

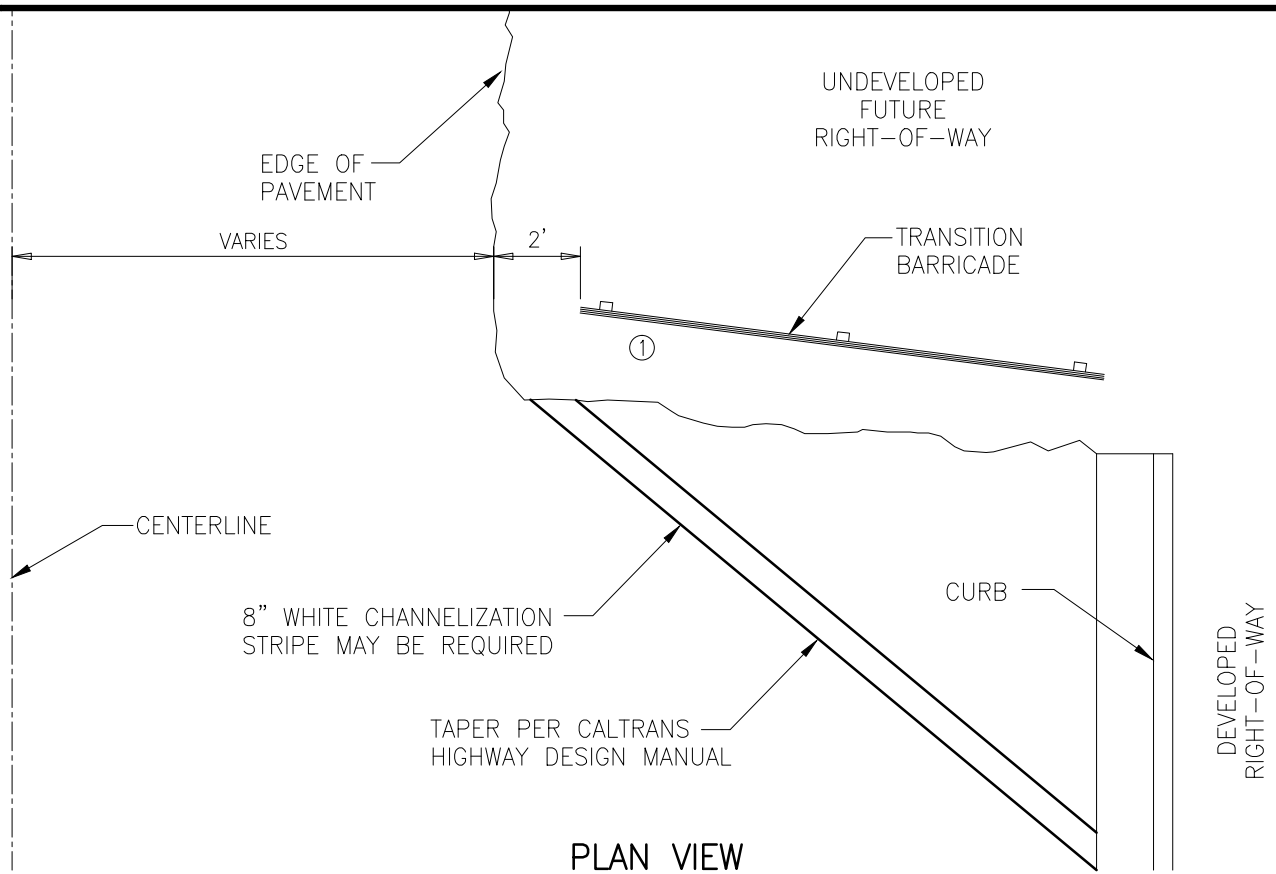
Improvement Standards

CITY OF WATERFORD



Department of Public Works
101 "E" Street
Waterford, California

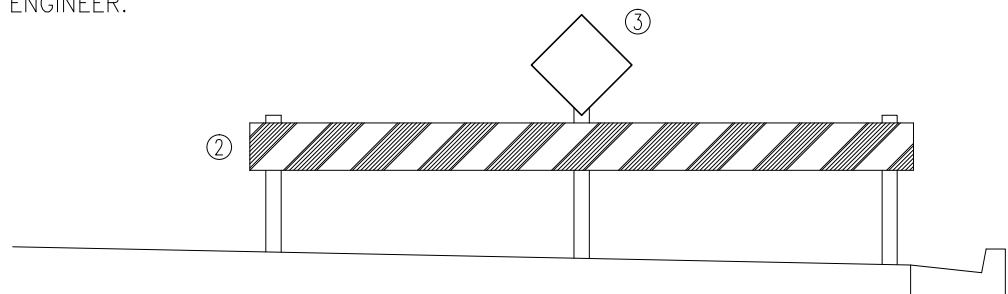
January 2014



PLAN VIEW

NOTES:

1. ALTERNATE LOCATION FOR BARRICADE SHALL BE AS APPROVED BY THE CITY ENGINEER.
2. SEE DRAWING 201 FOR BARRICADE STRIPING.
3. 18" X 18" YELLOW OM1-3 "SCOTCHLITE" WITH REFLECTIVE BACKGROUND, OR APPROVED EQUAL ON ALUMINUM WARNING SIGN.
4. ADDITIONAL SIGNING OR MARKINGS AS REQUIRED BY THE CITY ENGINEER.



PROFILE



BARRICADE FOR ROAD WIDTH TRANSITION

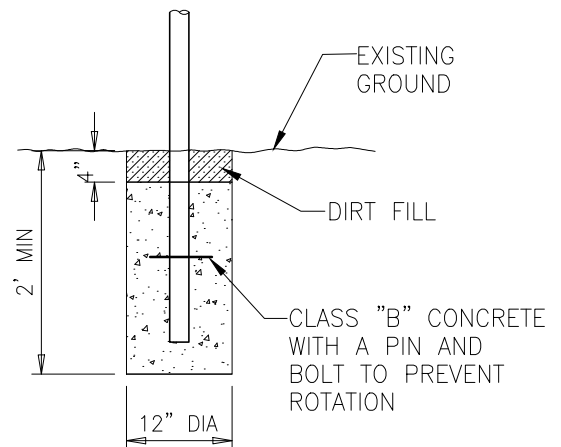
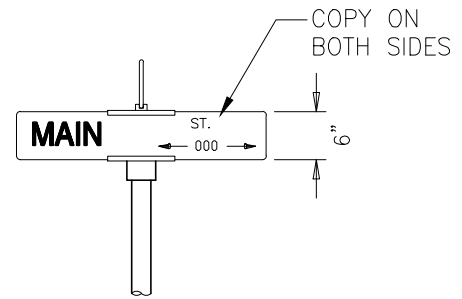
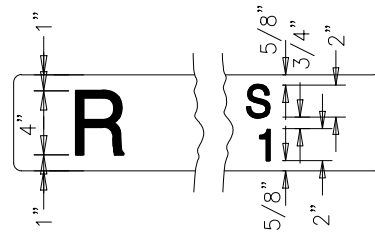
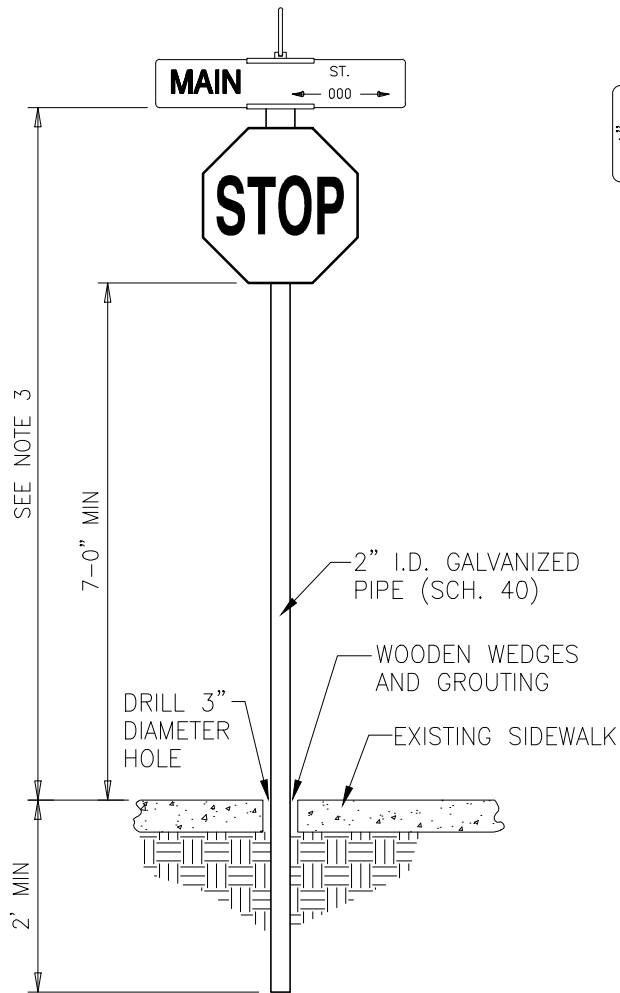
Tony Marshall

TONY B. MARSHALL, CITY ENGINEER

12/05/2013

DATE

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NOTES:

1. MOUNTING HARDWARE TO BE "HAWKINS HEAVY DUTY" SLOTTED BACK V14(HD)SL2C2P, OR APPROVED EQUAL.
2. STREET SIGN MANUFACTURER SHALL BE SUBJECT TO APPROVAL OF THE CITY ENGINEER.
3. HEIGHT FROM GROUND TO BOTTOM OF PLATE SHALL BE 7 FEET. THIS HEIGHT SHALL BE 9 FEET WHEN "STOP" SIGNS ARE ATTACHED, PROVIDING 7 FEET FROM GROUND TO BOTTOM OF "STOP" SIGN.



