533	3-1/2	"	"	3.950	4.000	4.050	3.486	0.226	1.74
734523	4	"	"	4.450	4.500	4.550	3.961	0.237	2.10
734524	5	str cut	"	5.513	5.563	5.613	4.975	0.258	2.80
010334	6	bell	"	6.575	6.625	6.675	5.986	0.280	3.63

**4.3 Elbows**

**Table 4.3a**, Elbow dimensions, 90 and 45 degree

Stock Number	Trade Size, IPS, in	Degree Bend	End #1	End #2	Radius, in
734551	1/2	90	bell	str. cut	4
734671	3/4	90	"	"	4-1/2
734550	1	90	"	"	5-3/4
734546	1-1/4	90	"	"	7-1/4
734547	1-1/2	90	"	"	8-1/4
734548	2	90	"	"	24
734549	2-1/2	90	"	"	24
734553	1-1/4	45	"	"	7-1/4
734554	1-1/2	45	"	"	8-1/4
734555	2	45	"	"	18
734557	3	45	"	"	36
734558	3-1/2	45	"	"	36
734559	4	45	"	"	36
734560	5	45	str. cut	"	48
010337	6	45	bell	"	48



90 degree elbow



45 degree elbow

**MATERIAL STANDARD**

Schedule 40 PVC Conduit and Fittings

standard number: **7015.05**

superseding: December 23, 2009

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**4. Detailed Requirements, continued**

**4.3 Elbows, continued**

**Table 4.3b**, Elbow dimensions, 22-1/2 and 5 degree

Stock Number	Trade Size, IPS, in	Degree Bend	End #1	End #2	Radius, in
734561	2	22-1/2	"	"	18
734562	2-1/2	22-1/2	"	"	18
734563	3	22-1/2	"	"	24
734564	3-1/2	22-1/2	"	"	24
734566	4	22-1/2	"	"	24
734568	5	22-1/2	str. cut	"	24
010444	4	5	bell	"	n/a
010443	5	5	bell	"	n/a



22-1/2 degree elbow



5 degree bend

**4.4 Fittings**

Female adapters shall have straight threads. Coupling fittings, 2 inch (IPS) and larger, shall be of molded manufacture, not expanded.

**Table 4.4a**, Fittings, female (F), male (M), and slip (S)

Stock Number	Trade Size, IPS, in	Description	Ends
734508	1/2	female adapter	S x F
734540	3/4	"	"
734541	1	"	"
734542	1-1/4	"	"
734543	1-1/2	"	"
734544	2	"	"
734545	2-1/2	"	"
734537	3	"	"
734538	3-1/2	"	"
734539	4	"	"
734536	5	"	"
010342	6	"	"
734920	1/2	male adapter	S x M
734914	3/4	"	"
734918	1	"	"
734924	1-1/4	"	"
734925	1-1/2	"	"
734926	2	"	"
734921	3	"	"
734923	4	"	"
010341	6	"	"



female adapter



male adapter

**MATERIAL STANDARD**

Schedule 40 PVC Conduit and Fittings

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**4. Detailed Requirements, continued****4.4 Fittings, continued**

Coupling fittings, 2 inch (IPS) and larger, shall be of molded manufacture, not expanded. S=slip

**Table 4.4b**, Fittings, straight couplings, slip (S)

Stock Number	Trade Size, IPS, in	Description	Ends
734512	1/2	straight coupling	S x S
734513	3/4	"	"
734514	1	"	"
734515	1-1/4	"	"
734516	1-1/2	"	"
734517	2	"	"
734518	2-1/2	"	"
734519	3	"	"
734520	3-1/2	"	"
734521	4	"	"
734522	5	"	"
010343	6	"	"

**5. Marking**

Each conduit section shall be marked according to the requirements of UL 651, Section 25.

The outer surface of each conduit section shall be marked with the following minimum information:

- Trade Size
- Schedule Number or equivalent information
- Manufacturer's name or symbol
- Date (or period) of manufacture
- UL or NRTL mark

Each fitting shall be marked according to the requirements of UL 651, Section 46.

The outer surface of each fitting shall be marked with the following minimum information:

- Manufacturer's name or symbol
- Catalog number

**6. Testing**

Conduit and fitting test data that establishes compliance with the requirements of UL 651 and this material standard shall be provided upon request.

**7. Packaging**

Straight conduit shall be furnished in 10 ft sections, unless specified otherwise on the purchase order.

Master bundles shall be secured with at least two bands of steel or UV-resistant plastic strapping.

Standard packaging for straight conduit shall be as follows:

Each master bundle shall be legibly marked with the following information:

- Manufacturer's identification
- Product description
- Seattle City Light's Purchase Order Number
- Seattle City Light's Stock Number
- Gross, net, and tare weight

**8. Shipping**

Conduit may be delivered on enclosed, covered, or flatbed trucks. If conduit is delivered on a flatbed truck, conduit shall be side-loaded.

Because Washington State law requires a 10 inch minimum side board when driving a forklift or pallet jack onto the bed of a truck or trailer, most flatbed trucks or trailers must be side-loaded to ease off-loading.

# MATERIAL STANDARD

Schedule 40 PVC Conduit and Fittings

standard number: **7015.05**

superseding: December 23, 2009

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## 9. Issuance

Conduit	FT
Elbows	EA
All Other Fittings	EA

## 10. Approved Manufacturers

### Conduit Straight Sections

- Cantex
- Cresline NW
- Heritage Plastics Incorporated
- IPEX
- JM Eagle
- Prime Conduit (formerly Carlon)
- Ridgeline Pipe Manufacturing
- Royal Pipe Systems

### Elbows

- Cantex
- Cresline NW
- Heritage Plastics Incorporated
- IPEX
- JM Eagle
- Kraloy
- Picoma Industries
- Raceway Technology & Mfr.
- Ridgeline Pipe Manufacturing
- Thomas & Betts (formerly Carlon)

### All Other Fittings

- Cantex
- Cresline NW
- Heritage Plastics Incorporated
- IPEX
- JM Eagle
- Kraloy
- Picoma Industries
- Ridgeline Pipe Manufacturing
- Thomas & Betts (formerly Carlon)

## 11. References

- 7020.05**; "Schedule 80 PVC;" Material Standard; SCL
- 7025.05**; "Fiberglass Conduit and Fittings, Medium Wall, Five-Inch IPS;" Material Standard; SCL
- 7100.0**; "Pipe Fittings, PVC Plastic, DWV and Schedule 40;" Material Standard; SCL
- 7345.2**; "Conduit and Fittings, EPC 40 and EPC 80 Rigid Polyvinyl Chloride" (cancelled); Material Standard; SCL
- F 512**; "Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation"; ASTM
- Shipek, John**; SCL Standards Engineer, subject matter expert and originator of 7015.05 (john.shipek@seattle.gov)

**SCHEDULE 80 PVC CONDUIT**



**1. Scope**

This material standard covers the requirements for Schedule 80 extruded rigid PVC (polyvinyl chloride) conduit.

The requirements for Schedule 40 PVC conduit and fittings are located in Material Standard 7015.05.

**2. Application**

Schedule 80 PVC conduit is used to construct smooth raceways for the pulling in of cable installed in a variety of applications.

Five inch IPS (Iron Pipe Standard) size conduit is specified with both ends straight cut to minimize the gap at the conduit joints. Minimized gaps are less likely to catch debris during construction and lead to damaged cable.

Schedule 80 PVC conduit is appropriate for riser pole applications.

Design engineers should be aware that different types of conduit have widely different physical properties that affect their application.

The straight cut end of a section of conduit is also known as the spigot end.

**3. Industry Standards**

Schedule 80 PVC conduit and fittings shall meet the requirements of the following industry standard:

**UL 651** - Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings, 7th Edition, dated October 4, 2005

The following clarifications apply:

Five inch IPS size shall meet the requirements for *specific applications*, Section 4.5 (straight cut, without couplings or adapters).

All other IPS sizes shall meet the requirements for *specific applications*, Section 4.6 (one bell end).

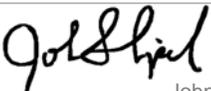
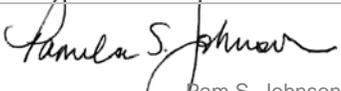
**4. Detailed Requirements**

**4.1 General**

Conduit shall be suitable for above ground use indoors or outdoors exposed to sunlight and weather and for underground use by direct burial or encasement in concrete.

Conduit dimensions shall conform to UL 651 and the IPS, where dimensions are based on outside diameters of iron pipe sizes.

Conduit color shall be medium to dark gray.

<i>standards coordinator</i>	<i>standards manager</i>	<i>unit director</i>
 John Shipek	 John Shipek	 Pam S. Johnson

**MATERIAL STANDARD**

Schedule 80 PVC Conduit

standard number: **7020.05**

superseding: April 23, 2009  
 effective date: December 16, 2009  
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**4. Detailed Requirements, continued**

**4.1 General, continued**

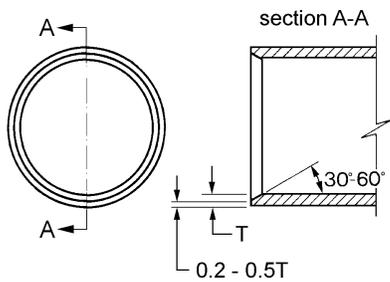
Conduit shall not have any features that can abrade or otherwise damage cable.

All conduit, 2 inch (IPS) and larger, shall be chamfered according to Figure 4.1.

Manufacturer shall inform Seattle City Light in writing of all design changes that could affect the product's understood or published capabilities or attributes.

Dimensional information cited in Section 4.2 should be consistent with UL requirements and is provided for the convenience of Seattle City Light design engineers, construction crews, inspectors, and quality assurance personnel who do not have ready access to UL 651.

**Figure 4.1**



**4.2 Conduit**

Conduit shall be certified by Underwriters Laboratories or one of the following NRTLs

(Nationally Recognized Testing Laboratories) as meeting the minimum requirements of Standard UL 651:

- CSA (Canadian Standards Association)
- ETL
- NSF International

**Table 4.2b**, Conduit shall meet the following performance requirements:

Description	UL 651 Section
Tensile strength	7
Deflection under heat and load	8
Extrusion process	9
Low-temperature handling	10
Water absorption	11
Resistance to crushing	12
Resistance to impact	13
Flame	14
Conduit for use with 90 degree C wire	17
Resistance to specific reagents	18
Sunlight resistance	19
Pipe stiffness	20
Pull - joint separation	21
Bending and pull - joint separation	22
Joint water tightness	23
Elastomeric materials accelerated aging	24
Permanency of printing	25

**Table 4.2a**, straight (str)

Stock No.	Trade Size, IPS, in	End #1	End #2	Outside Diameter, Minimum, in	Outside Diameter, Average, in	Outside Diameter, Maximum, in	Inside Diameter, Minimum, Average, in	Wall Thickness, Minimum, in	Weight, Nominal, lbs / ft
738740	1-1/2	bell	str cut	1.888	1.900	1.912	1.446	0.200	0.69
738741	2	"	"	2.363	2.375	2.387	1.881	0.218	0.96
738742	2-1/2	"	"	2.860	2.875	2.890	2.250	0.276	1.50
738743	3	"	"	3.485	3.500	3.515	2.820	0.300	1.96
738744	3-1/2	"	"	3.950	4.000	4.050	3.280	0.318	2.35
738745	4	"	"	4.450	4.500	4.550	3.737	0.337	2.86
738746	5	str cut	"	5.513	5.563	5.613	4.713	0.375	3.98
010333	6	bell	"	6.575	6.625	6.675	5.646	0.432	5.47



# MATERIAL STANDARD

Schedule 80 PVC Conduit

standard number: **7020.05**

superseding: April 23, 2009  
effective date: December 16, 2009  
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## 5. Marking

Each conduit section shall be marked according to the requirements of UL 651, Section 25.

The outer surface of each conduit section shall be marked with the following minimum information:

- Trade Size
- Schedule Number or equivalent information
- Manufacturer's name or symbol
- Date (or period) of manufacture
- UL or NRTL mark

## 6. Testing

Conduit test data that establishes compliance with the requirements of UL 651 and this material standard shall be provided upon request.

## 7. Packaging

Straight conduit shall be furnished in 10 ft sections, unless specified otherwise on the purchase order.

Master bundles shall be secured with at least two bands of steel or UV-resistant plastic strapping.

Standard packaging for straight conduit shall be as follows:

Each master bundle shall be legibly marked with the following information:

- Manufacturer's identification
- Product description
- Seattle City Light's Purchase Order Number
- Seattle City Light's Stock Number
- Gross, net, and tare weight

## 8. Shipping

Conduit may be delivered on enclosed, covered, or flatbed trucks. If conduit is delivered on a flatbed truck, conduit shall be side-loaded.

Because Washington State law requires a 10 inch minimum side board when driving a forklift or pallet jack onto the bed of a truck or trailer, most flatbed trucks or trailers must be side-loaded to ease off-loading.

## 9. Issuance

**Stock Unit:** FT

## 10. Approved Manufacturers

### Conduit Straight Sections

Cantex  
Cresline NW  
Heritage Plastics Incorporated  
IPEX  
JM Eagle  
Prime Conduit (formerly Carlon)  
Ridgeline Pipe Manufacturing  
Royal Pipe Systems

## 11. References

**7015.05**; "Schedule 40 PVC;" Material Standard; SCL

**7345.2** (cancelled); "Conduit and Fittings, EPC 40 and EPC 80 Rigid Polyvinyl Chloride"; Material Standard; SCL

**F 512**; "Standard Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation"; ASTM

**Shipek, John**; SCL Standards Engineer, subject matter expert and originator of 7020.05 (john.shipek@seattle.gov)

**FITTINGS FOR UNDERGROUND USE – DIRECT BURIAL PVC**

**1. Scope:** This specification is for polyvinyl chloride (PVC) plastic utilities fittings suitable for underground installations: Type DB-120 for direct burial.

The fittings shall comply with the latest revision to NEMA TC 9, "Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation."

**2. Fittings** shall be rated for direct burial use and furnished in the sizes and types specified on the purchase order. Sweep elbows shall have plain square cut ends free of ridges and burrs. Sockets shall be in accordance with Table 2-2 or 2-3 of NEMA TC 9. Plugs and end bells shall be in accordance with Tables 2-12 and 2-7 or 2-8, respectively, of NEMA TC 9.

**3. Color:** Fittings shall be medium to dark gray in color.

**4. Markings:** In addition to the marking requirements of NEMA TC 9, each shipping lot shall be marked with the City purchase order number, gross and net weights, and the name and address of the manufacturer.

**5. Reference Specification:** NEMA TC 9, ASTM D 2672, ASTM F 512 (latest revisions)

**6. Stock Unit:** EA

Sweep Elbows				End Bells (see note 1)		Plugs (see note 2)	
Stock No.	Nominal Size, in.	Bend, degrees	Radius, in.	Stock No.	Nominal Size, in.	Stock No.	Nominal Size, in.
*	3	22-1/2	150	734944	2	734938	2
*	4	22-1/2	150	734946	3	734940	3
*	5	22-1/2	150	734947	3-1/2	–	–
*	3	30	150	734948	4	734942	4
*	4	30	150	734949	5	734943	5
*	5	30	150	010340	6	010338	6

\* Starred items are not stocked, but are listed for contractor's information.

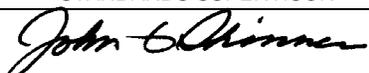
**Table Notes**

1. Approved end bell manufacturers: Carlon; Kraloy; PW Eagle Inc., dba PWPipe; Scepter.
2. Approved plug manufacturer: Carlon only.
3. For regular couplings and adapters and 45° and 90° bends, see CL Material Standard 7345.2.

**7. Adapter:** 3-1/2" nominal round to 3-1/2" nominal square by 24" long.

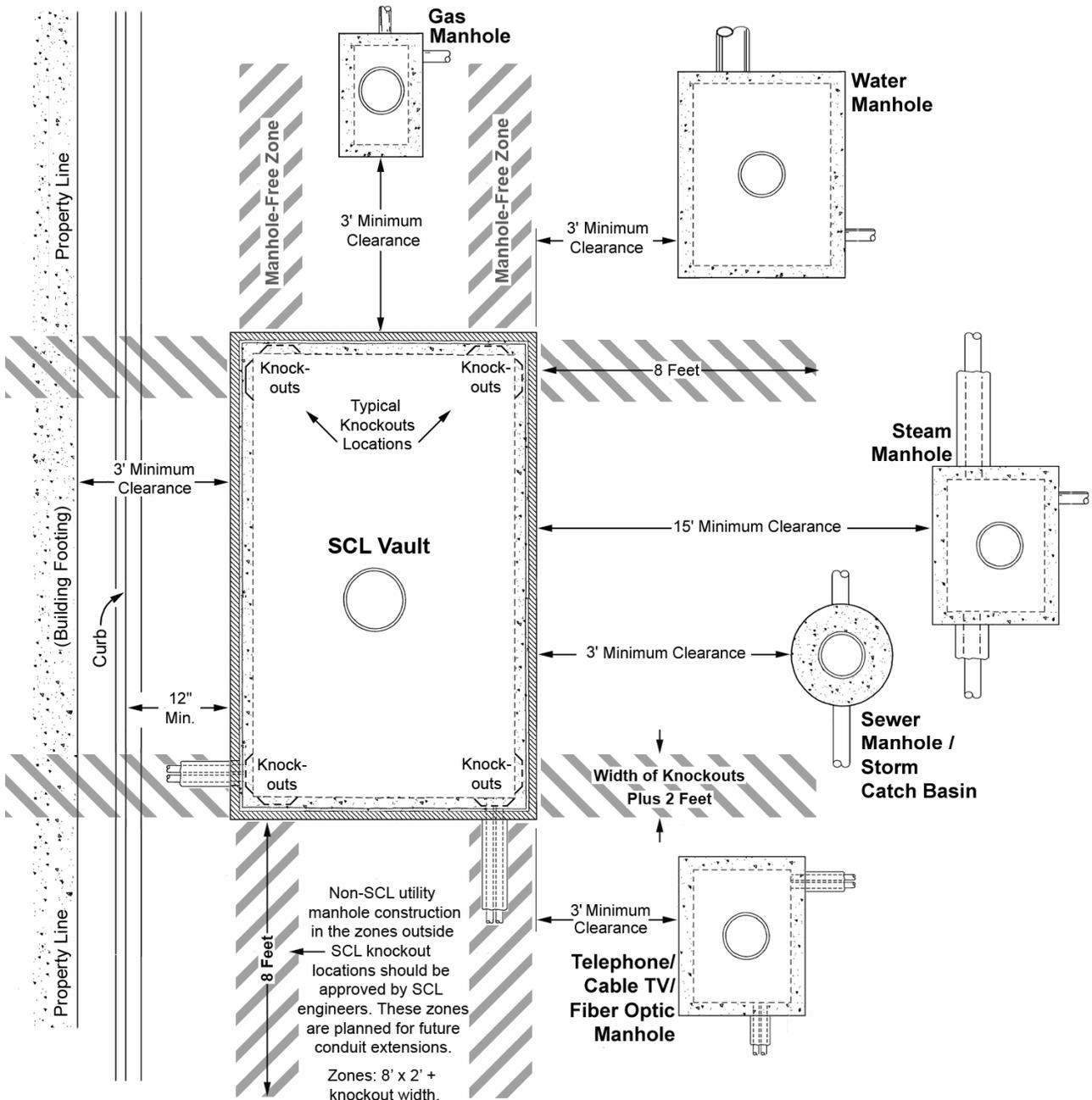
Stock No. 734565

Approved adapter manufacturers: Carlon; J-M Manufacturing Inc.; Picoma; PW Eagle Inc., dba PWPipe; Raceways Tech.

STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
 Charles L. Shaffer	 John G. Skinner	 Hardev Juj

**ELECTRICAL CONDUIT AND FACILITIES IN PUBLIC RIGHTS-OF-WAY**

**Figure 1, Minimum Spacing and Clearances  
Between SCL Vaults and Manholes and Other Installations**



standards coordinator	standards supervisor	unit director
 John Shipek	 John Shipek	 Pam S. Johnson

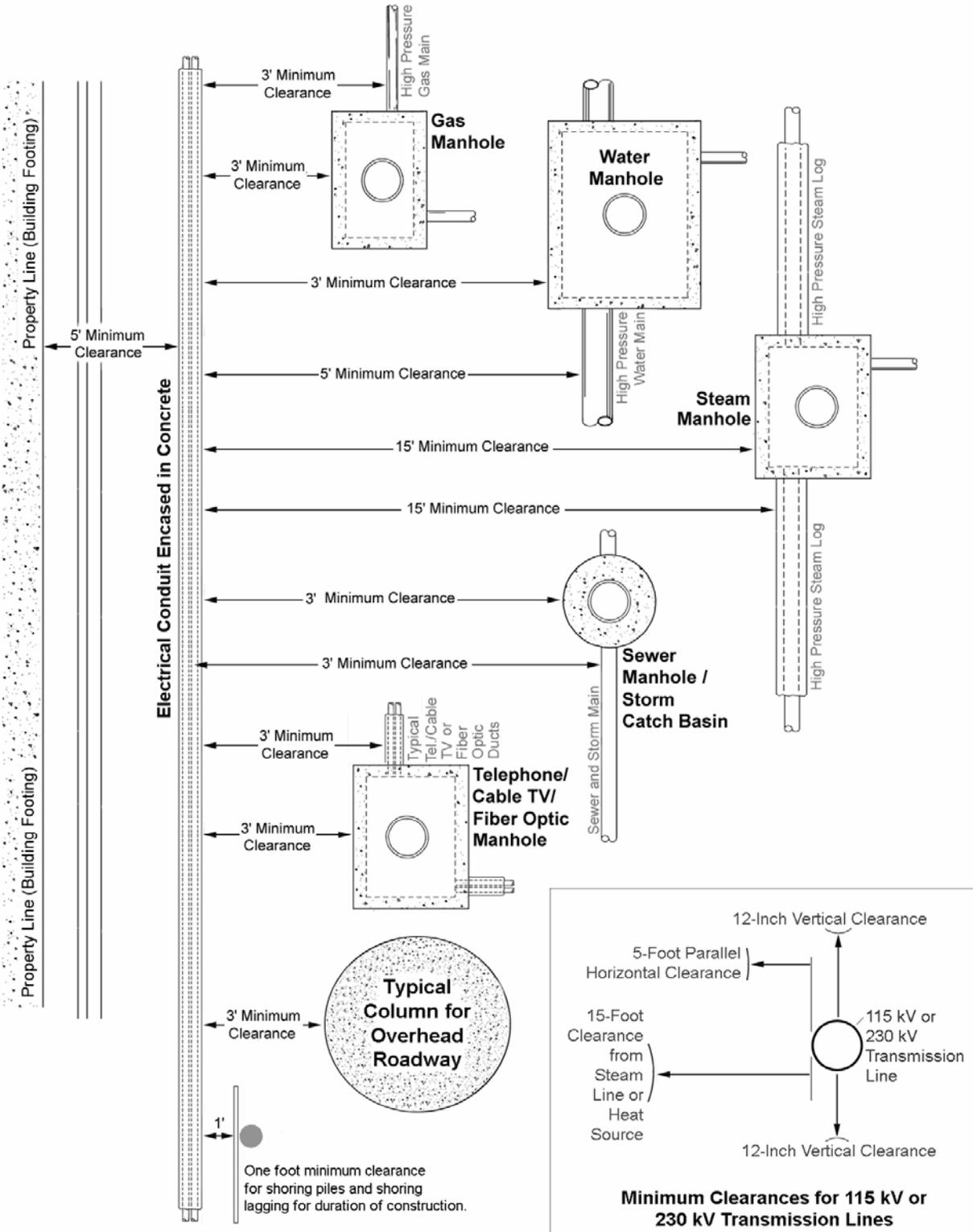
# CONSTRUCTION GUIDELINE

Electrical Conduit and Facilities in Public Rights-of-Way

superseding: August 18, 2006

effective date: September 10, 2008

**Figure 2, Minimum Spacing and Clearances Between SCL Conduits and Other Installations**



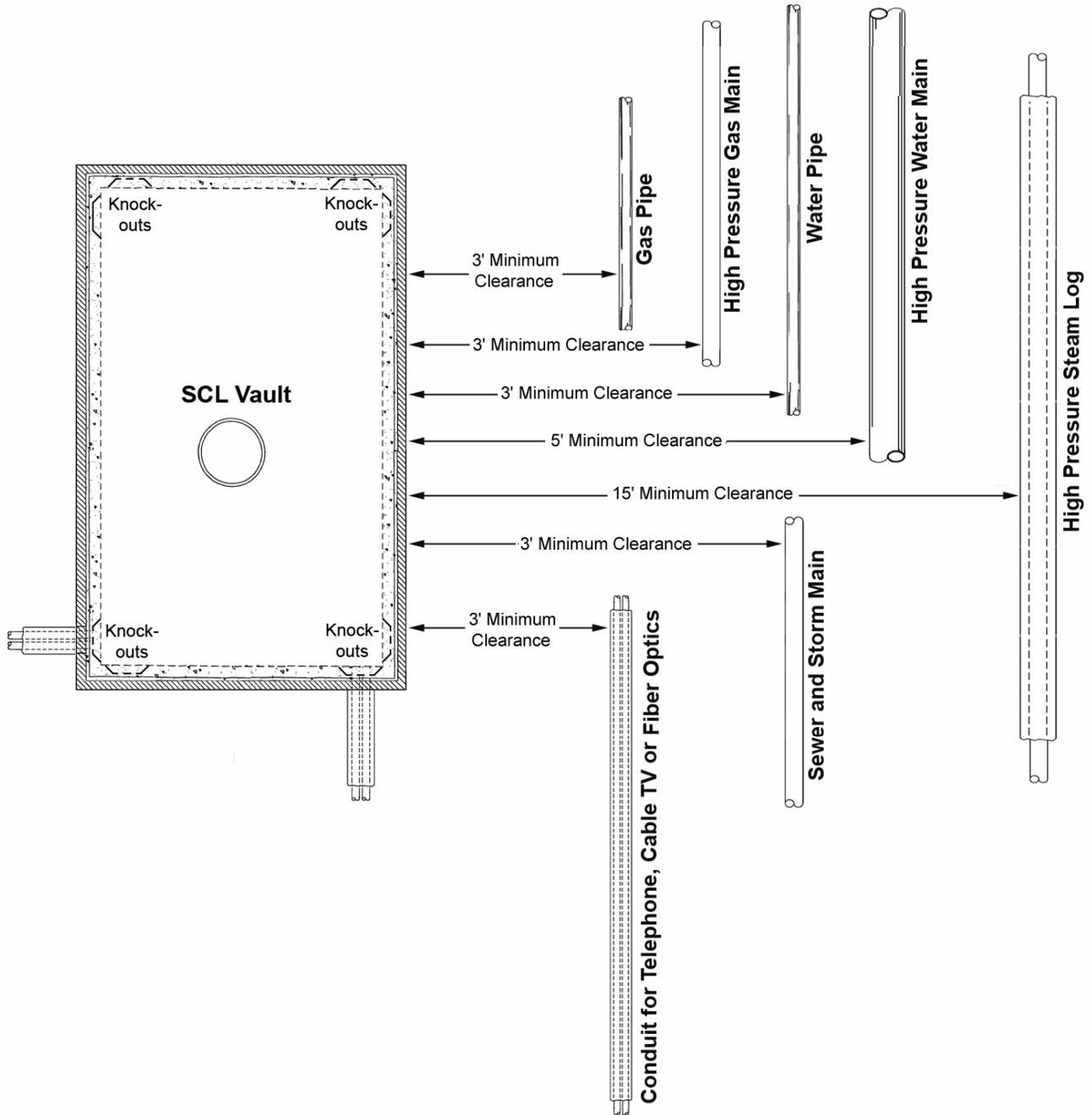
# CONSTRUCTION GUIDELINE

Electrical Conduit and Facilities in Public Rights-of-Way

superseding: August 18, 2006

effective date: September 10, 2008

**Figure 3, Minimum Spacing and Clearances Between SCL Vaults and Manholes and Other Utility Conduits, Mains, Ducts and Pipes**



**CONSTRUCTION GUIDELINE**

Electrical Conduit and Facilities in Public Rights-of-Way

**1. Minimum Separation for Utilities and Structures**

Provide minimum separation for City Light cable, conduit, manholes and vaults from other utilities or structures as follows unless parties concur in writing on lesser separations.

The separation between electrical power conduit and utilities such as telephone, cable TV, and fiber optic cable shall be 3 feet, minimum, measured in any direction, and shall be offset as much as possible so as to be separated from City Light conduit horizontally and not directly above. The separation between electrical power conduit and structures such as roadway columns including footings shall be 3 feet, minimum, measured in any direction, unless parties concur on lesser separations.

City Light 115 or 230 kV transmission lines shall always require a minimum of 12 inches of vertical separation and 5 feet of parallel, horizontal separation from other facilities or in the case of steam lines or other heat sources, a minimum of 15 feet separation.

Overhead clearance above City Light underground vaults and manholes: To allow crane access to City Light vaults and manholes for lowering and raising equipment, the minimum vertical height above the underground facilities, of overhead structures and any encumbrances, such as roadway columns, shall be 25 feet.

During construction projects, installations of shoring, shoring piles and shoring lagging shall maintain a separation from City Light conduits, duct banks, vaults and manholes of no less than one foot for the duration of construction.

**Separation from SCL Facilities  
(None Directly Above Without Approval\*):**

<b>Non-SCL Utility or Structure</b>	<b>Duct Banks</b>	<b>115 or 230 kV Lines</b>	<b>Vaults or Manholes</b>	<b>Adjacent to Knockouts <sup>Ψ</sup></b>
<b>Water</b> Manhole, Horizontal	3 ft.	5 ft.	3 ft.	8 ft.
High Pressure Water Main, Vertical	12 in.	12 in.	None*	None*
High Pressure Water Main, Horizontal (Parallel to HP Main)	5 ft.	5 ft.	5 ft.	5 ft.
Other Water Pipe, Horizontal	3 ft.	5 ft.	3 ft.	3 ft.
<b>Sewer/Storm</b> Service Manhole, Horizontal	3 ft.	5 ft.	3 ft.	8 ft.
Sewer and Storm Water Main, Vertical	6 in.	12 in.	None*	None*
Sewer and Storm Water Main, Horizontal (Parallel)	3 ft.	5 ft.	3 ft.	3 ft.
SPU Storm Catch Basin, Horizontal	3 ft.	5 ft.	3 ft.	5 ft.
<b>Natural Gas</b> Manhole, Horizontal	3 ft.	5 ft.	3 ft.	8 ft.
High Pressure Gas Main, Vertical	6 in.	12 in.	None*	None*
High Pressure Gas Main, Horizontal (Parallel)	3 ft.	5 ft.	3 ft.	3 ft.
Other Gas Pipe, Horizontal	3 ft.	5 ft.	3 ft.	3 ft.
<b>Steam</b> Manhole or <b>Any Heat Source</b>	15 ft.	15 ft.	15 ft.	15 ft.
High Pressure Steam Log	15 ft.	15 ft.	15 ft.	15 ft.

\* **No Installations Directly Above SCL Facilities Without SCL Engineering Approval! See below for direction on exceptions.**

<sup>Ψ</sup> No utility handholes or other underground structures to be installed in the area outside and adjacent to knockouts that are within a City Light vault in a zone extending outward from the vault for 8 feet and wide enough to include one foot on each side of the knockouts. This zone to be reserved for future extensions of City Light duct runs unless parties receive explicit permission from City Light Engineering.

**CONSTRUCTION GUIDELINE**

superseding: August 18, 2006

effective date: September 10, 2008

Electrical Conduit and Facilities in Public Rights-of-Way

page: 5 of 7

**1. Minimum Separation for Utilities and Structures**, continued

Non-SCL Utility or Structure	Separation from SCL Facilities (None Directly Above Without Approval*):			
	Duct Banks	115 or 230 kV Lines	Vaults or Manholes	Adjacent to Knockouts $\Psi$
Telephone, Cable TV or Fiber Optic Cable Manhole, Horz.	3 ft.	5 ft.	3 ft.	8 ft.
Telephone, Cable TV or Fiber Optic Cable, Vertical	6 in.	12 in.	None*	None*
Telephone, Cable TV or Fiber Optic Cable, Horizontal (Parallel)	3 ft.	5 ft.	3 ft.	3 ft.
Fire Hydrants, Horizontal	6 in.	5 ft.	6 in.	8 ft.
Street Curbing, Horizontal	12 in.	5 ft.	12 in.	–
Building Footing, Horizontal	5 ft.	5 ft.	3 ft.	–
Metro Buses and Strain Poles (OH Operation), Horizontal	5 ft.	5 ft.	5 ft.	–
Concrete Support Column, Horizontal	3 ft.	5 ft.	3 ft.	8 ft.
Concrete Support Column Footings, Horizontal	3 ft.	5 ft.	3 ft.	8 ft.
Temporary Construction Shoring Piles, Horizontal	1 ft.	1 ft.	1 ft.	1 ft.

\* **No Installations Directly Above Scl Facilities Without Scl Engineering Approval! See below for direction on exceptions.**

$\Psi$  No utility handholes or other underground structures to be installed in the area outside and adjacent to knockouts that are within a City Light vault in a zone extending outward from the vault for 8 feet and wide enough to include one foot on each side of the knockouts. This zone to be reserved for future extensions of City Light duct runs unless parties receive explicit permission from City Light Engineering.

Refer to Section 9. for Planting Clearances.

**2. Trench Design and Construction**

All SCL transmission lines and all critical distribution lines, as determined by SCL, shall be designed using thermal resistivity soil studies.

The bottom of the trench shall be free of debris and fine graded by hand to remove sharp, embedded rocks and loose stones over 1/2 inch in size, or the trench shall be over-excavated and the over-excavation replaced with bedding material to cover protruding rocks and stones by at least 2 inches. The bottom shall be graded even.

Bedding shall be sand.

Spacers for conduit separation shall be plastic lock-type placed 5 feet apart horizontally in both straight and bending sections of duct banks. Two by four-inch (nominal) concrete or wood blocking, twice the area of the foot of the base spacer, shall be provided under base spacers. See Construction Guideline 2-11, Section 9.

Over conduit, place bedding material or a 2 inch layer of unsaturated excavated material selected to exclude all sharp rocks and stones over 1/2 inch in size. Around all telephone and television cables, place bedding material or select excavation material. Backfill conforming to this may be placed directly over conduit and all cables.

The trench depth between 20 inches and 30 inches is reserved for lateral services.

Cover over conduit and cables shall be measured from finished grade or top of curb, whichever is lower. If no curb, then measure from edge of pavement.

City of Seattle: Location and depth of all conduit cuts and services shall conform to the *Standard Plan For Construction* or except as indicated on construction drawings. Minimum Cover: 3 feet between street intersections; 4 feet at street intersections; and maximum depth, 6 feet. See Page 6.

**CONSTRUCTION GUIDELINE**

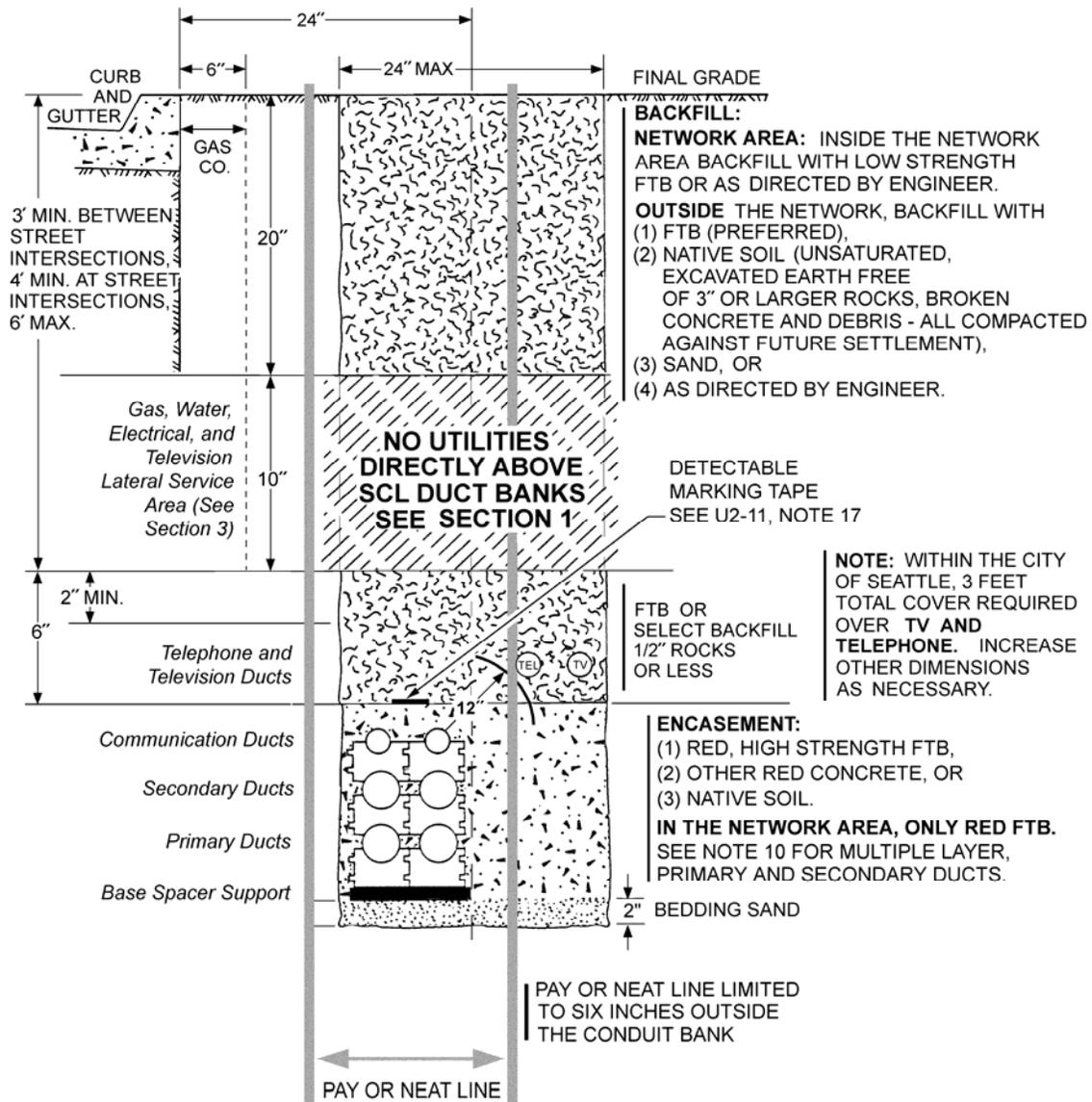
superseding: August 18, 2006  
 effective date: September 10, 2008  
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Electrical Conduit and Facilities in Public Rights-of-Way

**3. Duct Bank Depth**

Normal minimum depth for SCL duct banks is 3 feet. Depth is measured from street grade to the top of the bank. For non-standard installations where it may not be possible to achieve Guideline depth for SCL duct banks, additional protection is required. The use of steel conduits and/or steel plating above the ducts may be used at the direction of SCL engineers in these situations. SCL engineering approval is always required for non-standard depth placement. With additional protection, SCL engineers have allowed a minimum depth of 24 inches for ducts containing less than 600 volts and 30 inches for ducts containing more than 600 volts. Where it is necessary to place ducts deeper (e.g. deeper than 6 feet), installations shall be reviewed by SCL engineers to assure cable ampacity is not compromised.