STREET SIGNS

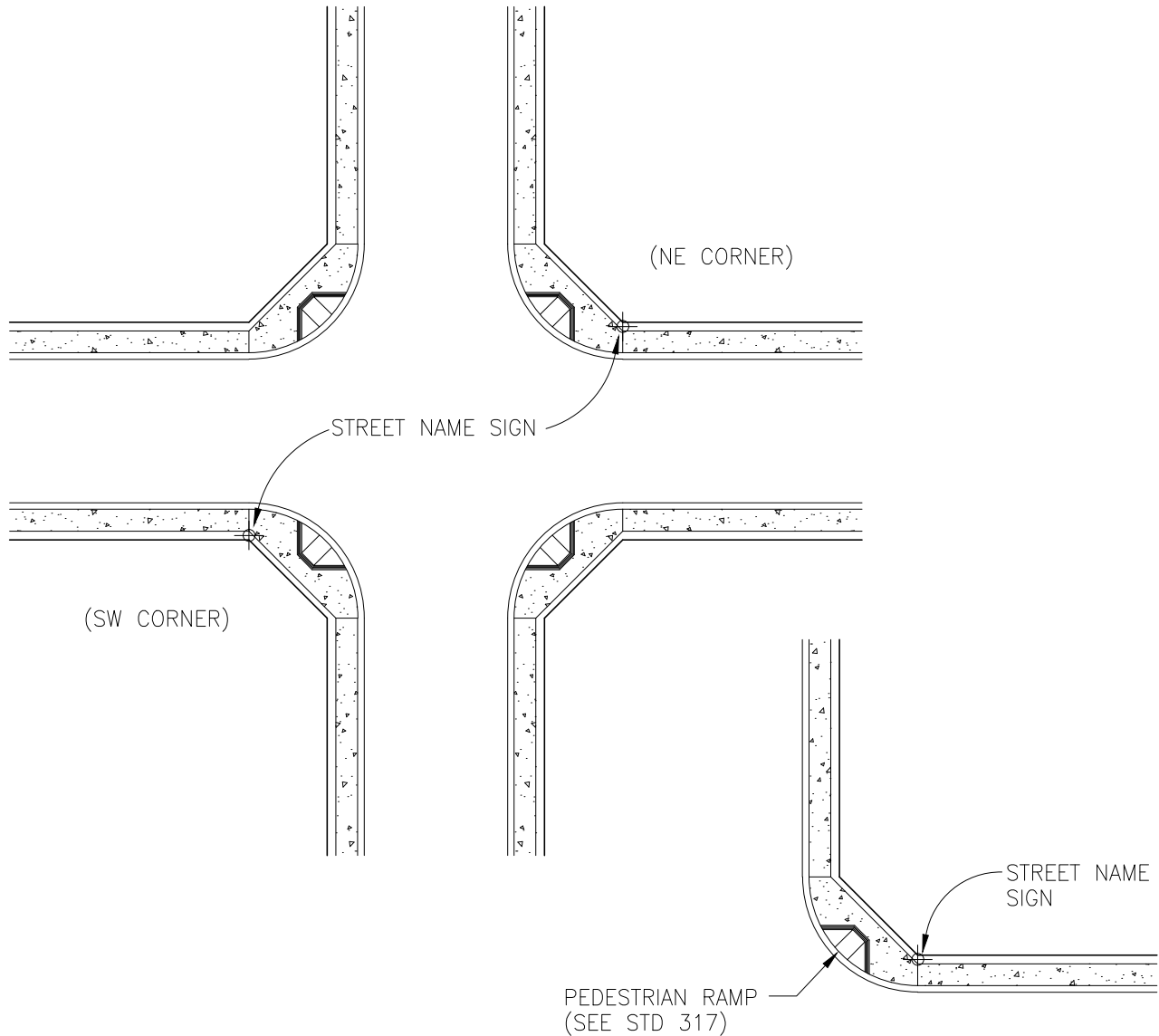
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12/05/2013

DATE

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NOTES:

1. SEE DETAIL 103 FOR INSTALLATION IN EXISTING SIDEWALKS.
2. SIGN LOCATION SHALL BE AS FOLLOWS: ON RESIDENTIAL STREETS – N.E. CORNER ONLY; ON MAJOR ARTERIALS – N.E. & S.W. CORNERS; ON INTERSECTIONS OF MAJOR ARTERIALS – ALL 4 CORNERS.
3. STREET NAME SIGNS SHALL BE MOUNTED ON TOP OF STOP SIGNS (WHERE APPLICABLE).
4. "NO PARKING" AND OTHER WARNING SIGNS TO BE PLACED BEHIND SIDEWALK; LOCATION TO BE DETERMINED BY THE CITY OF WATERFORD.



STREET SIGN LOCATION

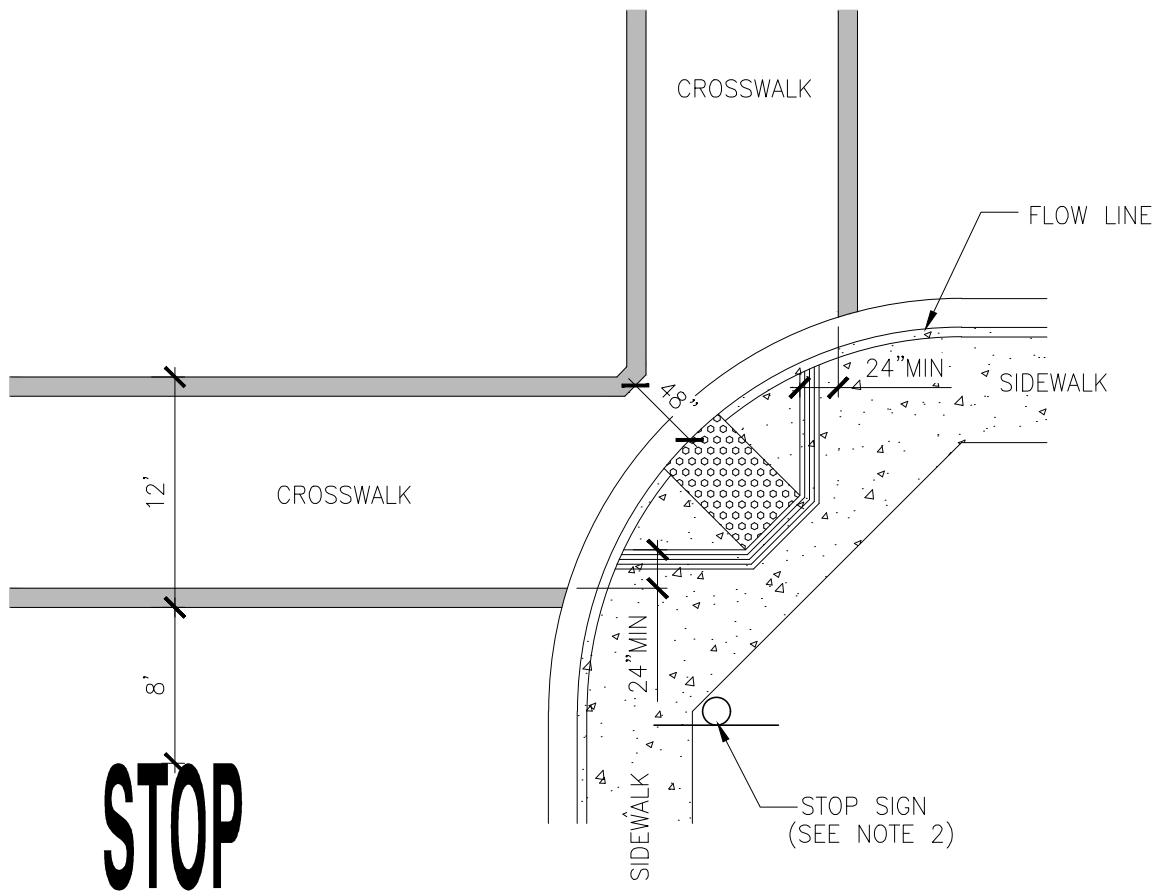
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12/05/2013

DATE

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NOTES:

1. AN INTERSECTION NOT REQUIRING CROSSWALKS SHALL HAVE A STOP BAR PLACED IN THE SAME LOCATION AS THE CROSSWALK LINE CLOSEST TO THE LEGEND.
2. STOP SIGN INSTALLATION SHALL BE AT THE BACK OF WALK AT THE CURB RETURN OR AS DIRECTED BY THE CITY ENGINEER. (SEE DETAIL 203 FOR INSTALLATION IN EXISTING SIDEWALK)