**Figure 4, Primary and/or Secondary Conduit**



**CONSTRUCTION GUIDELINE**

superseding: August 18, 2006

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Electrical Conduit and Facilities in Public Rights-of-Way

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**4. Multiple Layers of Conduit**

**CAUTION!** On parallel runs a **minimum of 6-inch** separation is to be maintained horizontally from top to bottom of trench. Utilities **shall not** be installed directly over each other (exceptions with SCL Engineering approval only).

For multiple layers of conduit, see Construction Guideline U2-11, Network Construction Guideline NDK-10, and Material Standard 7150.00 that recommend or require fluidized thermal backfill (FTB) as concrete encasement. Red dye shall be added to the encasement concrete mix at the rate of 4 pounds per yard. An FTB mix is also recommended for backfill.

5. For cable or conduit **installation on private property**, see Construction Guideline U12-1.4 / NDK-60.

6. **Bending of PVC conduit** with heat (e.g., heat blankets or hot boxes) is prohibited. See Construction Guideline U2-11 Note 8, or in the Network area, Network Construction Guideline NDK-10 Note 10.

**7. Working Around City Light Cables And Conduits**

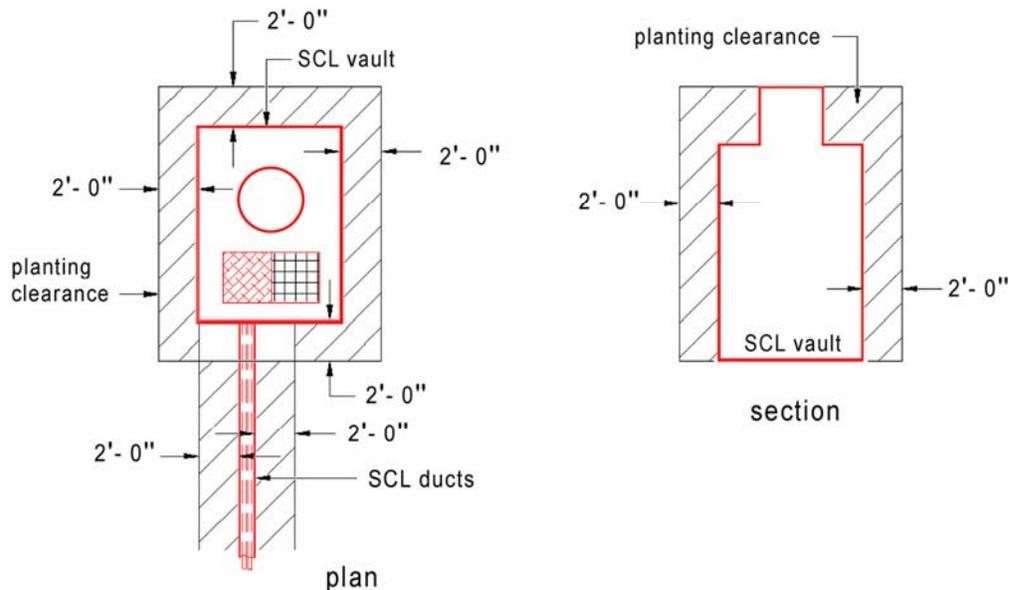
During new construction around existing City Light cables and conduits, hand digging is required within the red, locate-lines until the duct banks are exposed. Use of an earth auger for construction will require case-by-case direct supervision by City Light. During construction projects, installations of shoring, shoring piles and shoring lagging shall maintain a separation from City Light conduits, duct banks, vaults and manholes of no less than one foot for the duration of construction.

**8. Vaults Between Terminal Poles**

All primary dips between two terminal poles, regardless of wire size, should have at least one vault installed in the run. Exceptions should be engineered to assure ease of cable replacement or restoration.

**9. Planting Clearances****Figure 9, Planting Clearances**

Trees and other vegetation shall not be planted within 2 ft of SCL vaults and ducts





**CONSTRUCTION GUIDELINE**

**1. Location and Depth**

See City of Seattle Standard Plan No. 030 for location and depth of ducts and services in public right-of-way (Seattle City limits).

**2. Duct Size and Description**

In the in the URD area, install 6-inch Schedule 80 PVC conduit for new duct installations that are planned for primary cables of 600 amps and above.

**3. Trench Construction**

- **Depth and Grade.** Excavate trench to proper depth and grade. Minimum grade shall be plus or minus 3 inches per 100 feet for drainage between terminations. Vertical changes in grade (slope) shall be constructed with a minimum bend radius of 10 feet. For temporary terminations, the maximum grade for sand encased conduit shall not exceed 10% (see section 7).
- **Shoring Plywood.** Remove all plywood and other shoring materials and structures from the trench prior to encasement to allow maximum heat dissipation from conduits.

**4. Clearances**

Between street intersections, conduit encasements (see sections 10 and 11) shall be a minimum of 3 feet below the finished grade or the street level. Within street intersections, the depth to the encasement shall be 4 feet, minimum. The maximum depth to the encasement shall be 6 feet. Within the encasement, the top conduit shall be an additional minimum of 6 inches below the top of the encasement.

Encased conduit crossing power and communication ducts, sewer, storm and water mains (including hydrant laterals) shall have a 6-inch minimum clearance or be cushioned (supported) with Styrofoam or cushioning

(support) acceptable to the utilities. Encased conduit crossing gas mains shall have a 12-inch minimum clearance or be cushioned (supported) to the satisfaction of the utility. Minimum vertical clearance from services shall be 3 inches unless modified otherwise by the owning utilities.

Encased conduit parallel to water and high pressure gas mains shall have a 60-inch minimum clearance horizontal to the utility.

**5. Non-Transportation**

Ducts should not be transposed between vaults unless it is absolutely unavoidable.

**6. Communication Ducts**

- **Communication Ducts:** On all new underground installations of duct banks, two-3-inch ducts shall be included for communication uses. The two communication ducts shall be placed at the top of the duct bank in all new public right-of-way runs. The engineer will determine if the communication ducts are to be routed to new service locations. See section 8. on bends.
- **Communication Duct Handholes:** Where possible the two communications ducts shall be routed into separate 444 handholes to be placed in the vicinity of adjacent vaults. Run communications ducts into the bottom of the handhole wall (see the drawing of typical handhole installations at the top of the page in Construction Guideline U2-13.1). Communication duct handholes shall be placed at each street intersection, at mid-block, and in the vicinity of each vault. Communication duct handholes shall be numbered with the "C" preface (C-*nnn*). Occasionally it may be necessary to run the communication ducts into existing vaults.

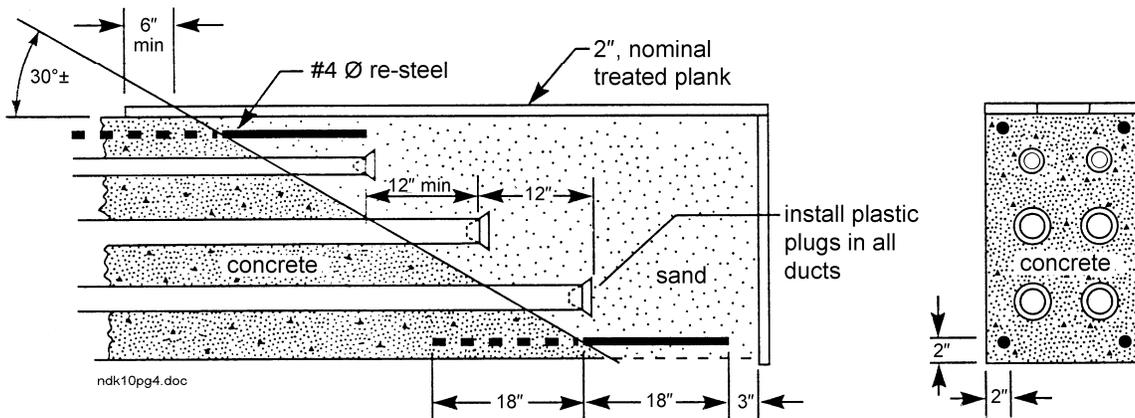
**Table 2, Material**

Item	Quantity	Description	Stock No.
1a	as req'd	Conduit, PVC, Schedule 40	734524 thru 734530 and 010334
1b	as req'd	Conduit, PVC, Schedule 80	738740 thru 738746 and 010333
2a	as req'd	Couplings, standard end, PVC	734512 thru 734522 and 010343
2b	as req'd	End Bells, PVC	734944 thru 734949 and 010338
3	as req'd	Spacers, plastic, non-metallic conduit	734669E thru 734692E, 010446 and 010447
4	as req'd	Cement, PVC, solvent	726680
5	as req'd	Cable Protector	2" to 2-1/2"
			3" to 6"
			731800E
			731801E

# CONSTRUCTION GUIDELINE

Installation of Nonmetallic Conduit with Concrete or FTB Encasement

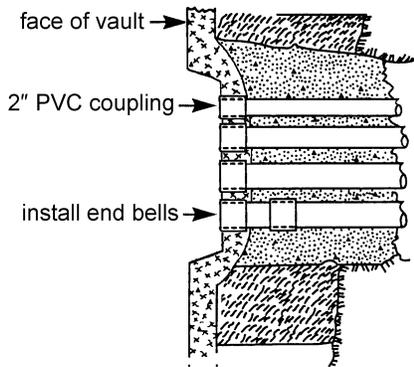
**Figure 7.1, Encased conduit temporary termination - trench**



## 7. Duct Termination

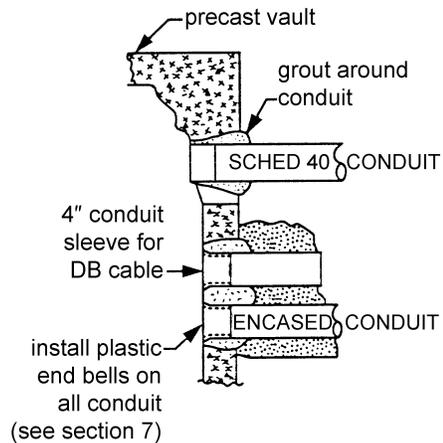
Conduits to be terminated in a vault, handhole, or manhole may either be individually grouted to the structure wall or a bank of conduits may be encased to the wall in a concrete envelope. Such concrete encasement shall be finished smooth on the inside of the wall. All ducts shall be end belled flush with the inside wall of the structure. See Construction Guideline U2-11.3. See plugging requirement in section 15 of this Guideline.

**Figure 7.2, Encased conduit**



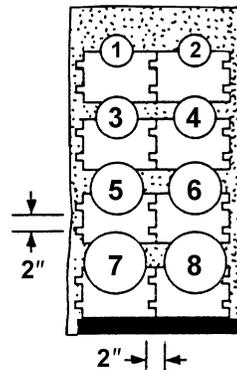
- Cable Protector Marking:** Cable protectors, marked with the destination of the empty conduit, may be installed in the termination of empty conduits. Use a permanent marking pen for marking the cable protector. This is especially important for service or stubbed out conduits (i.e. those which do not go to another City Light vault).

**Figure 7.3, Termination without encasement**



- Temporary Terminating:** If concrete encasement is to be temporarily terminated, i.e., overnight, then remove the sand fill and treated planks. Install reinforcement steel whenever concrete placing is to be delayed beyond initial set of the in-place concrete.

**Figure 7.4, Duct numbering**



Duct references for field counting of ducts **looking east or north:**  
 For ducts *running east and west*, **count from north to south.**  
 For ducts *running north and south*, **count from west to east.**

# CONSTRUCTION GUIDELINE

Installation of Nonmetallic Conduit with Concrete or FTB Encasement

standard number: **U2-11**

superseding: January 25, 2008

effective date: January 8, 2010

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## 8. Change In Direction

For a horizontal change in direction, the conduit may be cold-formed at about 68°F to minimum bend radii of 20 feet for 4-inch conduit, 30 feet for 5-inch, and 36 feet for 6-inch, provided the deflection does not exceed 15°. The installation of preformed PVC bends is expressly forbidden for any use except where approved by the Seattle City Light engineer. For a horizontal change in direction exceeding 15°, the sweep shall be effected with a 140-inch minimum radius bend of galvanized rigid steel conduit.

PVC conduit will not be allowed for system conduit bends. With prior written permission from Seattle City Light, fiberglass (RTRC) conduit sweeps of 140 inches, minimum radius, may be used. Steel bends shall be provided with PVC adapter couplings as required. Any conduit run that requires more than the equivalent of two 90° bends need to be approved by Seattle City Light Engineering.

The installation of preformed small radius bends (5°, 22.5°, 45°, etc.) is expressly forbidden for any use except where specified by the engineer for service conduit.

When duct runs change direction, the bend radii of the 3-inch communication ducts in the duct run shall match the radii of the larger dimension ducts to avoid communication ducts overhanging the rest of the bank. This may require special order 3-inch bends.

## 9. Spacers

Spacers for conduit separation shall be plastic lock-type of such configuration to give the required separation between conduit and earth as shown on the drawings. Horizontally, spacers shall be placed 5 feet apart in both straight and bending sections of duct banks. Three-inch base spacers shall be used to obtain the three-inch side cover under conduit. Base spacers may also be used to obtain three-inch side cover of conduit in bends. Two by four-inch (nominal) concrete or wood blocking, twice the area of the foot of the base spacer, shall be provided under base spacers. See Material Standard 7346.8.

## 10. Encasement

Conduit encasement shall be:

- Red, high strength fluidized thermal backfill (a concrete mix),
- Red concrete (non-FTB formulas), or
- As specified by City Light engineer.

### High Strength Fluidized Thermal Backfill (FTB):

High strength fluidized thermal backfill is a concrete mix and is the preferred material for encasement. For the FTB mixture, see section 11, below. Refer to Material Standard 7150.00. Where FTB is to be used for encasement, add red dye at the rate of 4 pounds per yard.

**Non-FTB Concrete Materials:** Concrete for conduit encasement shall be Class 5, manufactured with 3/8-inch minus gravel and with 1 ± 1/2 fluid ounces of "Sika AER" air entraining agent per sack of cement and sufficient water to produce a slump of 4 to 6 inches. Red dye shall be added to all concrete mixes as with FTB, above.

**Placing Concrete:** Place the concrete and vibrate to eliminate voids, taking care not to puncture, deform or float the conduit. As concrete heat expands the conduit, start placing concrete encasement from the middle of the run and work out both ways or start from one end and continue to the other end.

**Cure Time:** Wait 48 hours before backfilling and pulling cable.

**Sealing Concrete:** After the concrete has set, and to prevent dehydration of the concrete, seal the surface with either Hunt Process Sealer or loose moist backfill material.

**Native Soil:** Where native soil is used, rock diameters shall be limited to 3/4 inches.

## 11. Backfill

Backfill shall be

- fluidized thermal backfill (FTB),
- native soil,
- sand
- or as directed by the CL engineer.

**Fluidized thermal backfill (FTB)** is the standard City Light backfill and encasement product. City Light orders FTB in two mixtures, low and high strength. FTB is a flowable, controlled density fill with known thermal characteristics and contains aggregate, fluidizer (fly ash), and cement. Refer to Material Standard 7150.00 for requirements.

**Native soil.** Where native soil is used for backfill, rock diameters shall be limited to 3/4-inches.

**Sand** for backfill shall be washed building sand, thoroughly saturated with water and mixed to a fluid consistency. Sand shall conform to the gradation shown in the table below.

Sieve Size, in	Percent Sand Passed by Weight	Sieve Size	Percent Sand Passed by Weight
2	–	No. 4	95 - 100
1-1/2	–	No. 8	–
1	–	No. 16	45 - 80
3/4	–	No. 50	7 - 30
1/2	–	No. 100	0 - 6
3/8	100	No. 200	0 - 2.5

## CONSTRUCTION GUIDELINE

Installation of Nonmetallic Conduit with Concrete or FTB Encasement

standard number: **U2-11**

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effective date: January 8, 2010

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### 11. Backfill, continued

**Note**, this Guideline does not apply to the **Network Area**. See Network Construction Guideline NDK-10. Only red-dyed, FTB concrete (high strength) is to be used in the Network system for encasing conduit. Fluidized thermal backfill (FTB) is required to backfill around conduit in the Network. Sand is not permitted for these Network system applications.

### 12. Conduits Entering Vault

When two sets of conduits (encased or direct burial) enter horizontally and at right angles to each other in the same corner of a vault, manhole or handhole, they shall enter at different elevations, i.e., one shall be vertically offset to the other. The encased conduit shall terminate to 1/2 inches of perpendicular, horizontal and vertical, for the 2 feet of minimum concrete encasement. Similarly, direct burial conduit shall terminate to 1/4 inches per foot of perpendicular.

### 13. Mandreling

Conduit bends shall be mandrelled prior to placement and encasement. After the concrete is placed the entire run shall be cleaned and mandrelled. Mandreling shall be done in the presence of an SCL inspector. See Construction Guideline U2-11.40.

### 14. Water Jet Cleaning

Conduit runs of 5-inch or larger shall be flushed with a water jet type system such as the "Jet Rodder" equipment. Completion subject to SCL inspector's approval. See Construction Guideline U2-11.40.

### 15. Plugs

After cleaning and mandreling, each conduit shall be plugged with plugs of the type and manufacturer specified in Seattle City Light Material Standard 7345.7.

### 16. Vaults Between Terminal Poles

All primary dips between two terminal poles, regardless of wire size, should have at least one vault installed in the run. Exceptions should be engineered to assure ease of cable replacement or restoration.

### 17. Detectable Underground Marking Tape

Install 3-inch wide red detectable underground marking tape, Stock No. 736800, on top of duct bank and also above any direct-buried cables and/or conduits.

**REINFORCEMENT OF CONCRETE ENCASED DUCT RUNS**

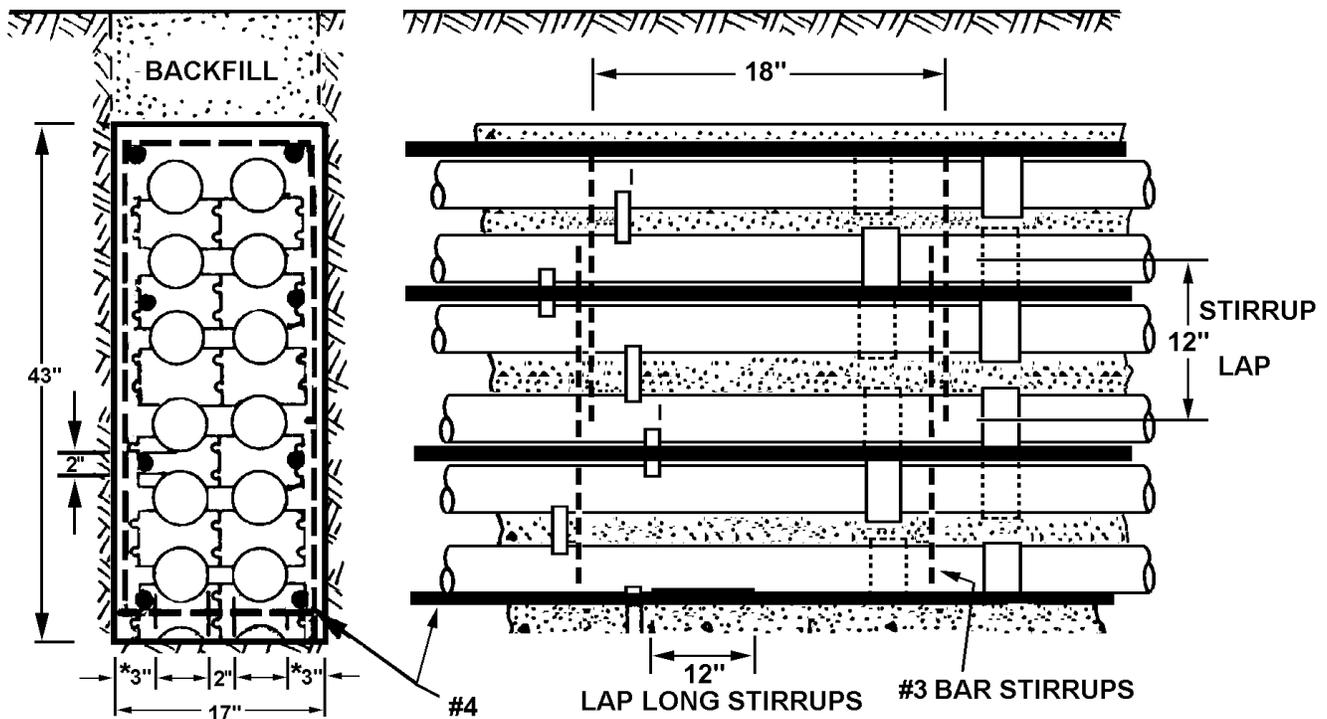
When the engineer determines that concrete encased duct runs need reinforcement, the reinforcement shall consist of #4 Grade 40 or Grade 60 deformed bars placed longitudinally in the duct run and tied with #3 closed stirrup at 18" on center. All reinforcing shall conform to ASTM Specification A 615-82.