CROSSWALK / STOP BAR PLACEMENT

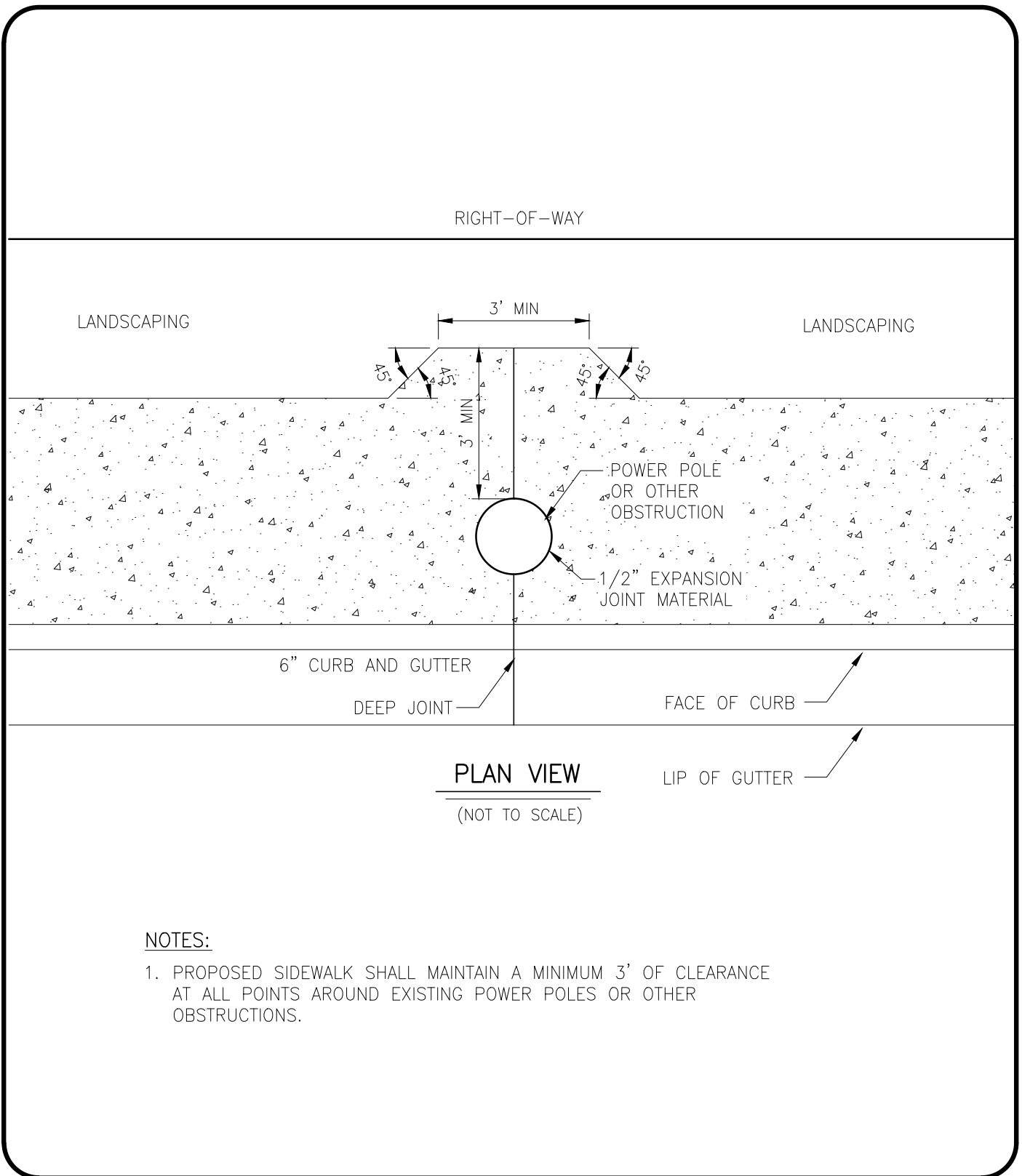
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12/05/2013

DATE

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NOTES:

1. PROPOSED SIDEWALK SHALL MAINTAIN A MINIMUM 3' OF CLEARANCE AT ALL POINTS AROUND EXISTING POWER POLES OR OTHER OBSTRUCTIONS.



SIDEWALK OBSTRUCTIONS

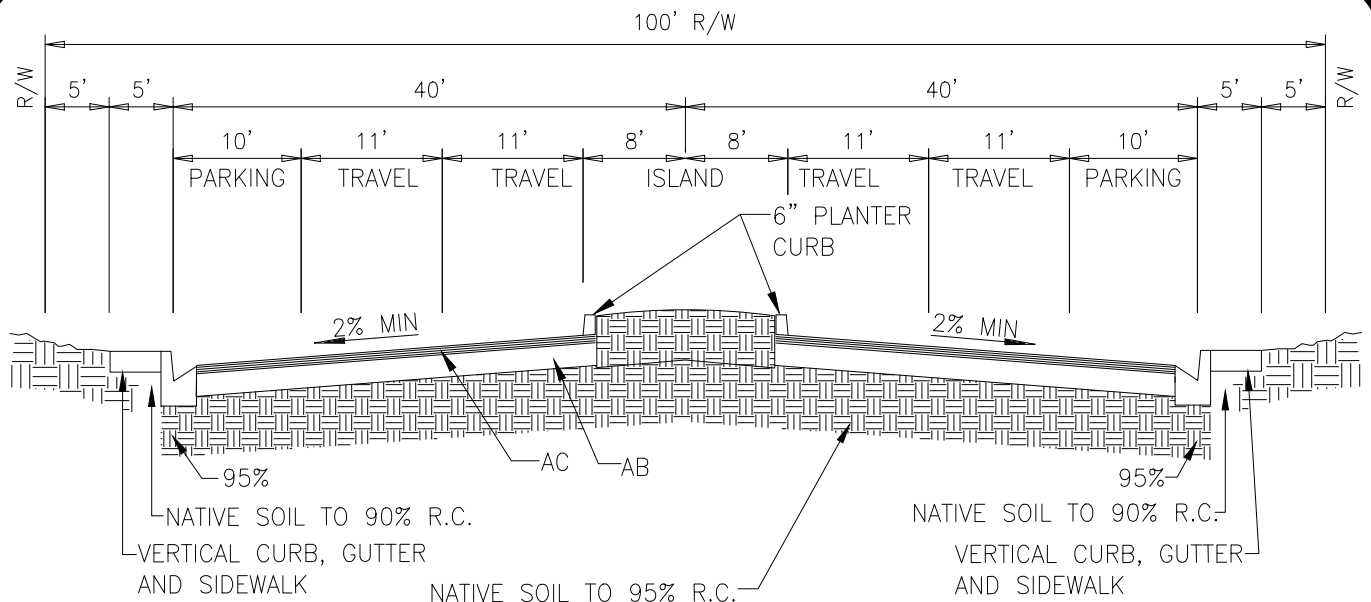
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12/05/2013

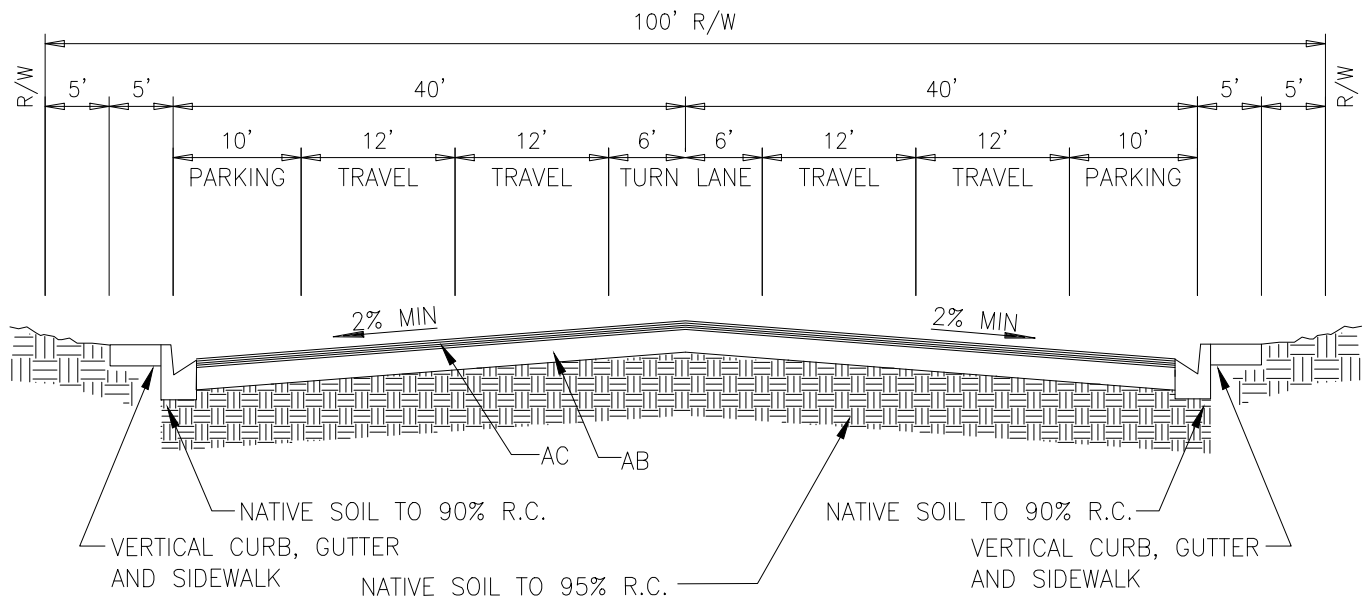
DATE

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TYPICAL 100' STREET SECTION

("F" STREET)



TYPICAL 100' STREET SECTION

(YOSEMITE BLVD.)

NOTE:

ALL CONSTRUCTION WITHIN THE HIGHWAY 132 RIGHT-OF-WAY (YOSEMITE BLVD) IS SUBJECT TO CALTRANS APPROVAL.