The number of longitudinal bars per duct section shall be the next highest even number to that number determined by the equation  $N = 0.12 (W+D) - 0.72$ , where N = number of bars, W = width of duct, and D = depth of duct envelope in inches.

The first four bars shall be placed in the corners of the concrete envelope. All bars thereafter shall be equally spaced between the corner bars. The longitudinal bars shall have a minimum of 2" of concrete cover. Minimum lap splice length for #3 and #4 bars shall be 12". Longitudinal splices are to be staggered.

Red dye shall be added to the concrete mix at the rate of 4 pounds per yard.

EXAMPLE: Assume duct envelope 17" wide, 43" deep  
 $N = 0.12 (17 + 43) - 0.72 = 0.12 (60) - 0.72 = 7.20 - 0.72 = 6.48$   
 Use 8 - #4 bars.



\* OVERPOUR SHALL NOT EXCEED 6"

u2-112.tif

ORIGINATOR	STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
Keith "BHAG-HOG" Rosand	Jim S. Horn	John Chinner	Betty Robin

**MANDRELING AND CLEANING OF DUCTS AND CONDUITS**

1. After the concrete has been poured or the trench backfilled over conduit each and every duct run and **conduit shall be tested** for obstructions or flattening by pulling a non-flexible wood mandrel of appropriate size through the duct or conduit within 5 days of installation. If an obstruction is found in a duct or conduit, that section shall be replaced.
2. **Cleaning** ducts shall be performed by drawing a brush with stiff bristles and a swab through each duct and conduit to make certain no foreign materials are left in the duct.
3. Conduit runs of 5 inches or larger **shall be flushed** with a water jet type system such as the "Jet Rodder" equipment. Completion subject to SCL inspector's approval.
4. Cleaning and mandreling operations may be performed **simultaneously**.
5. After cleaning and mandreling, each conduit shall have left in it a flat, pre-lubricated, polyester or Aramid **pull tape** of 2,500 lb. minimum tensile strength (Fibertek Inc. or equal; City Light Stock Nos. 012293 and 012480). The pull tape shall be printed with sequential footage markings. Every conduit not part of a duct bank shall contain a 3-inch wide

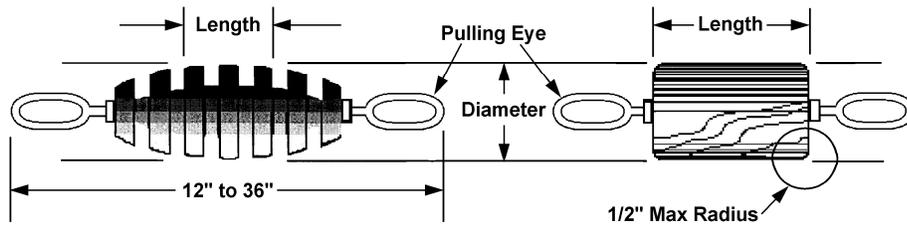
detectable underground marking tape, red-colored, Reef Industries "Sentry Line" #42-0110 or Pro-Line Safety or equal (City Light Stock No. 736800).

6. After cleaning and mandreling, each conduit shall be **plugged** with plugs of the type and manufacturer specified in Seattle City Light Material Standard 7345.7.

**7. Mandrel Sizes**

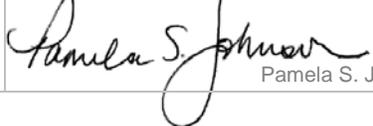
Conduit Size, in	Mandrel Diameter, in	Mandrel Length, in
3/4	0.62	1.00
1	0.78	1.25
1-1/4	1.00	1.50
1-1/2	1.25	1.75
2	1.62	2.25
2-1/2	2.00	2.75
3	2.50	3.25
3-1/2	3.00	3.75
4	3.50	8.00
5	4.75	12.00
6	5.50	12.00

**8. Typical Mandrel Configuration**



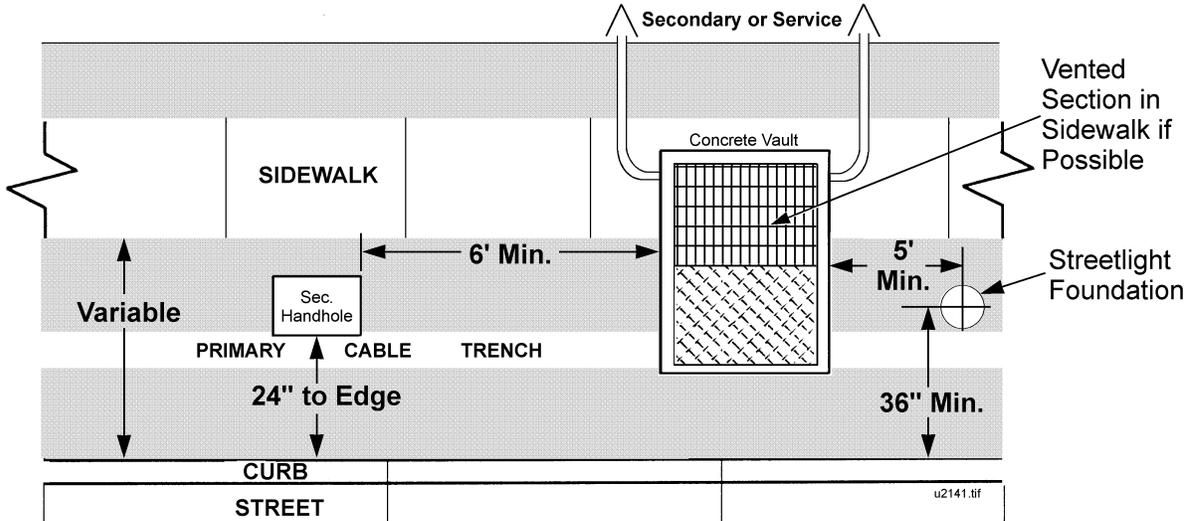
**Flexible Cutting Mandrel**  
 Not for Proofing - for Cleaning Only

**Wood Mandrel**

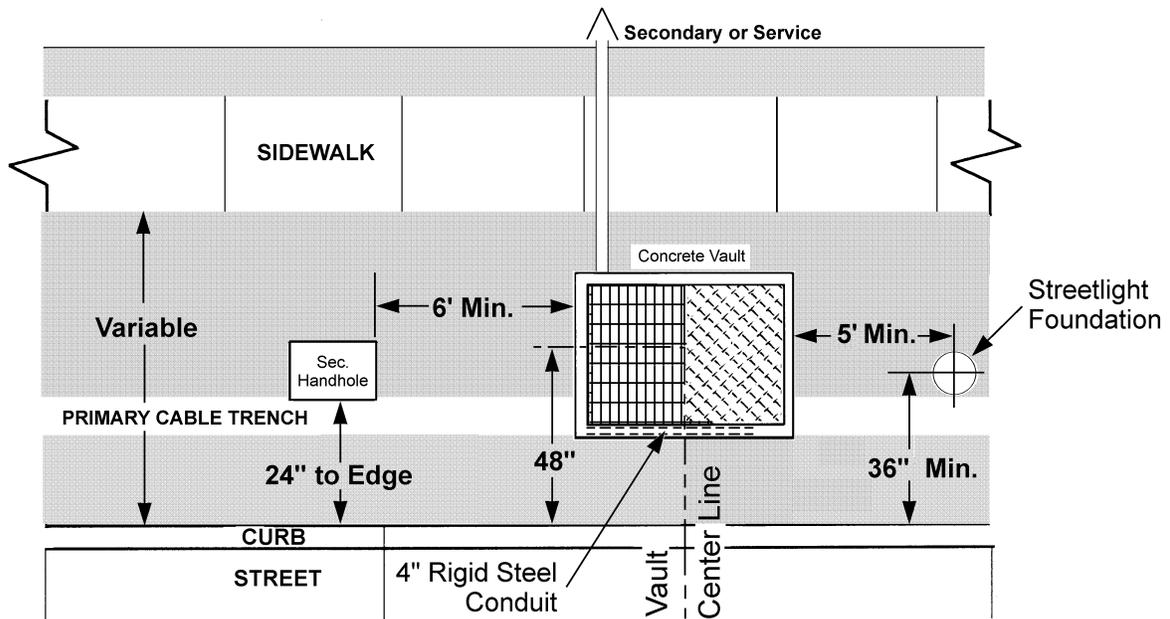
standards coordinator	standards manager	unit director
 John Shipek	 John Shipek	 Pamela S. Johnson

**RESIDENTIAL EQUIPMENT LOCATION DETAILS**

See Notes for Exceptions



**Preferred Orientation for 577 Vault with J-Box**



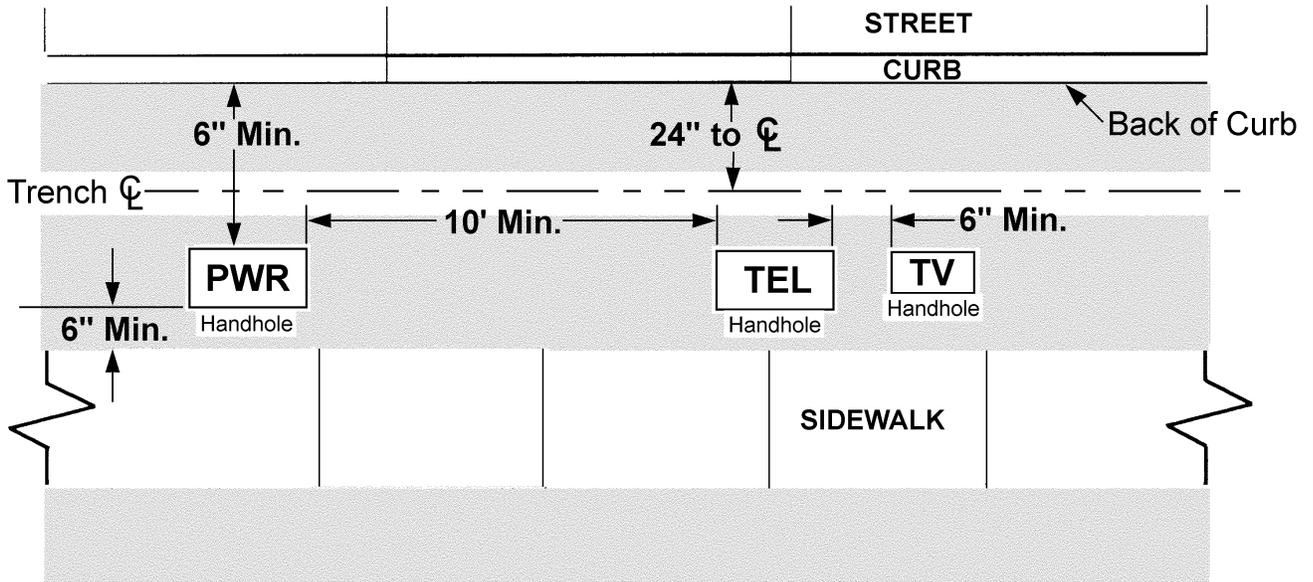
**Alternate Orientation for 577 Vault with J-Box**

See Construction Guideline U9-6 for clearance requirements for vaults with J-Boxes.

ORIGINATOR	STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
<i>Jim S. Horn</i>	<i>Charles J. Shaffer</i>	<i>John C. ...</i>	<i>Betty Robin</i>

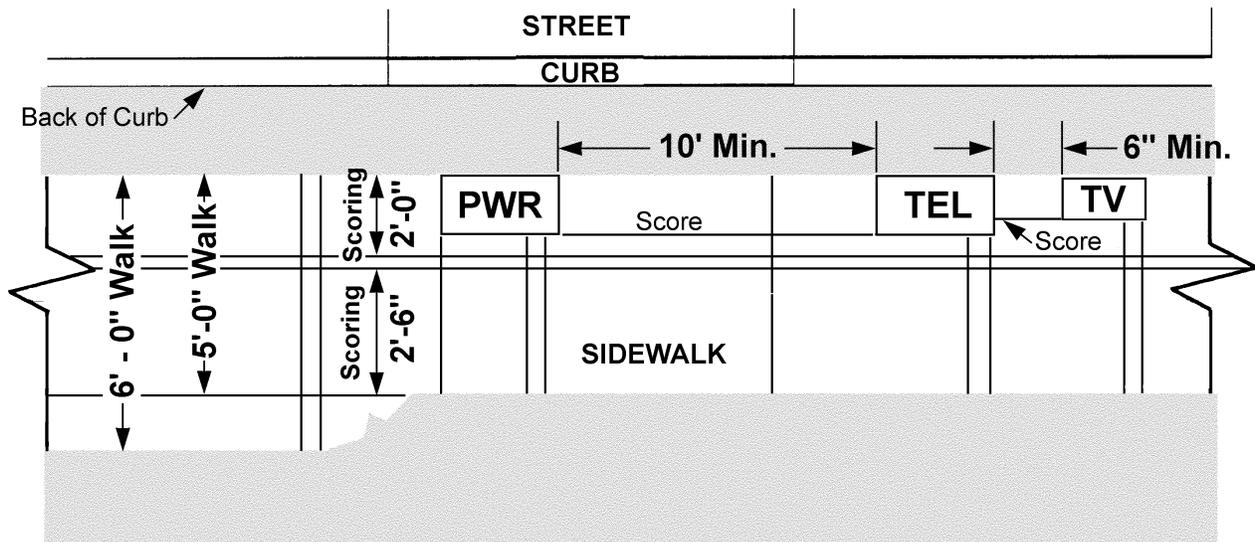
**RESIDENTIAL EQUIPMENT LOCATION DETAILS**

**Secondary Handholes  
 Preferred Locations**



**Alternate Locations in Sidewalks**

Where required due to lack of handhole space in planting strips.



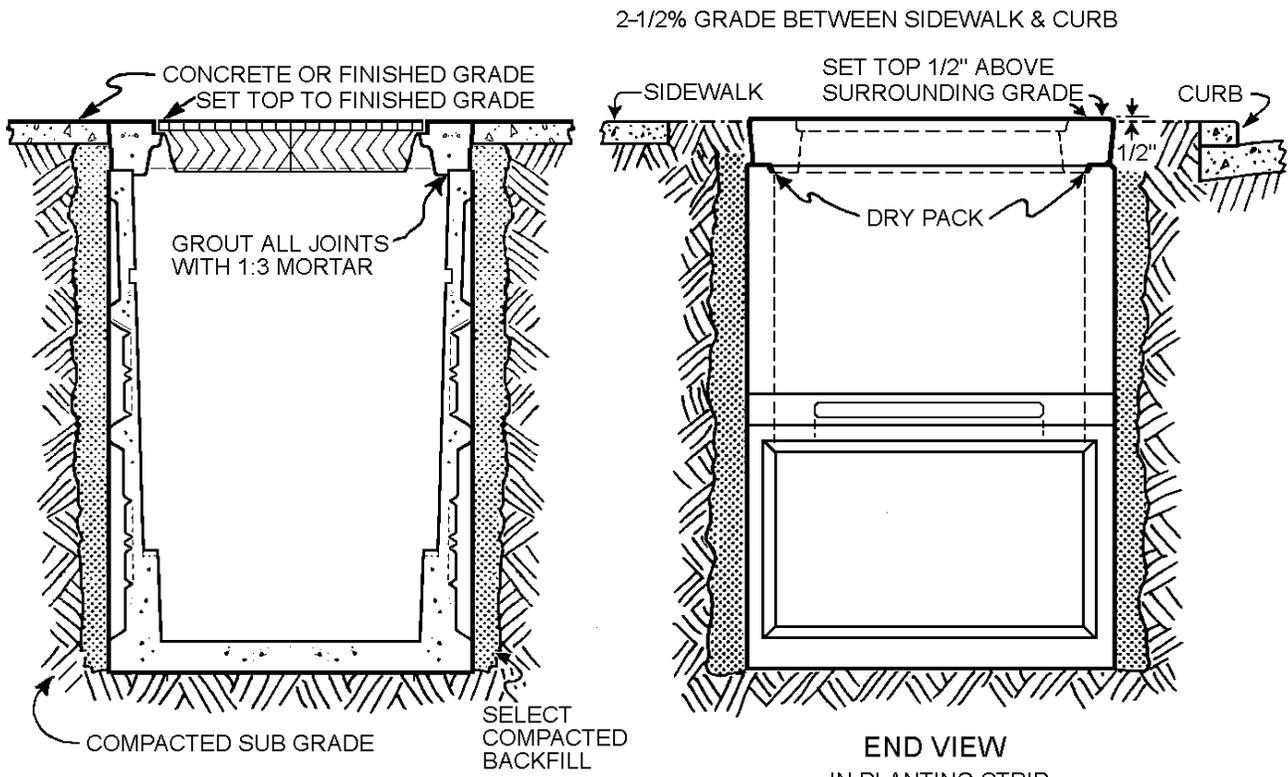
**RESIDENTIAL EQUIPMENT LOCATION DETAILS****Notes:**

1. The preferred vault orientation for combination transformer and J-Box in the 577 vault is with the length of the vault perpendicular to the curb. See page 1. See Construction Guideline U9-6 for clearance requirements for vaults with J-Boxes.
2. The length of the grated vent slots must run perpendicular to the dominant direction of travel of sidewalk traffic.
3. When in planting strip, top of vault to be set 1/2" above surrounding grade. Slope grade away from vault for drainage.
4. When vault or handhole extends into sidewalk area because of a narrow planting strip, the vault shall be located entirely in the sidewalk with the edge flush with the street edge of the sidewalk and to sidewalk grade. This applies only to the alternate location.
5. See drawings for changes in the dimensions above due to interferences.
6. See Construction Guideline U2-10 for trench details.
7. See Construction Guideline U2-14.2 or U2-15.1 for grade limitations on load break vault lids.