TYPICAL 100' STREET SECTIONS

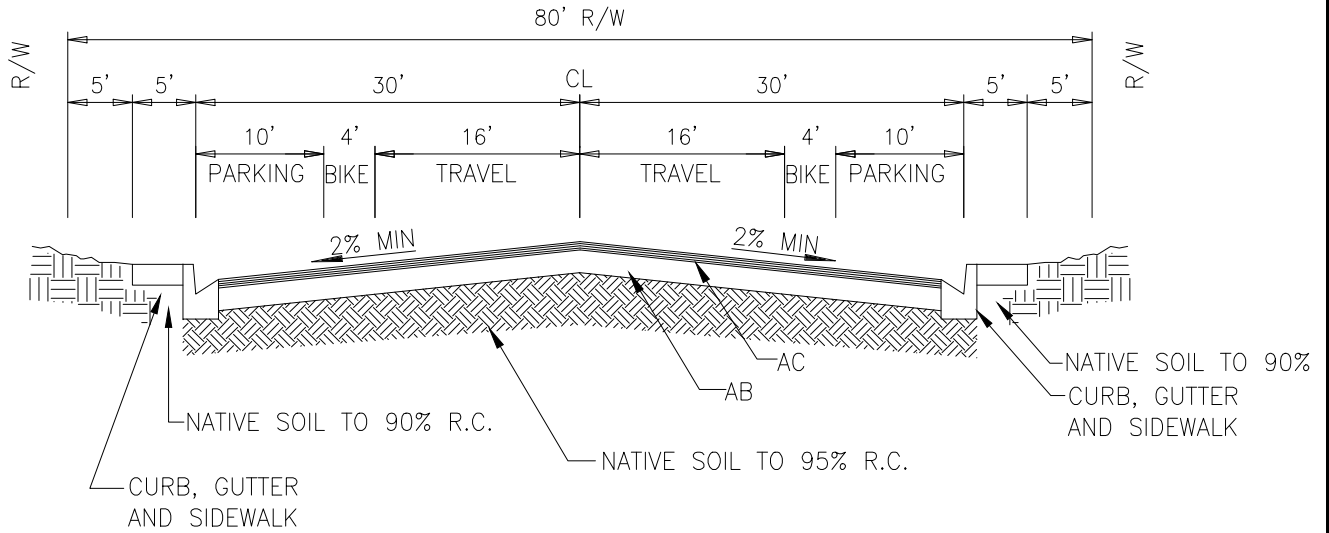
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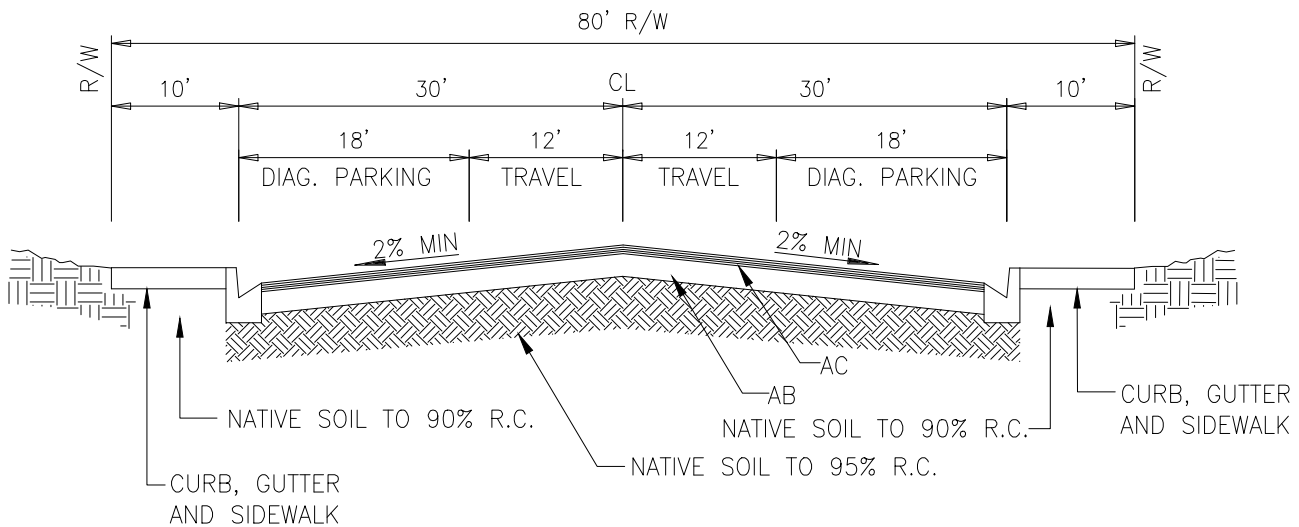
12/05/2013

DATE

301



TYPICAL 80' STREET SECTION



TYPICAL 80' STREET SECTION

DOWNTOWN



TYPICAL 80' STREET SECTIONS

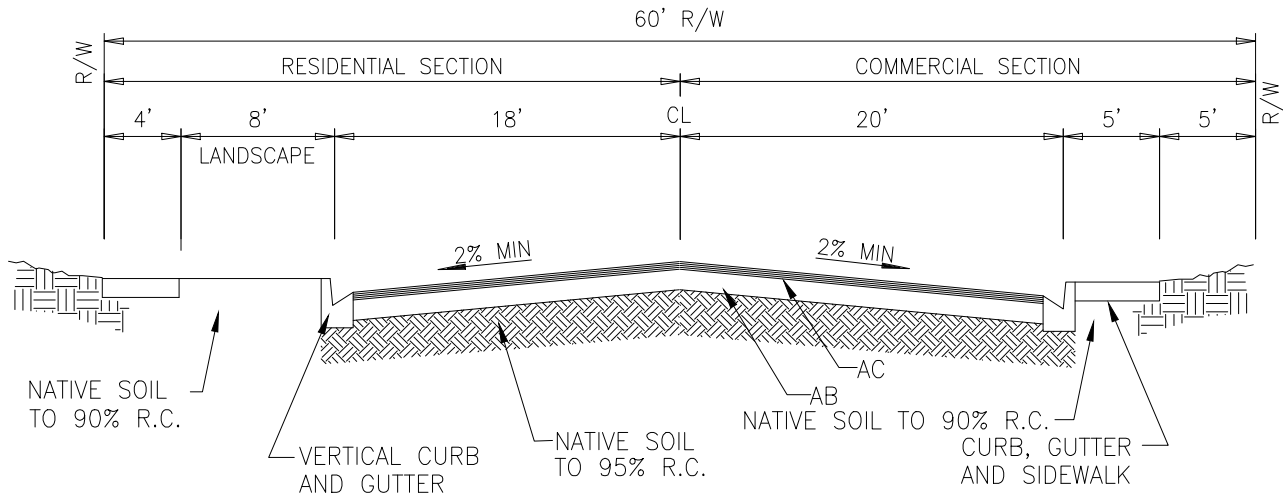
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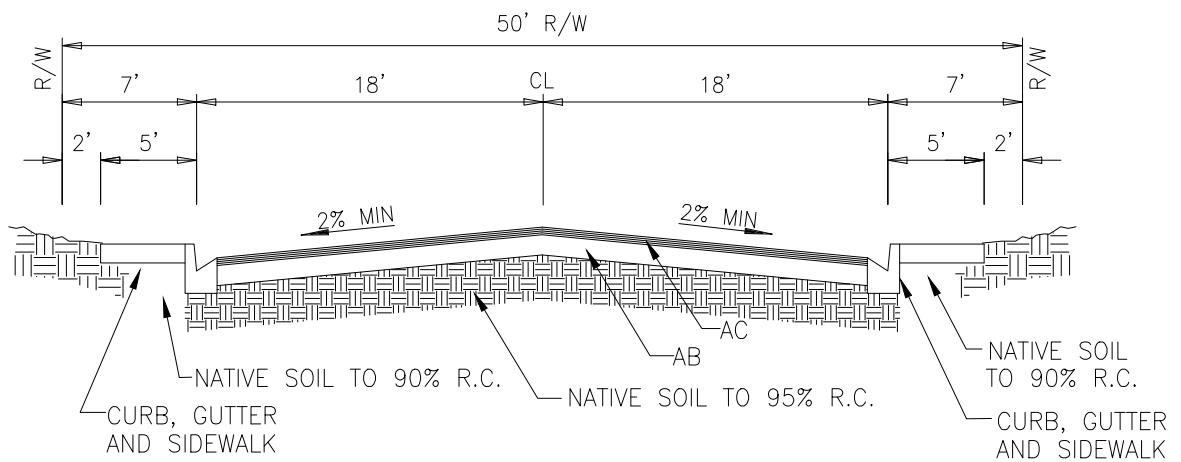
12/05/2013

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TYPICAL 60' STREET SECTION



TYPICAL 50' STREET SECTION/CUL-DE-SAC

(NOT TO SCALE)