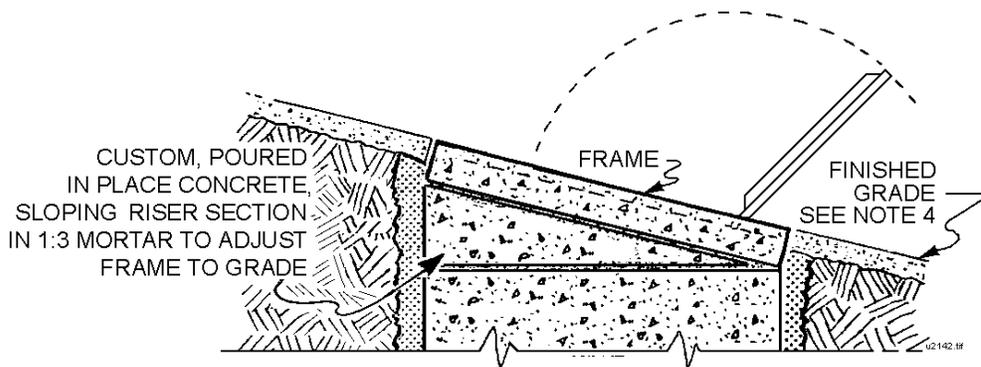
**References:**

1. Construction Guideline U2-14.2, Typical Vault or Handhole Installation
2. Construction Guideline U2-13.1, Typical Handhole with Conduit Installation Details
3. Construction Guideline U9-6, 577 Vault with 3 Loadbreak Junction Boxes – Installation, Grounding, and Connections

**TYPICAL VAULT OR HANDHOLE INSTALLATION  
 ( 5' X 7' X 7' and Smaller)**



**SIDE VIEW**  
 IN CONCRETE PAVING



**GRADE ADJUSTMENT DETAILS**

ORIGINATOR	STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
<i>Jens L. Horn</i>	<i>Charles L. Shaffer</i>	<i>John Chinner</i>	<i>Harold Juy</i>

**TYPICAL VAULT OR HANDHOLE INSTALLATION  
( 5' X 7' and Smaller)**

**NOTES:**

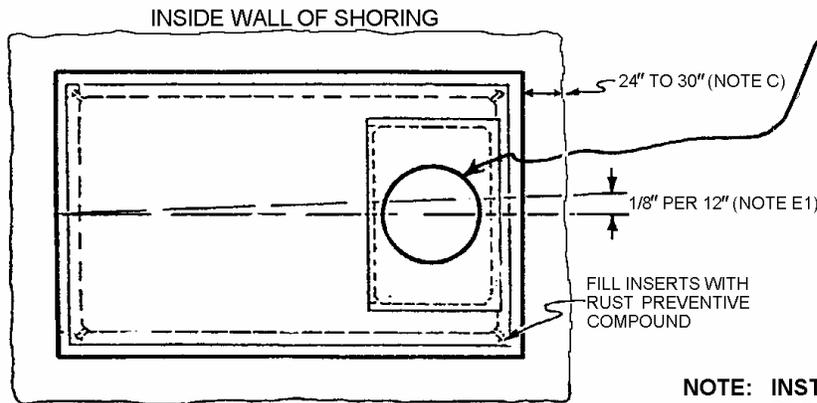
1. All work, including shoring and bracing, shall be in compliance with the latest editions of: State of Washington Department of Labor and Industries WAC 296-46B-450 "Equipment for General Use – Transformers and Transformer Vaults," Chapter 296-155- WAC "Safety Standards for Construction Work", Seattle Building Code Section 414 "Transformer Vaults" and Appendix Chapter 4, Division IV, Section 436 "Utility Transformer Vaults", and Seattle Board of Public Works, "Street and Sidewalk Pavement Openings and Restoration Rules".
2. Concrete shall be Class 5.5 as specified in "City of Seattle Standard Plans and Specifications". Trowel smooth.
3. Drypack all holes tight after installation.
4. When adjusting the vault entrance to a sloping grade, install a sloping riser section and a poured-in-place collar. Do not use brick and mortar slope adjustments if possible. Minimize the use of mortar adjustments and in no case shall the mortar thickness exceed one inch. For in-street use, a properly engineered sloping riser section is required. Where the riser section is specified at 12 inches deep or more, order a length of Unistrut cast into the side wall of the riser.
5. On sloping grade installations, hinge vault covers as noted. Hinged vault hatches shall be placed so that they lie flat when opened. Load break vaults shall not be installed if the grade exceeds 5.6% in any direction. This is to ensure proper hot stick operations.
6. The divider, when used, must come up tight to the vault cover. Brick up as necessary, or if over 4" of increase is required, order a special divider.
7. For transformer and J-Box combinations in the 577 vault, install rigid steel conduit through the transformer section of the vault as shown on page 1 of U9-5.
8. The preferred vault orientation for combination transformer and J-Box in the 577 vault is the length of the vault perpendicular to the curb. See U2-14.1, page 1.
9. The length of the grated vent slots must run perpendicular to the dominant direction of travel of sidewalk traffic.
10. Two 8 foot by 5/8 inch diameter copper clad steel ground rods shall be installed in opposite corners of each vault.
11. Engineers shall specify conduit entrance locations into vault on work order. Contractors/installers shall verify before installation.
12. All covers (other than vented grates) shall have a slip resistant surface which has been approved by City Light Standards.

**REFERENCES:**

1. **U2-14.1** Residential Equipment Location Details
2. **U9-5** 577 Vault, Transformer and Junction Box, Installation, Grounding and Connections
3. **U9-6** 577 Vault with 3 L. B. Junction Boxes, Installation, Grounding & Connections
4. **U2-13.1** Typical Handhole with Conduit, Installation Details (Non-load Bearing)

**CONSTRUCTION GUIDELINE**

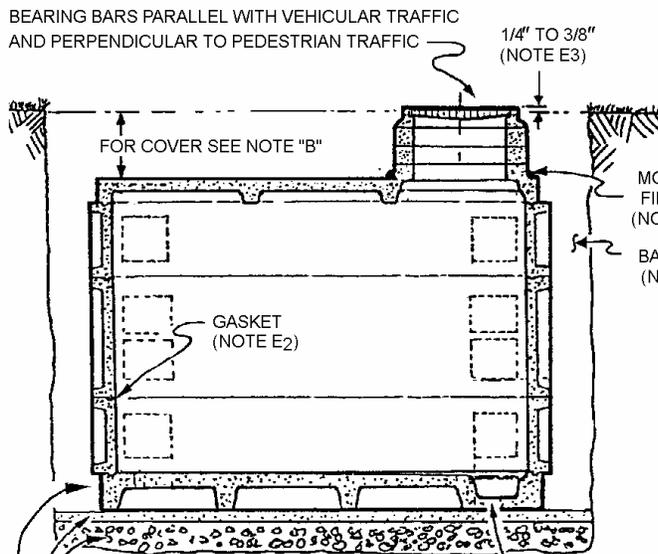
**INSTALLATION OF RING TYPE VAULTS**



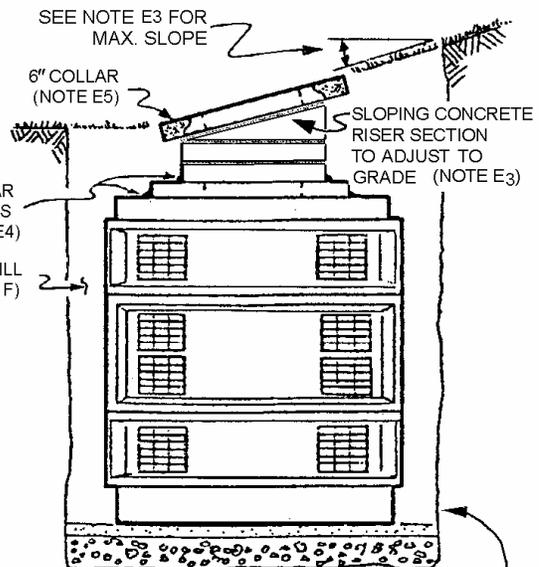
**PLAN VIEW**

**IMPORTANT:**  
 DO NOT PUT HATCH IN GUTTER OR IN ALLEY CENTER. IF HATCH MUST GO IN ALLEY CENTER, GRADE ALLEY RUNOFF AROUND HATCH (RAISE HATCH AS NECESSARY - 2" MAXIMUM.) HINGED VAULT HATCHES SHALL BE PLACED SO THEY WILL LIE FLAT WHEN OPENED. HINGED VAULT HATCHES AND RING VAULTS ARE NOT TO BE USED IN THE NETWORK AREA.

**NOTE: INSTALL GROUND RODS BEFORE PLACING ROOF SECTION**



**SECTION VIEW**



**END VIEW**

FOR COVER SEE NOTE "B"  
 GASKET (NOTE E2)  
 MORTAR FILLETS (NOTE E4)  
 BACKFILL (NOTE F)  
 BED WITH 4" CRUSHED ROCK (1-1/4" MINUS) AND 1/2" TO 1-1/2" SAND (NOTE D)  
 VAULT MUST BE SET LEVEL (NOTE THAT FLOORS HAVE A BUILT-IN SLOPE).  
 LOCATE SUMP BENEATH ENTRANCE HATCH (NOTE E2)

VAULT MUST BE SET LEVEL.

**Typical Vault Installation**

Vault configurations vary. Ring vaults are not acceptable in the Network area.

STANDARDS COORDINATOR

*Chris Detter*  
 Chris Detter

STANDARDS SUPERVISOR

*John Barnett*  
 John Barnett

UNIT DIRECTOR

*Richard Kent*  
 Richard Kent

**CONSTRUCTION GUIDELINE****A. Codes**

All work, including shoring and bracing, shall be in compliance with the latest editions of: State of Washington Department of Labor and Industries WAC 296-46B-450 "Equipment for General Use – Transformers and Transformer Vaults," Chapter 296-155 WAC "Safety Standards for Construction Work," Seattle Building Code Section 422 "Private and Utility Transformer Vaults," and the SDOT Director's Rule 2004—02, "Street and Sidewalk Pavement Opening and Restoration Rules."

**B. Cover**

The dimension from the vault top at the point of least depth to the pavement or ground above shall be as specified by Seattle City Light Work Order and/or construction drawings. Any deviation from this specification shall have the prior approval of the Seattle City Light Engineer.

All covers (other than vented grates) shall have a SLIP-RESISTANT surface which has been approved by City Light Standards.

**C. Excavation**

1. Excavate so there is not less than 24 inches nor more than 30 inches between ends and sides of vault and the vertical sides of excavation or shoring unless larger excavation is authorized by the Engineer.
2. Remove shoring before backfilling.
3. If excavation bottom is saturated prior to placing bedding material, then over-excavate area as directed by the Engineer and place cobbles (3-inch to 8-inch stone – no broken concrete).

**D. Bedding**

1. If excavation is not saturated prior to placing bedding material, compact bottom of excavation with two full compacting operations at right angles to each other with a mechanical compactor.
2. Place a layer of crushed rock (1-1/4 inch minus), screed and compact to a minimum thickness of 4 inches, and 1/2 inch to 1-1/2 inch sand to an even level surface.

**E. Installation**

1. Setting Tolerances
  - a. Horizontal twist, end-to-end:  $\pm 1/8$  inch per 12-inch length of vault.
  - b. Vertical, end-to-end:  $1/2$  inch  $\pm 1/4$  inch (to insure proper drainage into sump).
2. Vault Parts
  - a. Do not install parts cracked or otherwise damaged so that watertightness may be impaired, or parts with reinforcing exposed.
  - b. If a sump is specified by the SCL engineer, refer to Construction Guideline U2-12.1/NVH-60 for installation. Locate sump at same end as personnel hatch (see below, E. 3.).
  - c. For 814 and 818 vaults, place General Sealant G.S. No. 4 in joints between vault sections. For other vaults, place 5/8" x 1" butyl rubber "RUBATEX" gasket on the outer ridge of the interlocking joint.
3. Frame and Grate
  - a. To match slope of vault entrance with surrounding grade.
    - 1) In streets, alleys, parking lots, and other vehicle areas, the acceptable methods are:
      - Precast concrete sloping riser section
      - Cast-in-place concrete sloping riser section
    - 2) In sidewalks and other non-vehicle areas, the acceptable methods are:
      - Brick and mortar if the mortar is less than one inch (1") thick
      - Precast concrete sloping riser section
      - Cast-in-place concrete sloping riser section
  - b. Whenever the final grade of the hatch exceeds 10% (6 degree slope), the hinge side of the personnel hatch shall be located on the downhill side.
  - c. Maximum slope of frame and grate shall not exceed 2 inches in 12 inches without permission of Engineer. Load break vaults shall not be installed if the grade exceeds 5.6% in any direction. This is to insure proper hot stick operation.
  - d. Where the riser section is specified at 12 inches deep or more, order a length of Unistrut cast into the side wall of the riser.

**CONSTRUCTION GUIDELINE****E. Installation, continued****3. Frame and Grate, continued**

- e. Set riser in 1 inch of mortar (1 part cement to 3 parts sand with polyvinyl acetate bonding agent).
- f. Adjust between 1/4 inch and 3/8 inch above grade to prevent water from entering vault, but not to cause a hazard. Ramp concrete to top of frame for gradual transition. Do not put hatch in gutter area. Put hatch 18 inches minimum away from curb line.

**4. Seal Mortar**

Place 2-inch ± mortar fillets to seal out water at joints between vault top, cover slab, risers, and frame.

**5. Concrete Collar**

In areas other than concrete, place square or rectangular collar around the frame. Class 5 concrete collar shall be a minimum of 6 inches wide and a minimum of 6 inches thick. Reinforce collar with #4 bar placed in midsection, joints overlapped.

**6. Filling Spaces**

Fill spaces between ground rods and floor slab and other spaces through walls, tops and slabs with dry pack mortar mixed with "Weldcrete" polyvinyl acetate bonding agent in accordance with the manufacturer's directions.

**7. Ladder**

Install a permanent ladder in the vault if the distance from the top of the grate to the vault floor exceeds 12 feet 6 inches. See Seattle City Light Drawing D-28304.

**8. Grounding**

Two 8 foot by 5/8 inch diameter copper clad steel ground rods shall be installed in opposite corners of each vault.

**9. Conduit Entrances**

Engineers shall specify the locations where the conduit enters the vault on the work order. Contractors/installers shall verify location before installation.

**F. Backfill**

Backfill with trench-type, controlled-density fill (CDF) that conforms to the City of Seattle Specification No. 9-01.5. Low-strength fluidized thermal backfill (FTB) that conforms to SCL Material Standard 7150.00 may be substituted with the permission of the engineer. Place backfill so that no voids are left under the reinforcing ribs or riser sections.

The contractor/installer with the assistance of a Licensed Professional Engineer shall consult with the vault manufacturer to assure proper installation of the vault. Backfilling with some specified materials may require a multi-stage compaction processes to avoid damage to vault walls.

**G. Vault Damage**

Structurally damaged vaults shall be replaced or repaired. If the vault is to be repaired then a Washington State licensed professional engineer shall certify that the vault meets the original structural design parameters. For this Guideline, vaults with exposed rebar are considered to be damaged under any circumstances.

**H. Proximity to Sewers**

Vaults or manholes set within 5 feet 0 inches of, or over, sewers will require replacement of the sewer pipe with ductile iron. The new ductile iron pipe must be placed beyond the vault at each end a minimum of 3 feet 0 inches and/or into undisturbed soil at least 2 feet 0 inches. Contractor shall do excavation, backfill, and restoration. Installation of the pipe will be made by the Seattle Public Utilities Department.

**I. References:**

<b>NCB-20</b>	Grounding Network System Transformer Vaults, Wet, Dry, or Spot – Copper Bus
<b>NCB-30</b>	Grounding Network System – Wet Vault, Non-Transformer, One or Two 48-Inch Bus Bars
<b>NDK-10</b>	Installation of Nonmetallic Conduit with FTB Concrete Encasement
<b>7150.00</b>	Fluidized Thermal Backfills
<b>U2-11</b>	Installation of Nonmetallic Conduit with Concrete, FTB or Native Soil Encasement
<b>U2-12.1/NVH-60</b>	Sump Pump Pipe Installation, Vaults and Manholes
<b>U9-7.3</b>	Grounding and Connection Diagram, Single Phase 26kV Distribution Transformer

**CONDUIT RISERS ON POLES**

**1. General Requirements**

All conduits on poles shall be installed in a manner meeting the following requirements:

- 1.1. Minimum interference with pole and crossarm maintenance.
- 1.2. Maximum safety for lineworkers.
- 1.3. Minimum interference with other utilities on the same pole.

**2. Installation**

Conduits on poles shall be installed as follows:

- 2.1. A single conduit smaller than 2" with conductors of less than 750 volts potential may be placed directly on the pole in the crotch of the crossarm (Fig. 2.1)
- 2.2. A single conduit 2" and larger, or one with conductors of 750 volts or more, shall be spaced out from the pole face 4-1/2" and offset to give 1" clear space between the conduit and the center line of the pole lead. (Fig. 2.2)
- 2.3. When two conduits are installed they shall be spaced out 4-1/2" from the face of the pole and separated 2", providing a clear space 1" on each side of the center line of the pole lead. (Fig. 2.3)

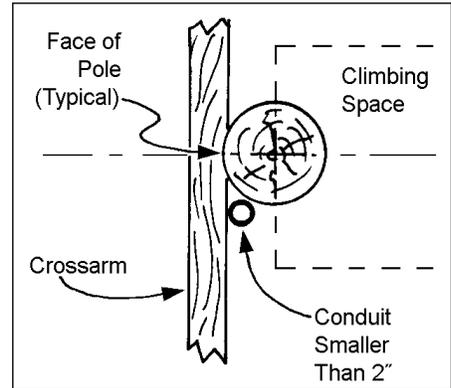


Figure 2.1

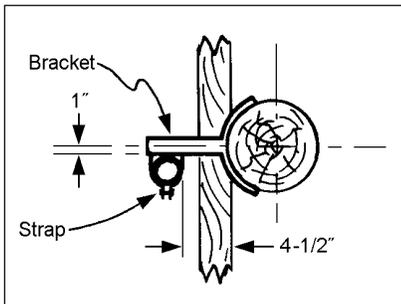


Figure 2.2

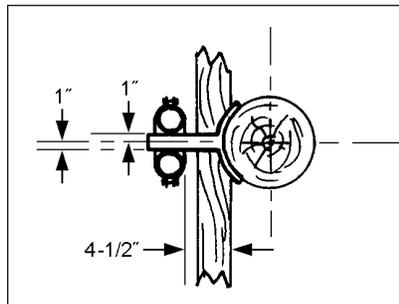


Figure 2.3

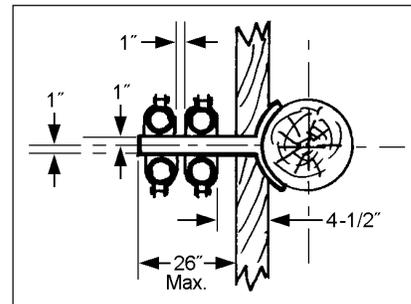


Figure 2.4

- 2.4. It is preferable to limit the number of conduits to two on a pole, but if more than two are required, they shall be installed as in Fig. 2.4. If two voltages are involved, the higher voltage shall be placed next to the pole.
- 2.5. The conduit shall have a minimum of one support in each length of conduit.
- 2.6. On poles with existing conduits, new conduits shall be installed in accordance with this specification. If it is practical, improve the existing conduit installations by moving the pole or conduits.
- 2.7. Where a telephone company terminal box interferes with conduit installation, Distribution Design will make arrangements for its relocation.
- 2.8. For grounding details, see SCL Construction Guideline U7-10.9/NDK-120.
- 2.9. Maximum bracket length shall be 26 inches. The number and size of conduits on a pole is strictly limited to that which can be properly mounted with a 26-inch bracket.

STANDARDS COORDINATOR	STANDARDS SUPERVISOR	UNIT DIRECTOR
<i>Charles L. Shaffer</i>	<i>John Chinner</i>	<i>Harold Juy</i>

**3. Material Requirements**

The following material requirements apply to all conduit riser installations:

- 3.1. All conduit risers shall be Schedule 80 PVC or Rigid Steel conduit for the first 8-10 feet above the ground line, and shall be Schedule 40 PVC rigid plastic conduit above 8-10 feet. See Construction Guidelines U7-10.1/ NDK-80 and U7-10.2/NDK-90 for steel conduit installation.
- 3.2. Conduit spaced out from the pole shall be mounted using the following brackets and straps.