TYPICAL 60' AND 50' STREET SECTIONS

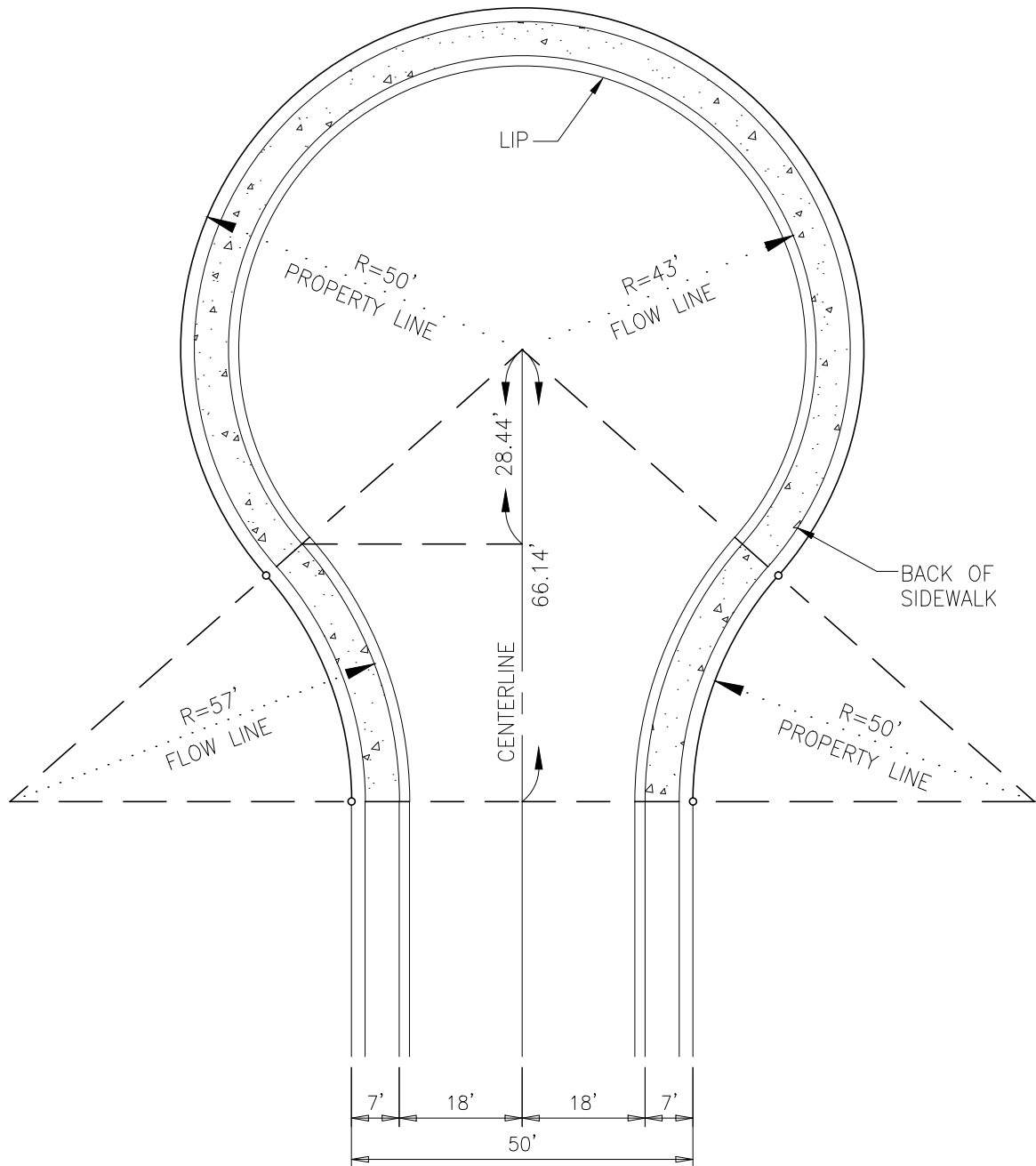
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12/05/2013

DATE

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NOTE:

1. MAXIMUM LENGTH OF CUL-DE-SAC TO BE 500 FEET, MEASURED FROM THE CENTERLINE OF THE INTERSECTING STREET TO THE CUL-DE-SAC RADIUS POINT.



TYPE I CUL-DE-SAC

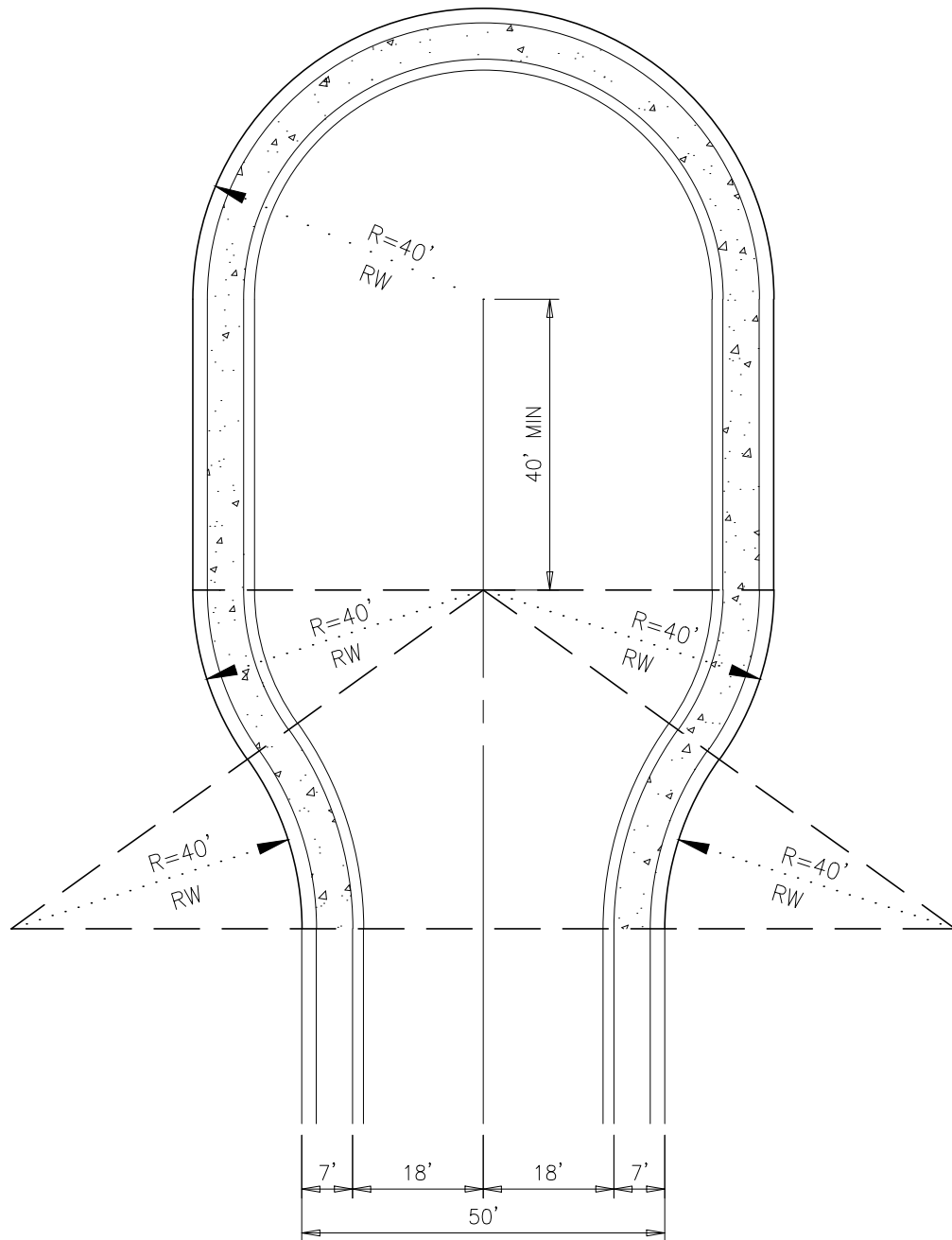
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12/05/2013

DATE

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NOTE:

1. MAXIMUM LENGTH OF CUL-DE-SAC TO BE 500 FEET, MEASURED FROM THE CENTERLINE OF THE INTERSECTING STREET TO THE CUL-DE-SAC RADIUS POINT.



TYPE II CUL-DE-SAC

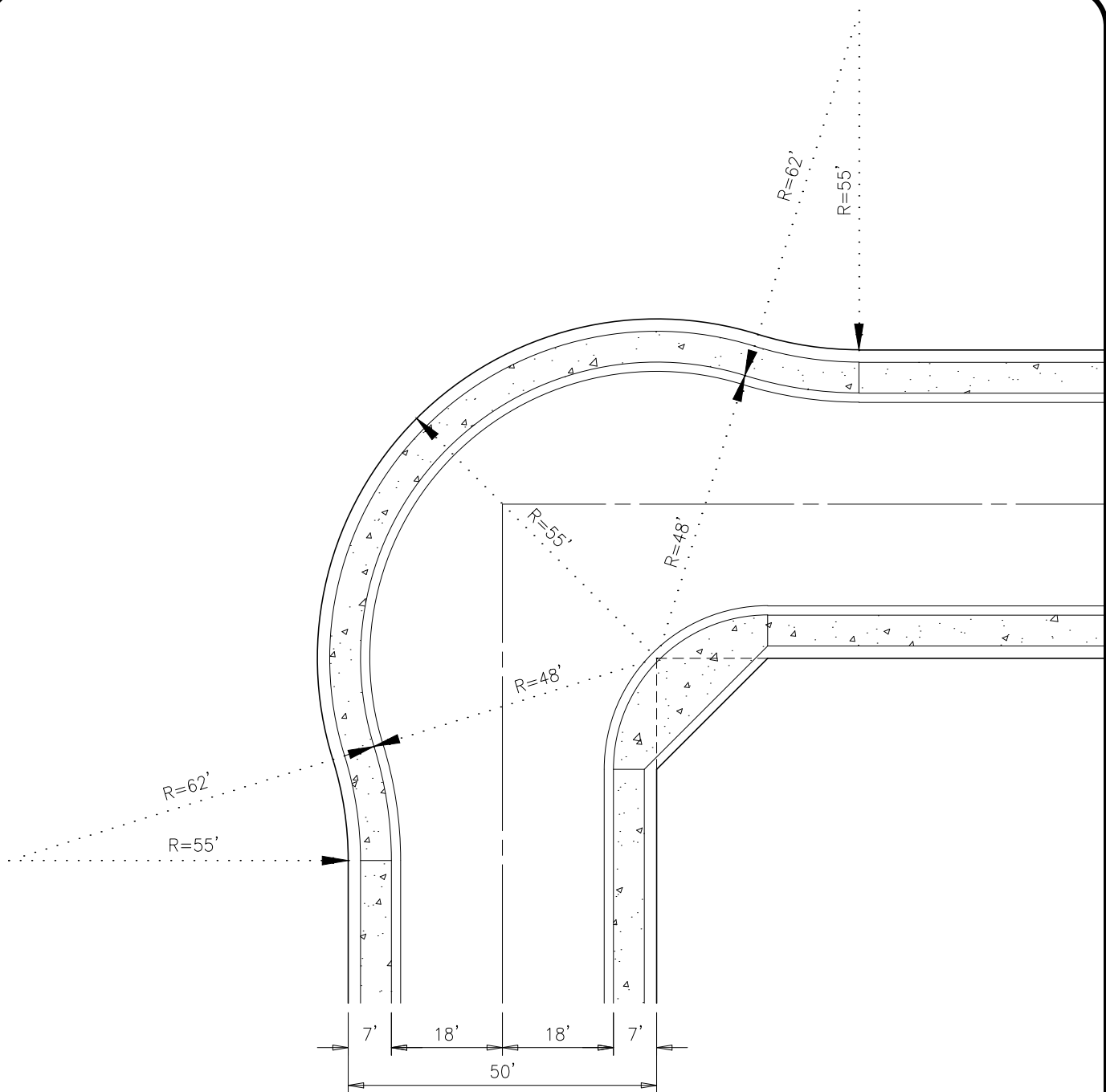
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12/05/2013