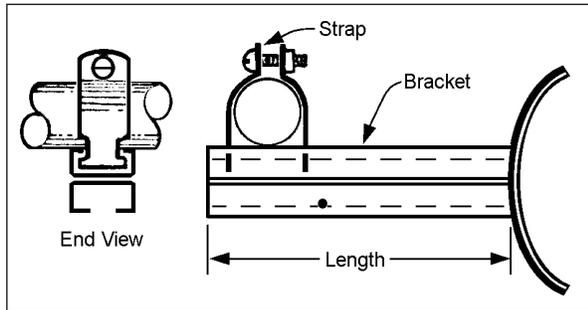


Figure 3.1

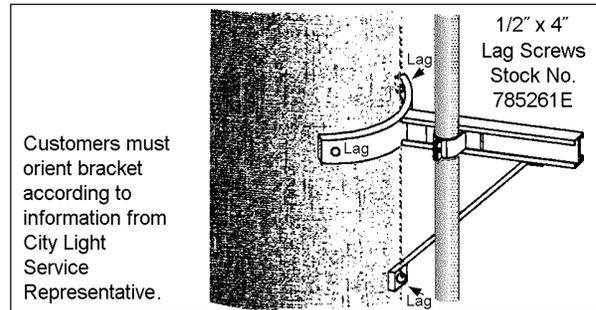


Figure 3.2

**Rigid Plastic Conduit PVC**

Conduit Size, Inches	Schedule 40 Stock No.	Schedule 80 Stock No.	Adapter Coupling Plastic to Metal	Strap
3/4	734526	–	734540	–
1	734527	–	734541	689760E
1-1/4	734528	–	734542	689761E
1-1/2	734529	738740	734543	689762E
2	734530	738741	734544	689764E
2-1/2	734531	738742	734545	689766E
3	734532	738743	734537	689768E
3-1/2	734533	738744	734538	689770E
4	734523	738745	734539	689772E
5	734524	<b>DO NOT USE</b>	734536	689774E

**4. Installation of Conduit Support Bracket, with or without a Brace**

Install bracket brace for use at top of first 10 ft. length of rigid steel or schedule 80 PVC conduit.

**Conduit Support Bracket**

Length, Inches	Stock No.	
	Pole Riser, With Brace	Pole Riser, Without Brace
10-1/2	686792E	686784E
12-1/2	686794E	686786E
18	686796E	686790E
26	012330	–

**Reference:** SCL Material Standard 6867.5

**CONSTRUCTION GUIDELINE**

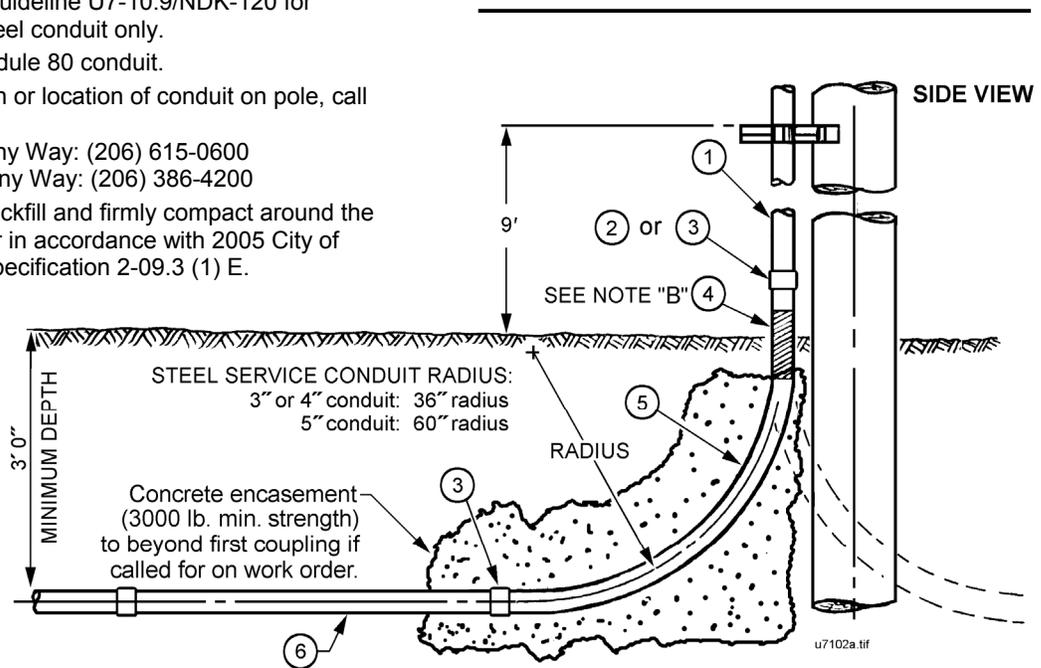
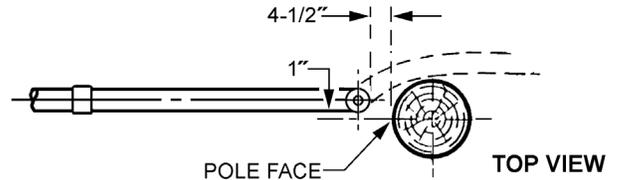
**PRIMARY CONDUIT RISER POLE BASE DETAIL**

**Steel Elbow**

**Notes for Steel Elbow Installations Only:**

See page 2 for Schedule 80 PVC Elbow

- A. First ten feet only of conduit up the pole shall be rigid steel unless otherwise specified by Seattle City Light engineer.
- B. Tape conduit 8" above to 8" below ground line (steel conduit only).
- C. Before excavating at pole base, the pole shall be temporarily guyed.
- D. See Construction Guideline U7-10/NDK-70 for conduit riser details.
- E. See Construction Guideline U7-10.9/NDK-120 for grounding detail, steel conduit only.
- F. Do not use 5" Schedule 80 conduit.
- G. For pole designation or location of conduit on pole, call Seattle City Light:  
 north of Denny Way: (206) 615-0600  
 south of Denny Way: (206) 386-4200
- H. After installation, backfill and firmly compact around the pole, bend and riser in accordance with 2005 City of Seattle Standard Specification 2-09.3 (1) E.



**Material List – Steel Elbow**

Item	Quantity	Description	Stock Number		
			3-inch	4-inch	5-inch
1	as required	CONDUIT, Rigid Steel	734743	734745	734747
		or CONDUIT, PVC Schedule 80	738743	738745	–
2	as required	COUPLING, Rigid Steel Conduit	731098	731100	731102
3	as required	CONDUIT ADAPTER, PVC to Steel	734537	734539	734536
4	as required	TAPE, Pipe Wrap, PVC, 2" X 10 mil	736730	736730	736730
5	as required	ELBOW, Rigid Steel	734822	734824	734826
6	as required	CONDUIT, PVC Schedule 40	734532	734523	734524

STANDARDS COORDINATOR

*Chris Detter*  
 Chris Detter

STANDARDS SUPERVISOR

*John Barnett*  
 John Barnett

UNIT DIRECTOR

*John Nierenberg*  
 John Nierenberg

**CONSTRUCTION GUIDELINE**

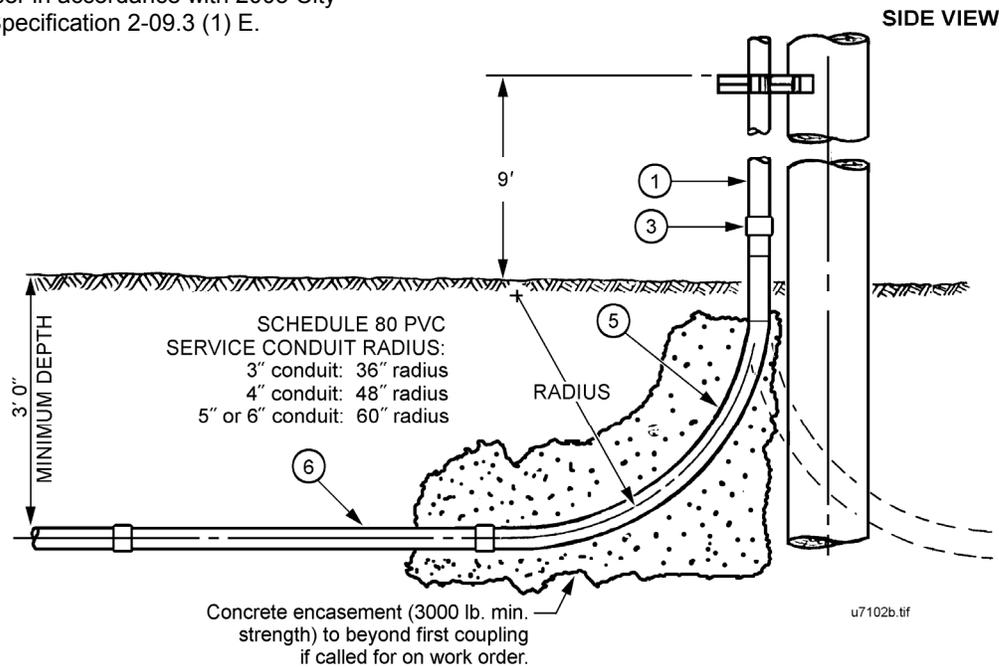
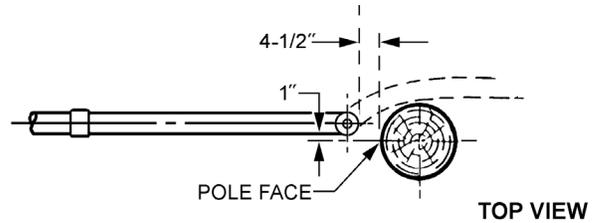
Primary Conduit Riser Pole Base Detail

**Schedule 80 PVC Elbow**

**Notes for Schedule 80 PVC Elbow Installations Only:**

**See page 1 for Steel Elbow**

- A. Only first ten feet of conduit up the pole shall be rigid steel unless otherwise specified by Seattle City Light engineer.
- B. Before excavating at pole base, the pole shall be temporarily guyed.
- C. See Construction Guideline U7-10/NDK-70 for conduit riser details.
- D. Do not use 5" Schedule 80 conduit or elbow.
- E. For pole designation or location of conduit on pole, call Seattle City Light:  
 north of Denny Way: (206) 615-0600  
 south of Denny Way: (206) 386-4200
- F. After installation, backfill and firmly compact around the pole, bend and riser in accordance with 2005 City of Seattle Standard Specification 2-09.3 (1) E.



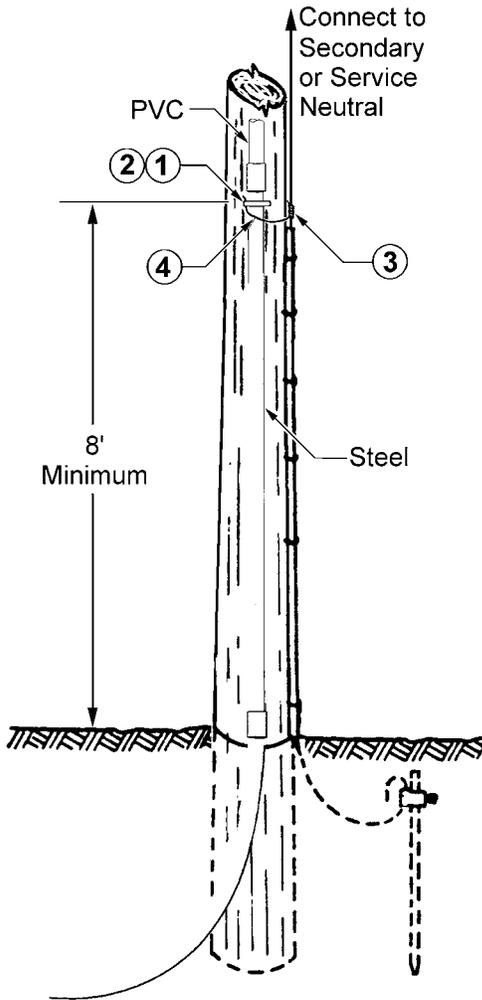
**Material List – Schedule 80 PVC Elbow**

Item	Quantity	Description	Stock No.	
			3-inch	4-inch
1	as required	CONDUIT, Rigid Steel	734743	734745
		or CONDUIT, PVC Schedule 80	738743	738745
3	as required	COUPLING, Adapter, PVC to Steel	734537	734539
5	as required	ELBOW, PVC, Schedule 80	non-stock	non-stock
6	as required	CONDUIT, PVC Schedule 40	734532	734523

**CONSTRUCTION GUIDELINE**

**GROUNDING CONDUIT RISERS ON POLES**

**Steel or Schedule 80 PVC Elbow and Steel Conduit, First 10 Feet**



**Steel Conduit Notes:**

- A. Rigid steel conduit shall be grounded just below the top coupling, approximately 8' to 10' above ground, as shown.
- B. When more than one rigid steel conduit is installed on a pole, one conduit shall be grounded as shown. The conduit supports and straps shall serve as a bonding device between the steel conduits.
- C. Connect conduit and pole ground to secondary or service neutral.
- D. For standard pole grounding, see Construction Guideline D16-2.
- E. See U7-10.2/NDK-90 for primary conduit riser pole base detail.
- F. See U7-10/NDK-70 for conduit risers on poles.
- G. All equipment grounds shall be #4 copper, polyethylene insulated.
- H. This grounding is required per NESC Rule 360C. See also NESC Rules 361 and 362.

**Material List**

Item	Quantity	Description	Stock No.	Material Standard
1	1	CONNECTOR, Conduit Grounding	676317	6763.1
2	1	CLAMP, Hose, stainless steel	676315E	6763.1
3	1	CONNECTOR, Split Bolt, #4 to #4	668864E	6688.7
4	3 ft.	WIRE, #4 bare Cu., SD	610208	6102.2

STANDARDS COORDINATOR

STANDARDS SUPERVISOR

UNIT DIRECTOR

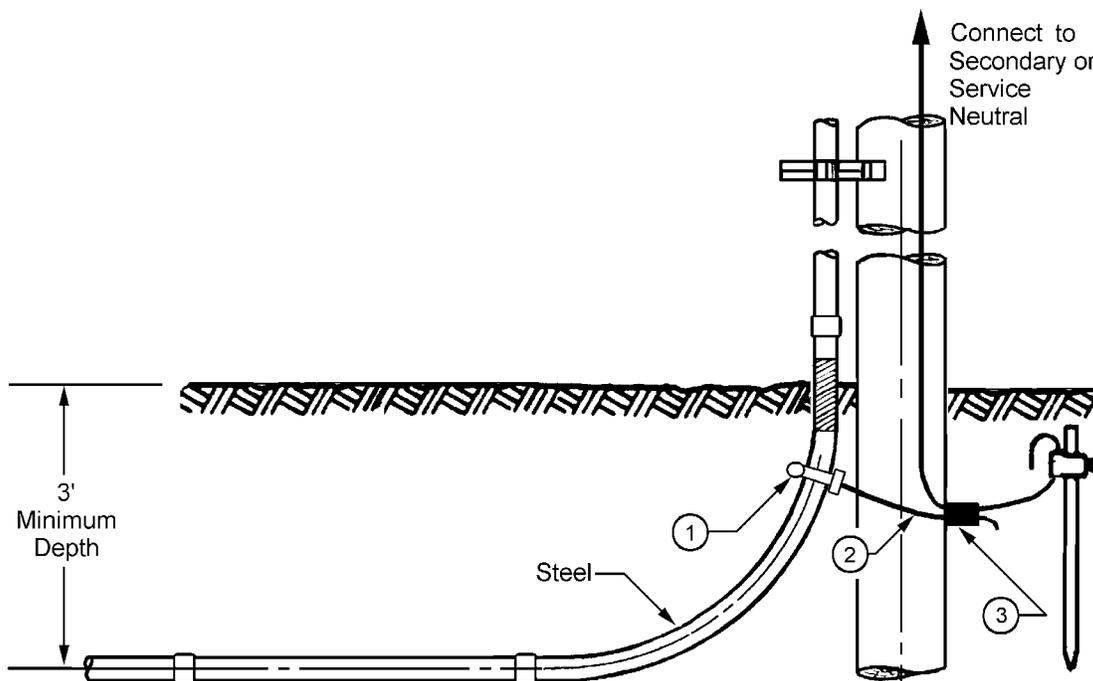
*Charles L. Shaffer*

*John Blinner*

*Hardey Juy*

**CONSTRUCTION GUIDELINE**

**Steel Elbow and Non-Metallic Conduit, First 10 Feet**



**Steel Elbow and Non-Metallic Conduit Notes:**

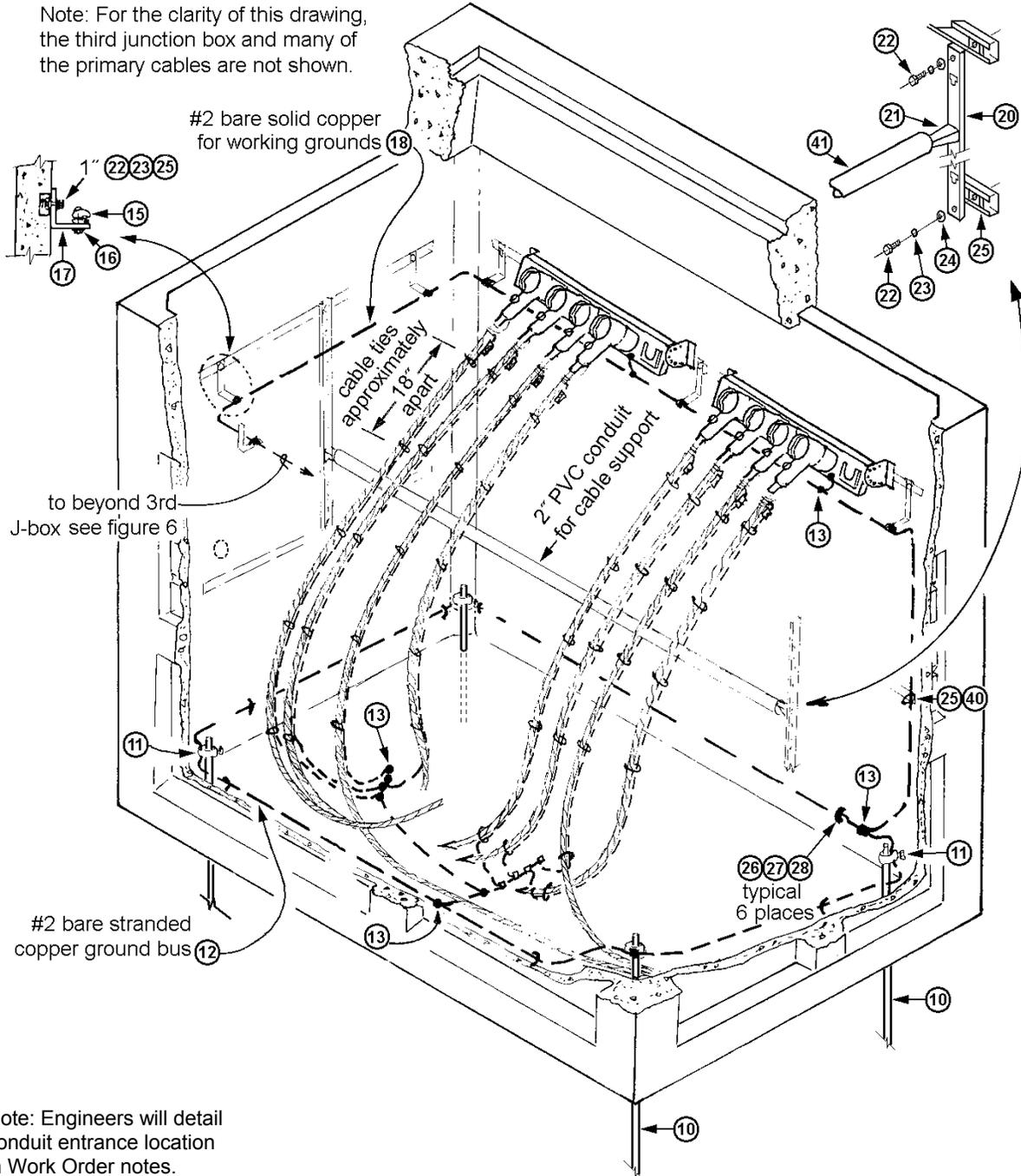
- A. Rigid steel conduit elbow shall be grounded below ground, as shown, and connect to secondary or service neutral.
- B. When multiple conduits are installed on the pole, all metallic conduit shall be grounded.
- C. For standard pole grounding, see Construction Guideline D16-2.
- D. All equipment grounds shall be #4 copper.
- E. See U7-10.2/NDK-90 for primary conduit riser pole base detail.
- F. See U7-10/NDK-70 for conduit risers on poles.
- G. All equipment grounds shall be #4 copper, polyethylene insulated.

**Material List**

Item	Quantity	Description	Stock No.	Material Standard	
1	As Required	CLAMP, Conduit Grounding	3"	676285	6762.7
			4"	676286	
			5"	676287	
2	As Required	WIRE, #4 Bare Cu, SD	610208	6102.2	
3	As Required	CONNECTOR, Compression, "C", #4 to #4	677323E	6773.5	

**577 VAULT WITH THREE LOADBREAK JUNCTION BOXES  
INSTALLATION, GROUNDING AND CONNECTIONS**

Note: For the clarity of this drawing, the third junction box and many of the primary cables are not shown.



Note: Engineers will detail conduit entrance location in Work Order notes.

**Figure 1. Junction Box Installation**

standards coordinator

*Patti Berg*  
Patti Berg

standards supervisor

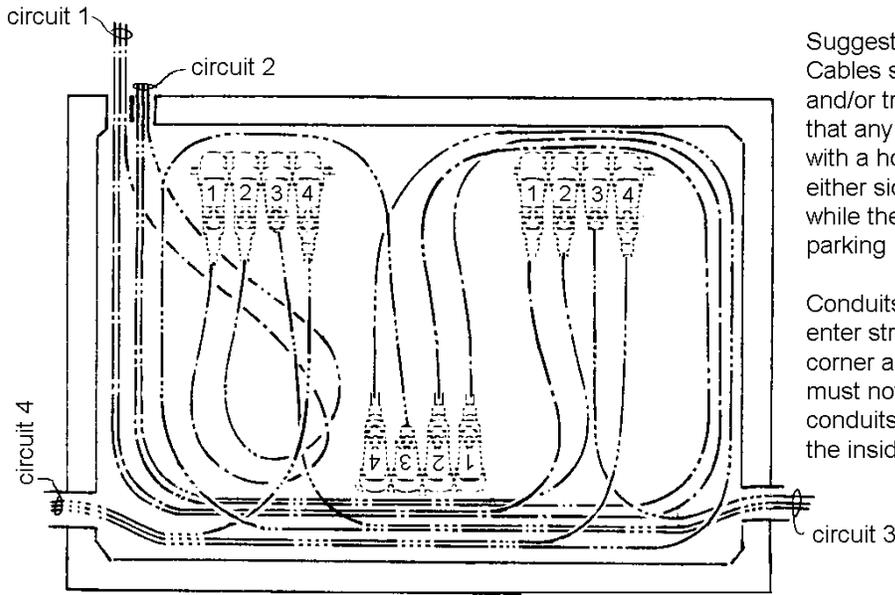
*John Shipek*  
John Shipek

unit director

*Pam S. Johnson*  
Pam S. Johnson

**CONSTRUCTION GUIDELINE**

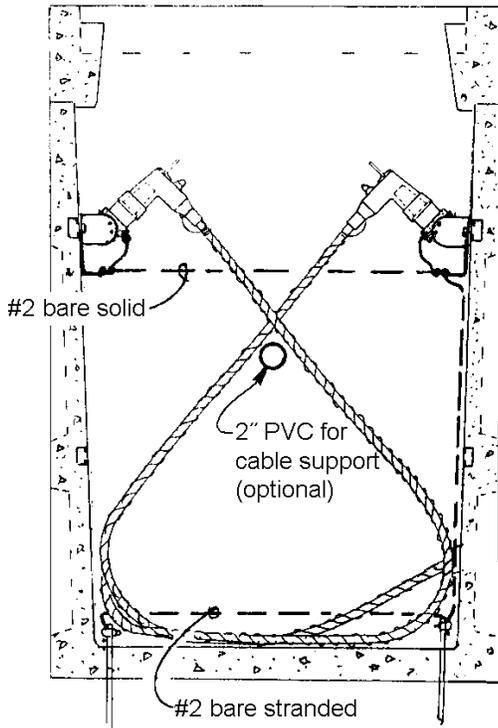
577 Vault with Three Loadbreak Junction Boxes --  
Installation, Grounding and Connections



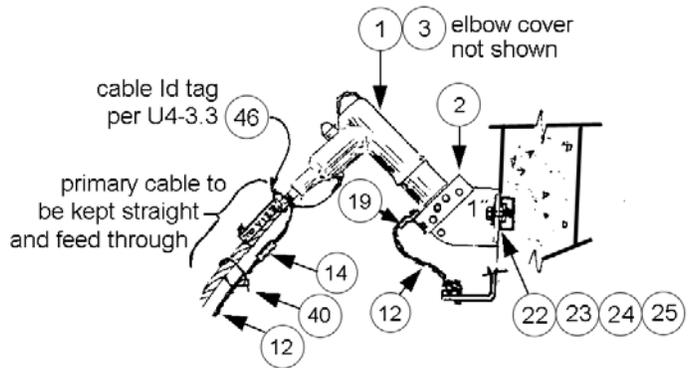
**Figure 2. Cable Training and Conduit Entrance**

**Suggested Cable Training:**  
Cables shall be racked, routed and/or trained in such a manner that any elbow may be removed with a hot-stick and placed on either side with a feed-through while the feed-through is on the parking position of the J-box.

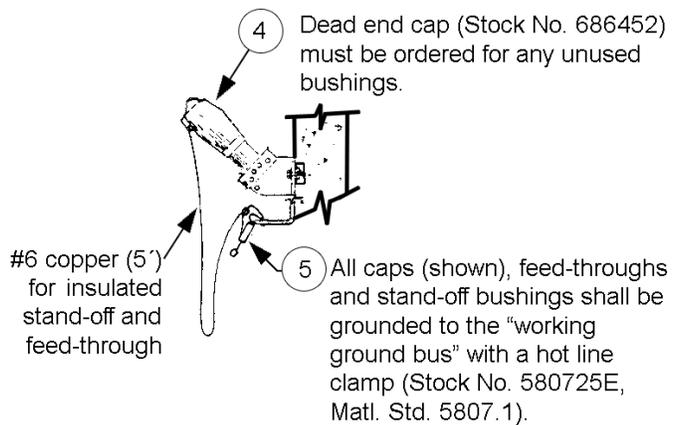
Conduits entering the vault should enter straight and as close to a corner as possible. The conduit must not interfere with any other conduits or any of the channels on the inside walls of the vault.



**Figure 3. Cable Support**



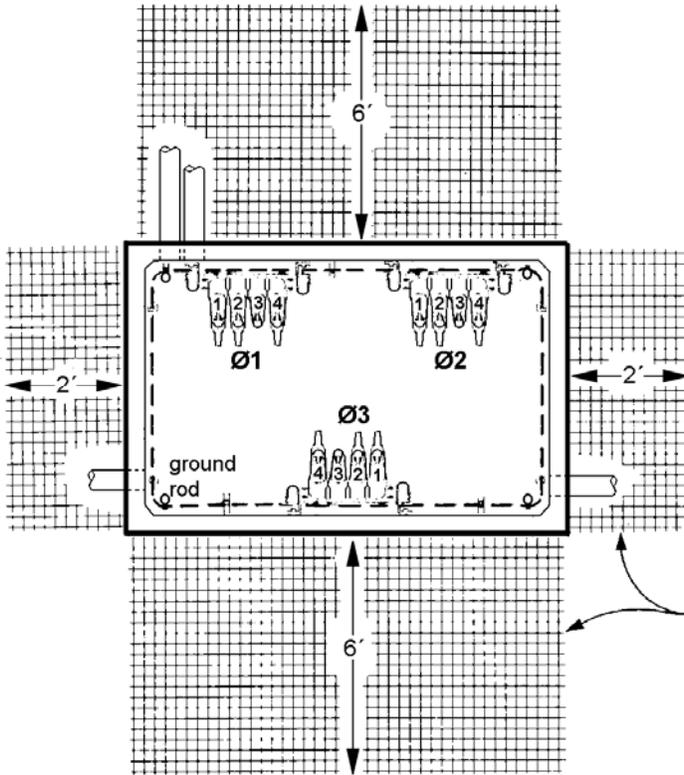
**Figure 4. Elbow**



**Figure 5. Dead End Cap**

**CONSTRUCTION GUIDELINE**

577 Vault with Three Loadbreak Junction Boxes --  
Installation, Grounding and Connections



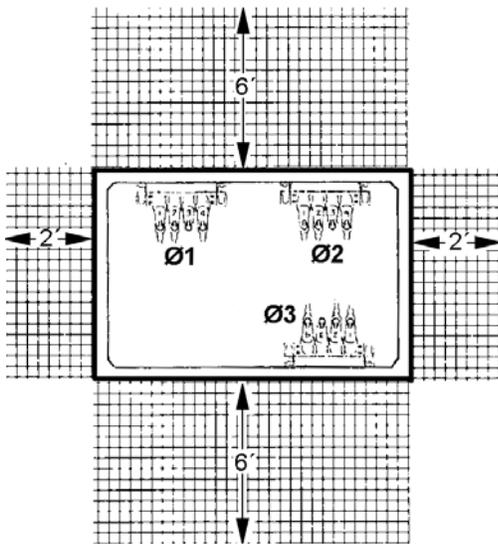
**Preferred J-Box Locations**

- A. The J-boxes shall be located Ø1, Ø2, Ø3, in clockwise rotation.
- B. The positions on the J-boxes shall be 1, 2, 3, 4, left-to-right when facing the J-box.
- C. The number #2 bare solid wire for attaching working grounds shall be as tight as possible.

These areas are to be kept clear and level to insure proper hotstick operation. See U2-14.2 for maximum allowable grade around hatch.

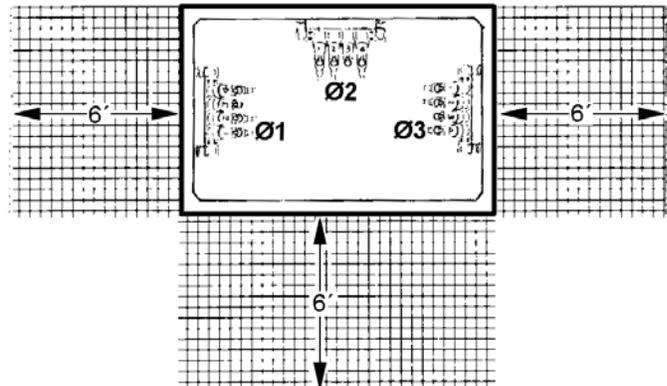
**Figure 6. J-Box Locations and Operating Clearances**

When using either of the J-box location alternatives below, particular attention must be given to where the cables (conduits) enter the vault and to proper cable training.



**Figure 7. First Alternate J-Box Locations**

Figure 8 alternative is to be used only when obstructions prevent the use of options. This option is never to be used for 5-way J-boxes.



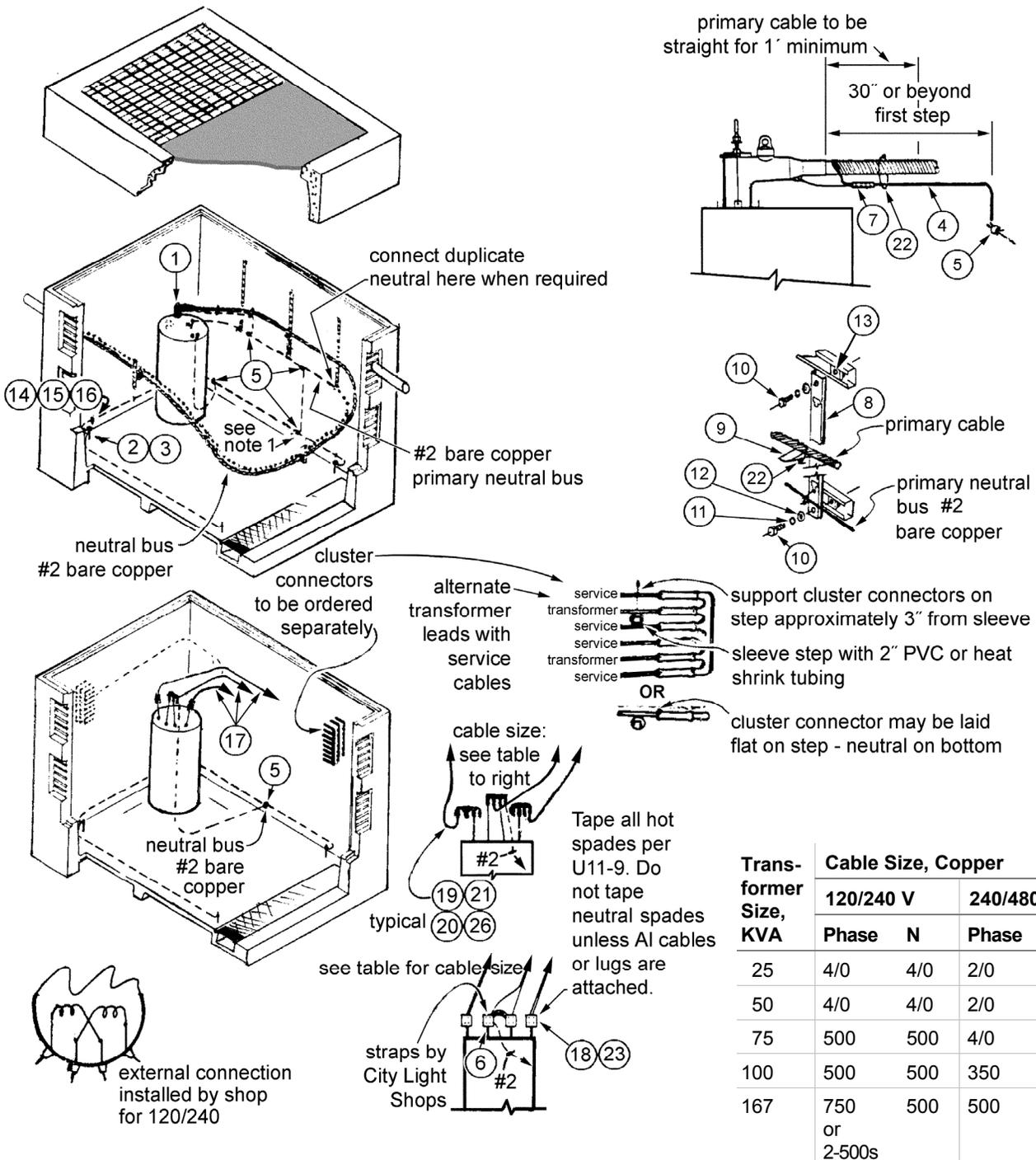
**Figure 8. Second Alternate J-Box Locations**

**CONSTRUCTION GUIDELINE**577 Vault with Three Loadbreak Junction Boxes --  
Installation, Grounding and Connectionsstandard number: **U9-6**  
page: 4 of 4  
superseding: May 10, 2006  
effective date: September 10, 2008**Material List**

Item	Description	Quantity	Stock Number	Material Standard	
<b>Primary</b>					
1	ELBOW, Load Break, 15.2/26.3 kV	9 or 12	686445	6864.05	
2	JUNCTION BOX, Load Break	3 position	686454	6864.07	
		4 position	686455	6864.07	
		5 position* (see item 6)	686555	6864.07	
3	COVER, Load Break Elbow, 1 per elbow	9 or 12	686467	none	
4	CAP, Insulating Dead End	as required	686452	6864.07	
5	CLAMP, Hot Line Tap	as required	580725E	5807.1	
6	BUSHING INSERT, not included with 5-position J-box	as required*	686449	6864.07	
<b>Grounding</b>					
10	GROUND ROD, Copper Clad, 5/8" x 8'	4	564238E	5642.1	
11	CLAMP, Ground Rod, medium duty, 5/8" to #2	4	564012E	5640.3	
12	WIRE, #2 Bare Stranded, copper, soft drawn	200' (estimate)	610434	6103.9	
13	CONNECTOR, Compression Tap, parallel #2 - #2 (crimpet)	18 (estimate)	677326E	6773.5	
14	SPLICE, Straight, copper, #2 - #2, 1 per elbow	9 or 12	677357E	6773.8	
15	CONNECTOR, Grounding, cable to flat, #4 - #2/0	9	676674	6766.1	
16	WASHER, Cut, bronze, 3/8"	9	788024E	7880.2	
17	BRACKET, Ground Support, Unistrut	9	686466	none	
18	WIRE, #2 Bare Solid, copper, hard drawn	20'	610006	6100.1	
19	TERMINAL LUG, Compression #2	3	677071E	6770.7	
<b>Racking and Mounting</b>					
20	RACK, 18 Hole, galvanized, 30"	2 (estimate)	721666E	7216.7	
21	HOOKS, Cable Rack, galvanized steel	4"	as required	720625E	7206.2
		7-1/2"	as required	720626E	7206.2
		14"	2 (estimate)	720631E	7206.2
22	BOLT, Machine, zinc plated	1/2" x 1"	17 (estimate)	784825E	7847.1
		1/2" x 1-1/2"	7 (estimate)	784827E	7847.1
23	WASHER, Lock, galvanized, 1/2"	19 (estimate)	584255E	5842.1	
24	WASHER, Flat, galvanized, 1/2"	17 (estimate)	585025E	5847.1	
25	NUT, Unistrut, 1/2" P4010	20 (estimate)	723607E	none	
26	CABLE TIE, plastic, 0.184" x 7"	6 (estimate)	735805E	7358.1	
27	MOUNTING BASE, for cable tie, 1/2"	6 (estimate)	735852	none	
28	ANCHOR, Stud Bolt, 1/4" x 1-3/4"	6 (estimate)	780091E	7800.9	
<b>Miscellaneous</b>					
40	CABLE TIE, plastic	0.184" x 7"	65 (estimate)	735805E	7358.1
		14"	5 (estimate)	735811E	7358.1
41	CONDUIT, PVC, Schedule, 40, 2"	7' (estimate)	734530	7015.05	
42	CONDUIT, PVC, Schedule, 40, 4"	as required	734523	7015.05	
43	CABLE PROTECTOR, nylon	as required	731801E	7318.1	
46	TAG, Cable Identification	9 or 12	735800E	7318.1	

**CONSTRUCTION GUIDELINE**

**GROUNDING AND CONNECTION DIAGRAM, SINGLE PHASE 26 KV DISTRIBUTION TRANSFORMER**



Transformer Size, KVA	Cable Size, Copper			
	120/240 V		240/480 V	
	Phase	N	Phase	N
25	4/0	4/0	2/0	2/0
50	4/0	4/0	2/0	2/0
75	500	500	4/0	4/0
100	500	500	350	350
167	750	500	500	500
	or 2-500s			

**CONSTRUCTION GUIDELINE**Grounding and Connection Diagram, Single Phase 26 kV  
Distribution Transformer

STANDARD NUMBER:

**U9-7.3**

PAGE: 2 of 3

SUPERSEDING: August 1, 2007

EFFECTIVE DATE: January 25, 2008

**Material List**

Item	Description	Quantity	Stock Number	Material Standard	
1	ELBOW, Dead Break, 15.2 kV to ground	1	686416	6864.05	
2	ROD, Ground, copper clad, 5/8"x8'	4	564238E	5642.1	
3	CLAMP, Ground Rod, to #2 copper, 5/8"	4	564012E	5640.3	
4	WIRE, #2 Bare Stranded, copper	100'	610434	6103.9	
5	TAP, #2 to #2 Crimpet, copper	6	677326E	6773.5	
6	LUG, #2 Compression, copper, 1/2" stud	1	677071E	6770.7	
7	SPLICE, Compression, straight, copper	1	677357E	6773.8	
8	RACK, 18 Hole, galvanized, 30"	6 (estimate)	721666E	7216.7	
9	HOOK, Cable Rack, galvanized steel	4"	6 (estimate)	720625E	7206.2
		14"	2 (estimate)	720631E	7206.2
10	BOLT, Zinc Plated	1/2" x 1"	6 (estimate)	784825E	7847.1
		1/2" x 1-1/2"	6 (estimate)	784827E	7847.1
11	LOCK WASHER, galvanized, 1/2"	12 (estimate)	584255E	5842.1	
12	FLAT WASHER, galvanized, 1/2"	12 (estimate)	585025E	5847.1	
13	NUT, Unistrut, P4010, 1/2"	12 (estimate)	723607E	-	
14	CABLE TIE, plastic, 0.184" x 7"	5 (estimate)	735805E	7358.1	
15	MOUNTING BASE, for cable tie, 1/2"	5 (estimate)	735852	-	
16	ANCHOR, Stud Bolt, 1/4" x 1-3/4"	5 (estimate)	780091E	7800.9	
17	CABLE, 600 Volt, XLP, copper	4/0	50'	613735	6010.0
		500	50'	613740	6010.0
		750	50'	613743	6010.0
18	COMPRESSION LUG, copper	4/0	3	677081E	6770.7
		500	3	677091E	6770.7
		750	3	677100	6770.7
19	CONNECTOR, 4 position, 1000 A	3	678707	6780.0	
20	TERMINAL LUG, Cluster Connector, #2 copper, transformer ground	1	012729	6786.00	
21	SLEEVE, Insulating	8	678620E	6786.2	
22	TIE STRAP, plastic	7"	4 (estimate)	735805E	7358.1
		14"	16 (estimate)	735811E	7358.1
23	Nuts, Bolts, Washers, Tape (refer to Construction Guideline U11-9)		-	-	
26	Terminal Lug, Al-Cu	2/0	3	678687E	6786.00
		4/0	3	678689E	6786.00
		350	3	678699E	6786.00
		500	3	678700E	6786.00

**CONSTRUCTION GUIDELINE**Grounding and Connection Diagram, Single Phase 26 kV  
Distribution TransformerSTANDARD NUMBER: **U9-7.3**

PAGE: 3 of 3

SUPERSEDING: August 1, 2007

EFFECTIVE DATE: January 25, 2008

**Notes:**

1. Attach copper ground bus to vault wall 6" above floor using cable ties, cable tie mounting base and anchor bolts, Material List Item No. 14, 15 and 16.
2. If J-Boxes, switches or other primary (equipment is installed in the same vault, connect primary neutrals to the primary neutral bus. Equipment grounds may be attached to the ground bus.)
3. Primary cable is to route so that it is racked on at least two walls.
4. Generally, secondary is racked above the primary.
5. Install HIGH VOLTAGE sign (Stock No. 765181) on all above grade installations.
6. When specified, install sump pump and/or vault lights per Guideline U10-6.
7. All secondary leads to be laid straight on steps (hooks) with no intertwining of the leads.
8. Cable tagging per U4-3.3.
9. To avoid induced currents and heating of the steps and racks, **DO NOT** lay separate phase conductors on separate steps.
10. Connect only the neutrals on all idle services.
11. Generally, up to 4 sets of service cables may be connected directly on the transformer spades or cluster connectors if:
  - 11.1 Service cables to be connected on cluster connectors are no larger than 500 kcmil.
  - 11.2 Service cables to be connected on the transformer spades are no larger than 750 kcmil.
12. Cluster connectors shown on the vault wall **are to be ordered separately** with the following considerations:
  - 12.1 Residential, light industrial or light commercial type;
    - Available in 3, 4, 6 or 8 position with streetlight tap (Stock No. 678800, 678707, 678713 and 678715).
    - Maximum cable size is 500 kcmil per position since the cluster connector requires 7/8" bolt spacing, hook type lugs (Stock No. 678687E through 678700E).
    - Each cluster connector weighs approximately 4-1/2 pounds.
  - 12.2 Heavy Duty Type;
    - Available in 4, 6 and 8 position (Stock No. 678760 through 678763).
    - Maximum cable size is 1000 kcmil per position. These connectors require 1-3/4" bolt spacing lugs (Stock No. 651255 through 651272 for Aluminum and 677065E through 677100 for copper).
    - **Each** heavy duty cluster connector weighs approximately 16 pounds.
13. In lieu of ground rods, 50 feet of No. 2 bare stranded copper wire, per rod, may be laid in the bottom of the trench in opposite directions. The wire shall be a minimum of 6" away from other cables, conduits or concrete encasements.

Seattle City Light

# CONSTRUCTION GUIDELINE

standard number: **U10-2**  
superseding: 1 of 3  
effective date: February 1, 2008  
page: December 10, 2009

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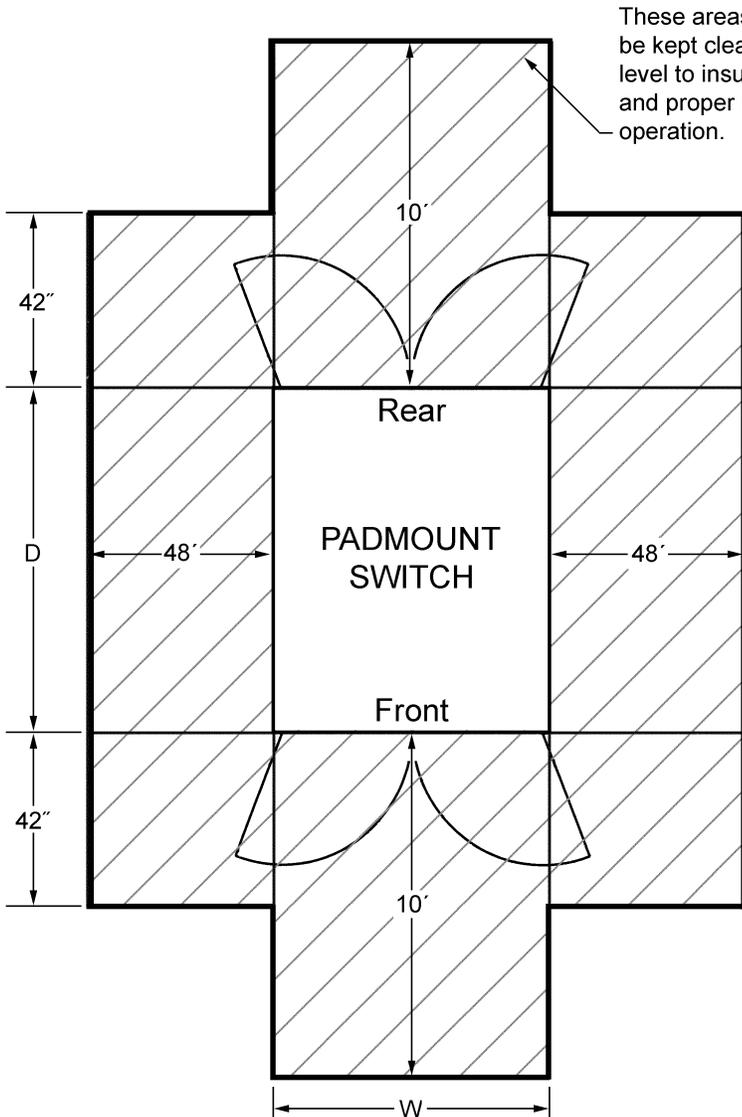
## TRANSFORMER SERVICE VAULTS AND PADMOUNTS CUSTOMER'S RESPONSIBILITY - OUTSIDE NETWORK AREA

**Cancel**

<i>standards coordinator</i>	<i>standards manager</i>	<i>unit director</i>
 Uzma Siddiqi	 John Shipek	 Pam S. Johnson

**PAD CONSTRUCTION FOR PAD MOUNTED SWITCHGEAR**

**Minimum Clearances**



4" diameter steel pipe barrier posts or 8" curb to be specified as required.

**Pad Dimensions:**

PMH Switch Type	W, in.	D, in.
5	45	67
9, 10, 12	84	78-1/2

STANDARDS COORDINATOR

*Goldberg*

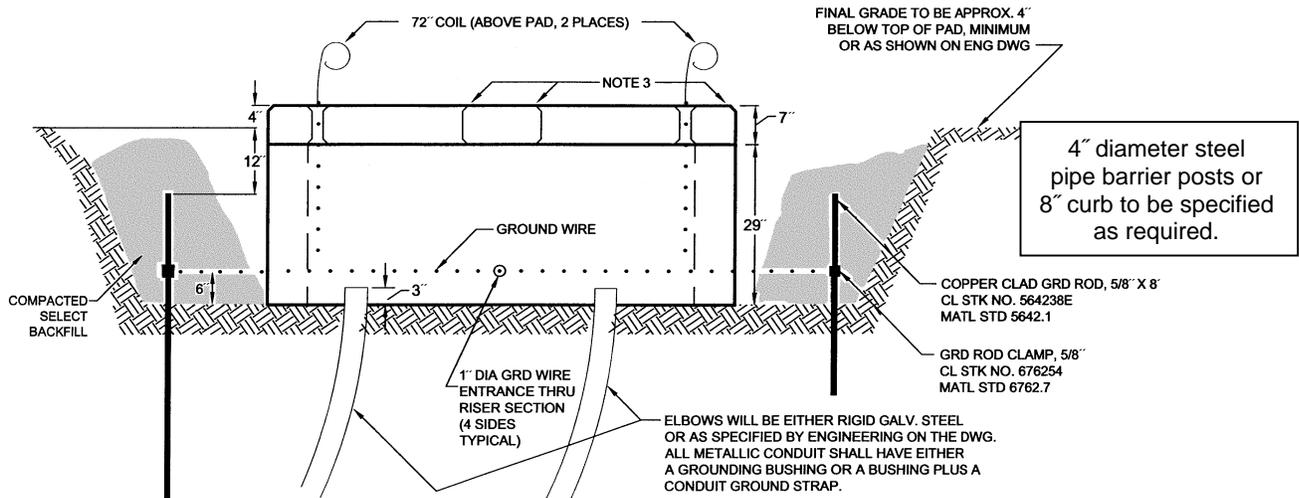
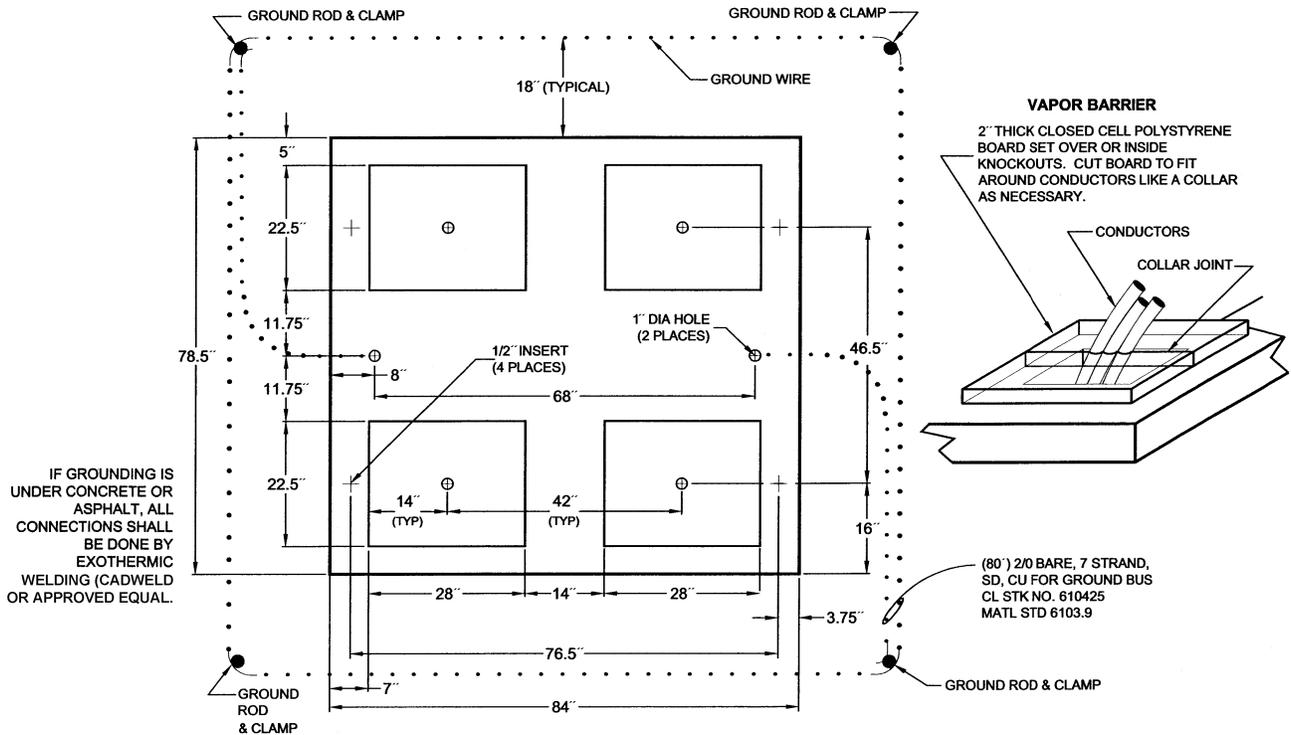
STANDARDS SUPERVISOR

*John Schinner*

UNIT DIRECTOR

*Hardee Gray*

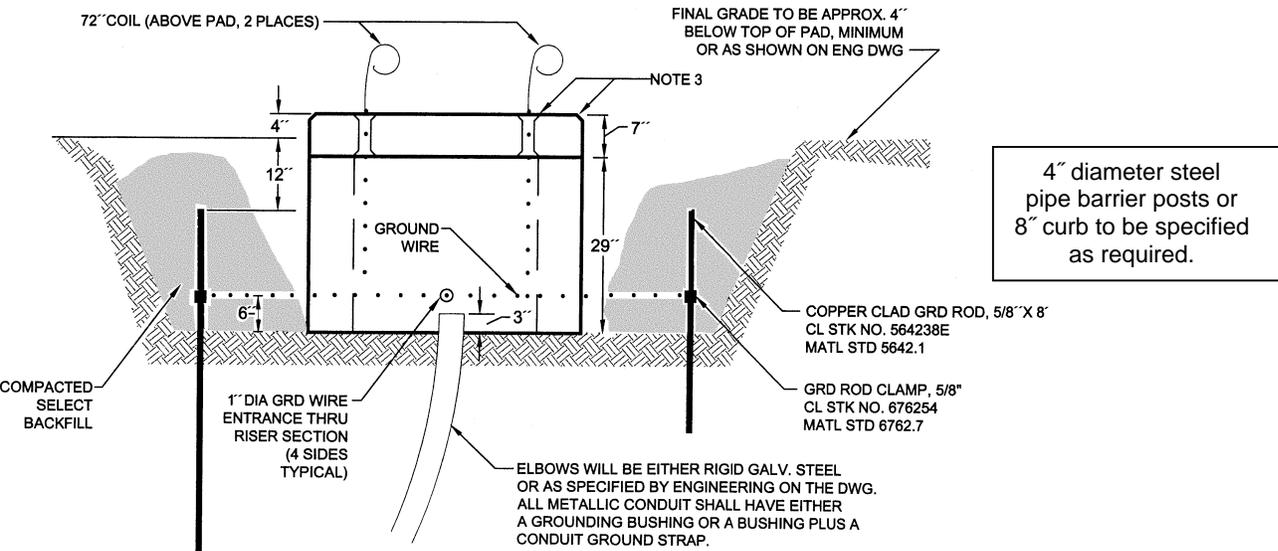
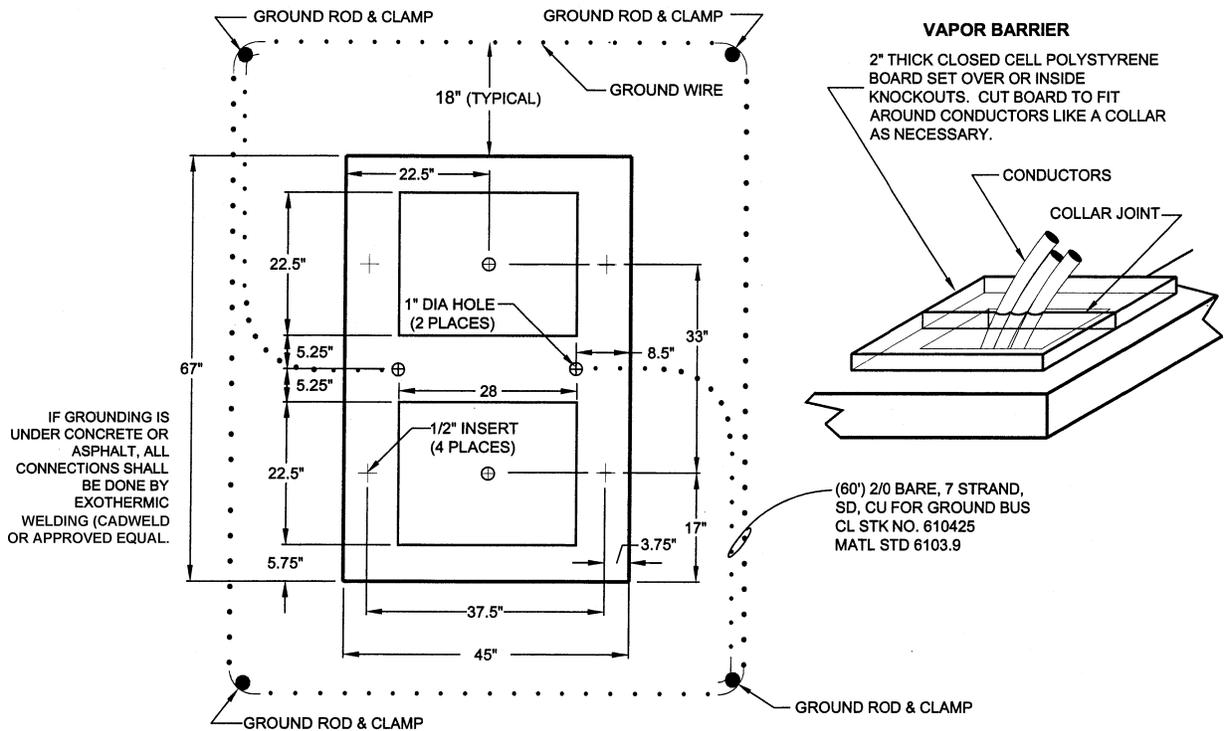
**Four Compartment**



**Four Compartment Notes**

1. This pad assembly consists of a base and a 29" riser. The base & riser may either be poured in place or prefabricated, and of either one or two piece construction.
2. See Seattle City Light drawing B-5704 for reinforcing and misc. construction details.
3. If poured in place, reinforcing bar must be in place and inspected by City Light before concrete pour.
4. Chamfer slab edge and cable openings one inch (1") on all sides.
5. If used to service customer equipment, top of elbow must be below service entrance height at the customer equipment.
6. Install vapor barrier over or inside knockouts. Use 2" closed cell polystyrene board. This is intended to be readily available material such as used in the least expensive ice chests. Cut board to fit around conductors like a collar as necessary.

**Two Compartment**



**Two Compartment Notes**

1. This pad assembly consists of a base and a 29" riser. The base and riser may either be poured in place or prefabricated, and of either one or two piece construction.
2. See Seattle City Light drawing B-5704 for reinforcing and misc. construction details.
3. If poured in place, reinforcing bar must be in place and inspected by City Light before concrete pour.
4. Chamfer slab edge and cable openings one inch (1") on all sides.
5. If used to service customer equipment, top of elbow must be below service entrance height at the customer equipment.
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