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NOTES:

1. KNUCKLE RADII FOR INTERSECTING STREETS GREATER THAN 50' IN WIDTH ARE TO BE ESTABLISHED INDIVIDUALLY AS DETERMINED BY THE CITY ENGINEER.
2. INTERSECTION KNUCKLES SHALL BE INSTALLED WHERE THE CENTERLINE RADIUS IS LESS THAN 125'.



STREET INTERSECTION KNUCKLE

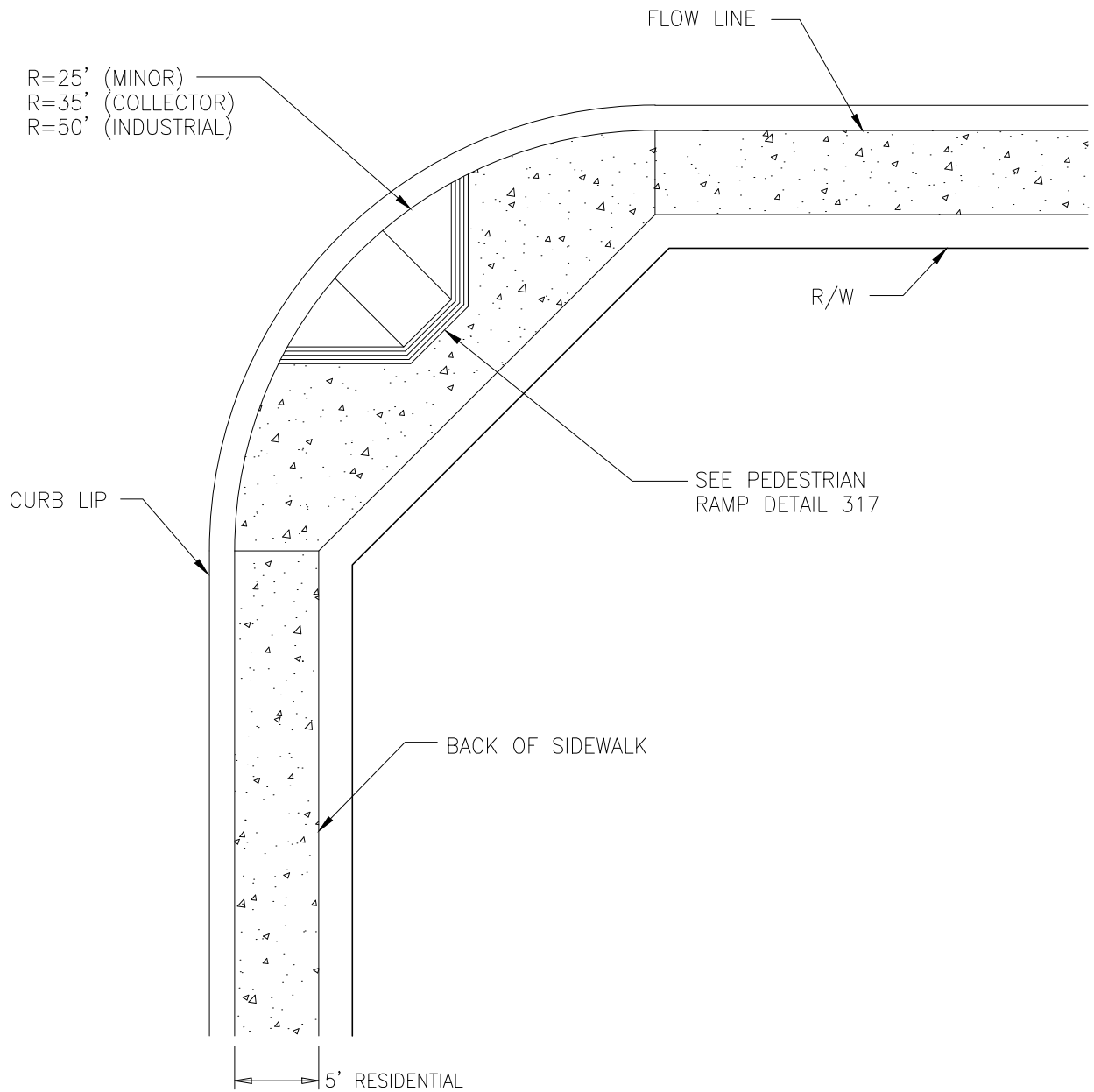
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CURB RETURN DETAIL

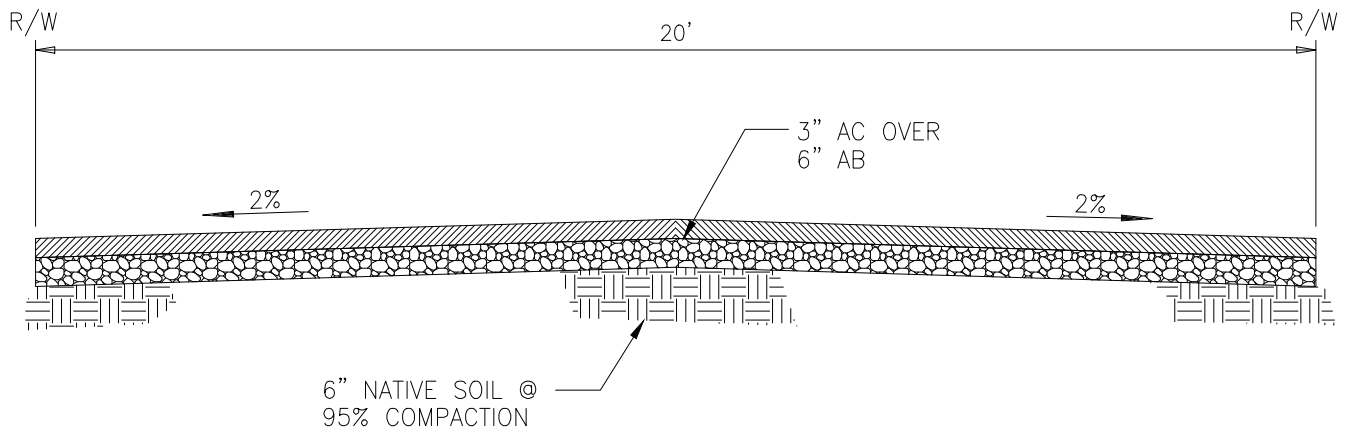
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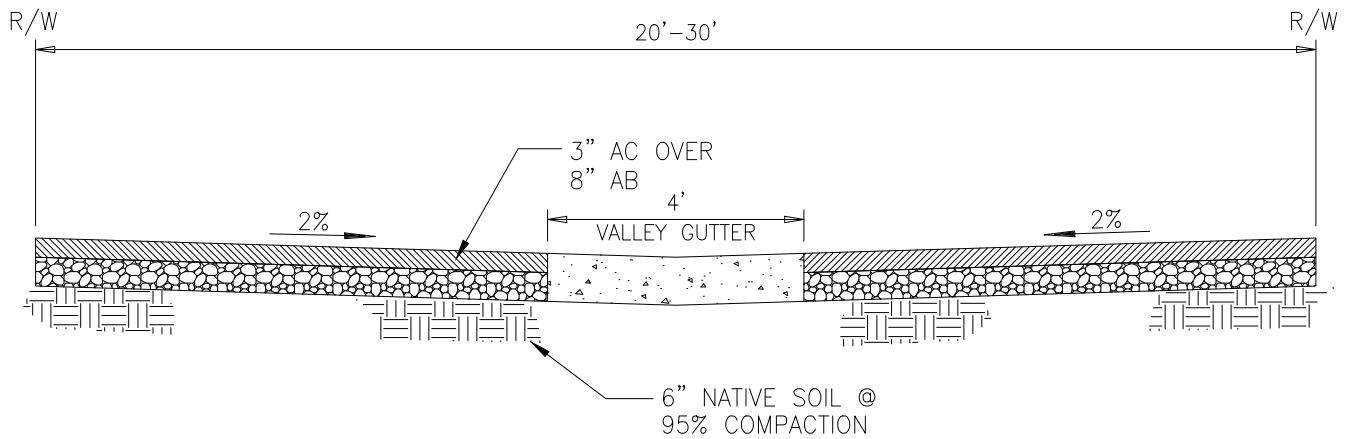
DATE

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RESIDENTIAL SECTION

(NOT TO SCALE)



COMMERCIAL SECTION

(NOT TO SCALE)

NOTE:

PARTIAL WIDTH ALLEYS SHALL BE NO LESS THAN 14'.



ALLEY SECTIONS

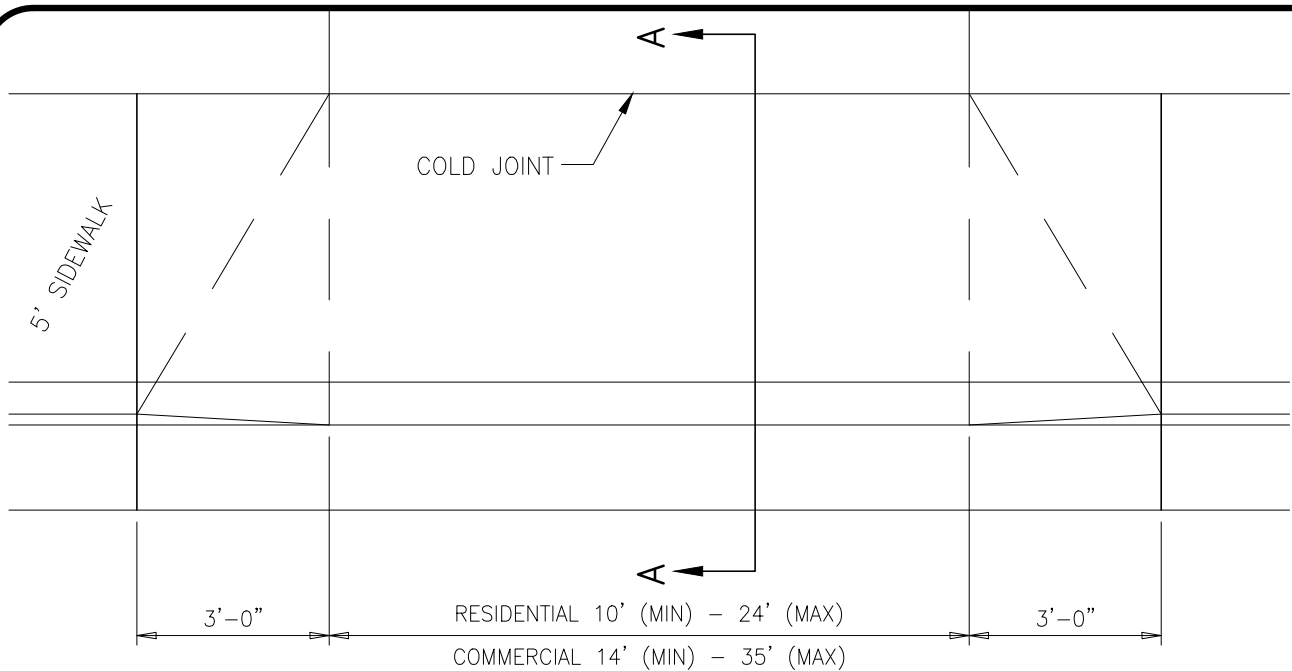
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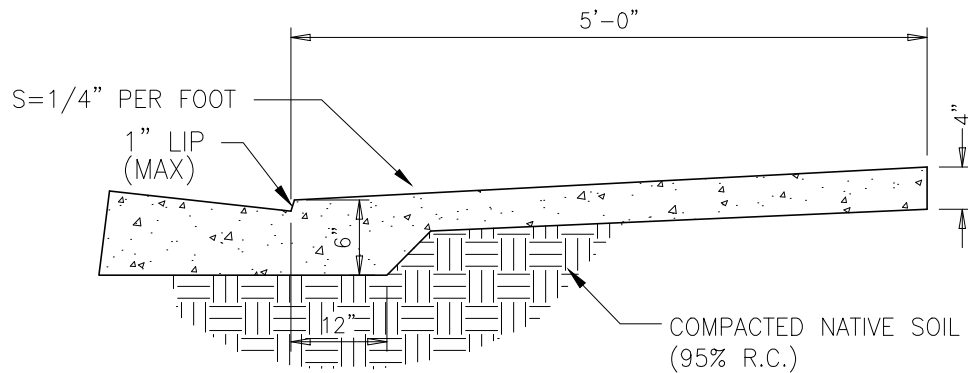
DATE

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PLAN VIEW

(NOT TO SCALE)



SECTION A-A

(NOT TO SCALE)

NOTES:

1. DRIVEWAYS TO BE CONSTRUCTED OF 4" MIN CLASS "B" (5 SACK) PORTLAND CEMENT CONCRETE. COMMERCIAL DRIVEWAYS SHALL USE #4 REBAR AT 18" OC EACH WAY.
2. CONCRETE SURFACE SHALL BE TROWELLED SMOOTH AND BROOM FINISHED.
3. DRIVEWAYS ON CORNER LOTS SHALL NOT BE LOCATED ON THE RETURN SIDE OF THE LOT AND MUST MAINTAIN A MINIMUM DISTANCE OF 20' FROM THE RETURN, UNLESS OTHERWISE DIRECTED BY THE CITY.
4. IN EXISTING STREETS, ASPHALT SHALL BE SAW-CUT 12" MIN FROM LIP OF GUTTER, AND GUTTER FORMED AT EDGE. REPLACE AC WITH 3" AC OVER 8" AB



DRIVEWAY APPROACH

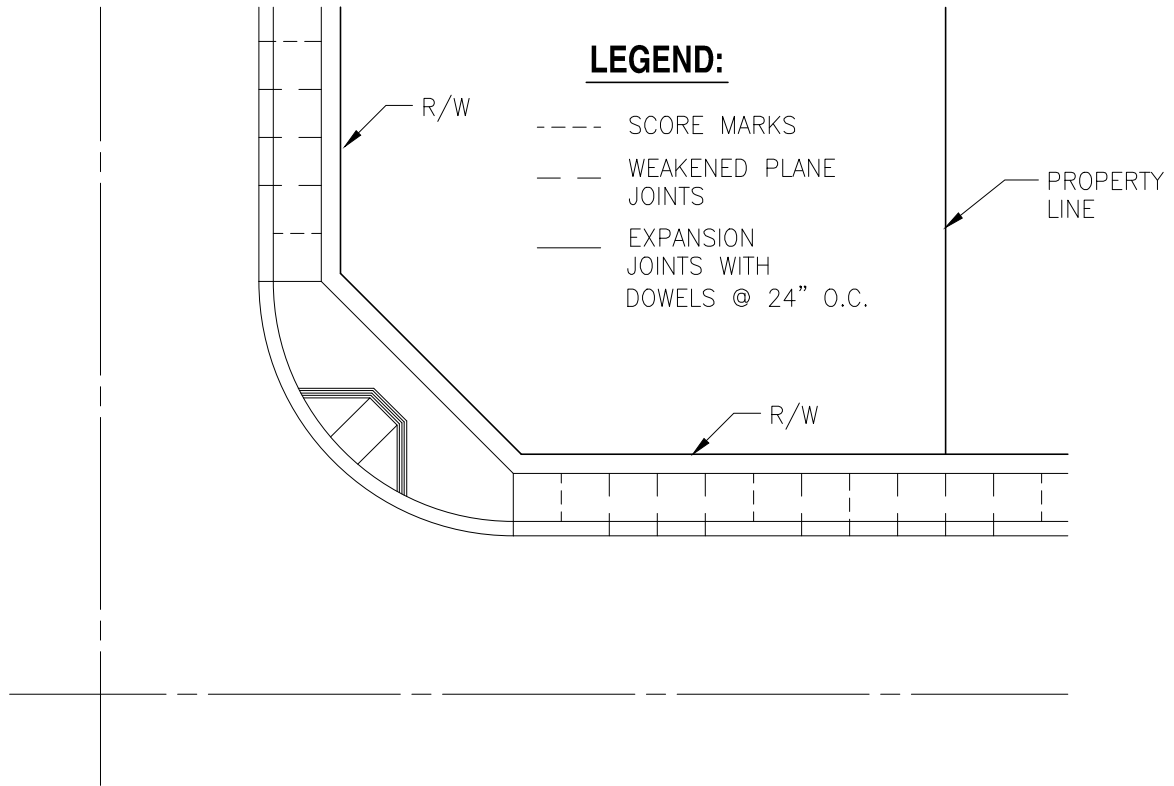
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12/05/2013

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NOTES:

1. SCORE MARKS SHALL BE SPACED AT 5' OC AND SHALL HAVE A MINIMUM DEPTH OF 1/4".
2. CURB, GUTTER, AND SIDEWALK SHALL HAVE WEAKENED PLANE JOINTS AT INTERVALS NOT EXCEEDING 10'. WEAKENED PLANE JOINTS SHALL HAVE A MINIMUM DEPTH OF 1-1/2" AND SHALL NOT EXCEED 1/8" IN WIDTH WHICH SHALL REMAIN OPEN.
3. EXPANSION JOINTS SHALL BE INSTALLED AT INTERVALS NOT EXCEEDING 100' AND SHALL BE INSTALLED AROUND UTILITY POLES TO PREVENT CONTACT WITH CONCRETE.
4. AN EDGING TOOL SHALL BE USED TO ROUND THE LIPS OF SCORE MARKS AND WEAKENED PLANE JOINTS.
5. GUTTER FLOW LINE SHALL BE WATER TESTED.



CURB, GUTTER, AND SIDEWALK

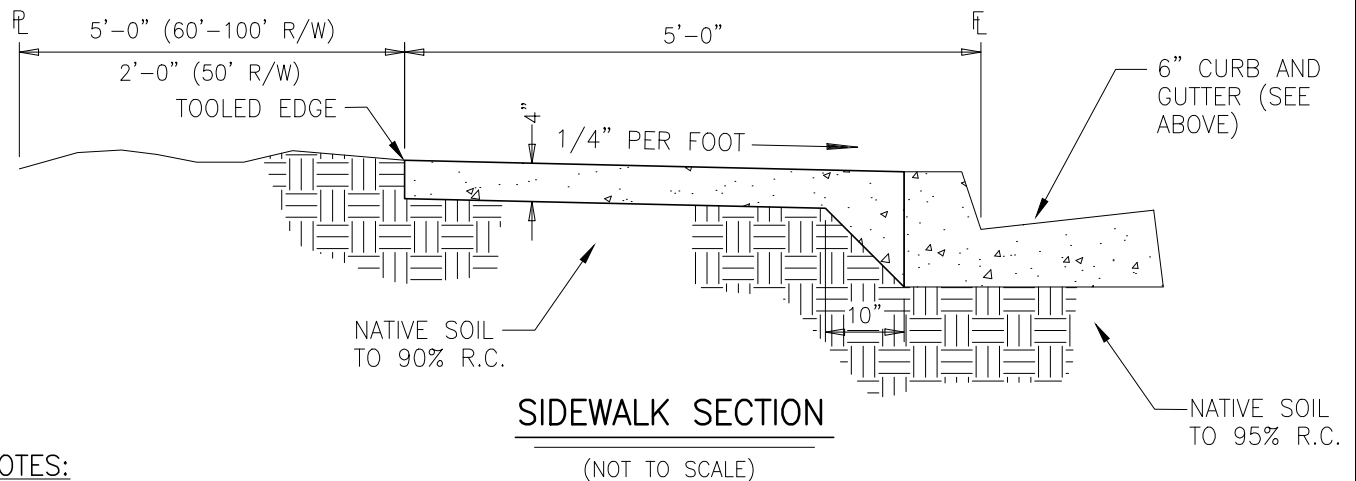
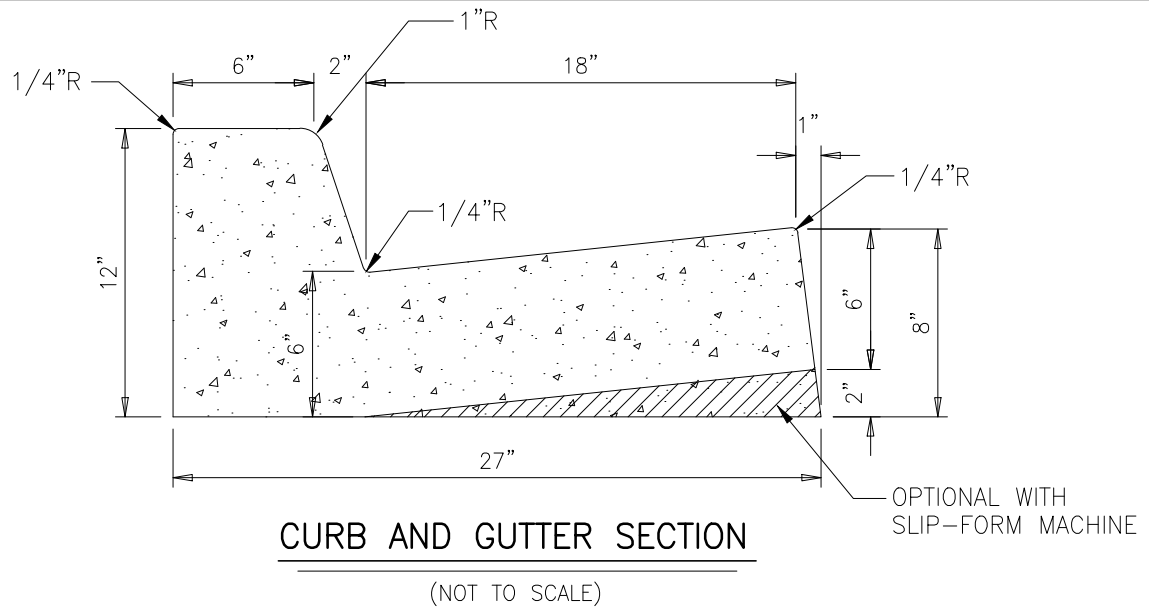
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NOTES:

1. CURB, GUTTER, AND SIDEWALK CONSTRUCTION SHALL CONFORM TO SECTION 73, STANDARD SPECIFICATIONS, CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), EXCEPT AS MODIFIED HEREIN.
2. ALL RADII FOR ROUNDING EDGES SHALL BE $\frac{3}{4}$ " UNLESS OTHERWISE NOTED.
3. CONCRETE SHALL BE CLASS B, PER CALTRANS SECTION 90.
4. EXPANSION JOINTS AND WEAKENED PLANE JOINTS SHALL BE INSTALLED AS INDICATED ON THE PLANS OR STANDARD DETAILS.
5. DURING CONSTRUCTION OF GUTTERS, WATER SHALL BE USED TO INSURE PROPER DRAINAGE ALONG THE FLOWLINE.
6. THE CONCRETE SURFACE SHALL BE FREE OF BLEMISHES AND NOT VARY MORE THAN $\frac{1}{4}$ " FROM A 10' STRAIGHT EDGE.
7. CONCRETE SHALL HAVE A LIGHT BROOM FINISH AND AN IMPERVIOUS MEMBRANE OR SPRAY CURE. 1 GAL/150 SF PIGMENTED CURING COMP ASTM C309 TYPE Z, CLASS A OR B. APPLY IMMEDIATELY AFTER MOISTURE SHEEN DISAPPEARS.
8. IF CURB AND SIDEWALK ARE NOT POURED MONOLITHICALLY, $\frac{1}{2}$ " x 18" DOWELS SHALL BE INSTALLED AT 48" O.C.



CURB AND GUTTER SECTION SIDEWALK SECTION

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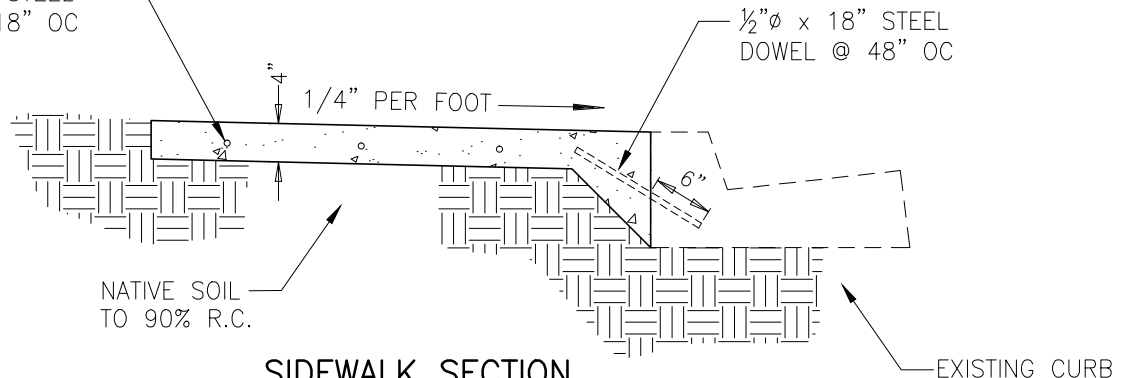
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12/05/2013

DATE

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$\frac{1}{2}$ " ϕ x 18" STEEL
DOWEL @ 18" OC



SIDEWALK SECTION

(NOT TO SCALE)

NOTES:

1. SIDEWALK SHALL BE REMOVED TO THE NEAREST SCORE MARK OR AS DIRECTED BY THE CITY OF WATERFORD.
2. CURB, GUTTER, AND SIDEWALK CONSTRUCTION SHALL CONFORM TO SECTION 73, STANDARD SPECIFICATIONS, CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), EXCEPT AS MODIFIED HEREIN.
3. ALL RADII FOR ROUNDING EDGES SHALL BE $\frac{3}{4}$ " UNLESS OTHERWISE NOTED.
4. CONCRETE SHALL BE CLASS B, PER CALTRANS SECTION 90.
5. MATCH WIDTH AND SCORING PATTERN WITH ADJACENT EXISTING SIDEWALK.
6. EXPANSION JOINTS AND WEAKENED PLANE JOINTS SHALL BE INSTALLED AS INDICATED ON THE PLANS OR STANDARD DETAILS.
7. DURING CONSTRUCTION OF GUTTERS, WATER SHALL BE USED TO INSURE PROPER DRAINAGE ALONG THE FLOWLINE.
8. THE CONCRETE SURFACE SHALL BE FREE OF BLEMISHES AND NOT VARY MORE THAN $\frac{1}{4}$ " FROM A 10' STRAIGHT EDGE.
9. CONCRETE SHALL HAVE A LIGHT BROOM FINISH AND AN IMPERVIOUS MEMBRANE OR SPRAY CURE. 1 GAL/150 SF PIGMENTED CURING COMP ASTM C309 TYPE Z, CLASS A OR B. APPLY IMMEDIATELY AFTER MOISTURE SHEEN DISAPPEARS.



SIDEWALK REPAIR SECTION

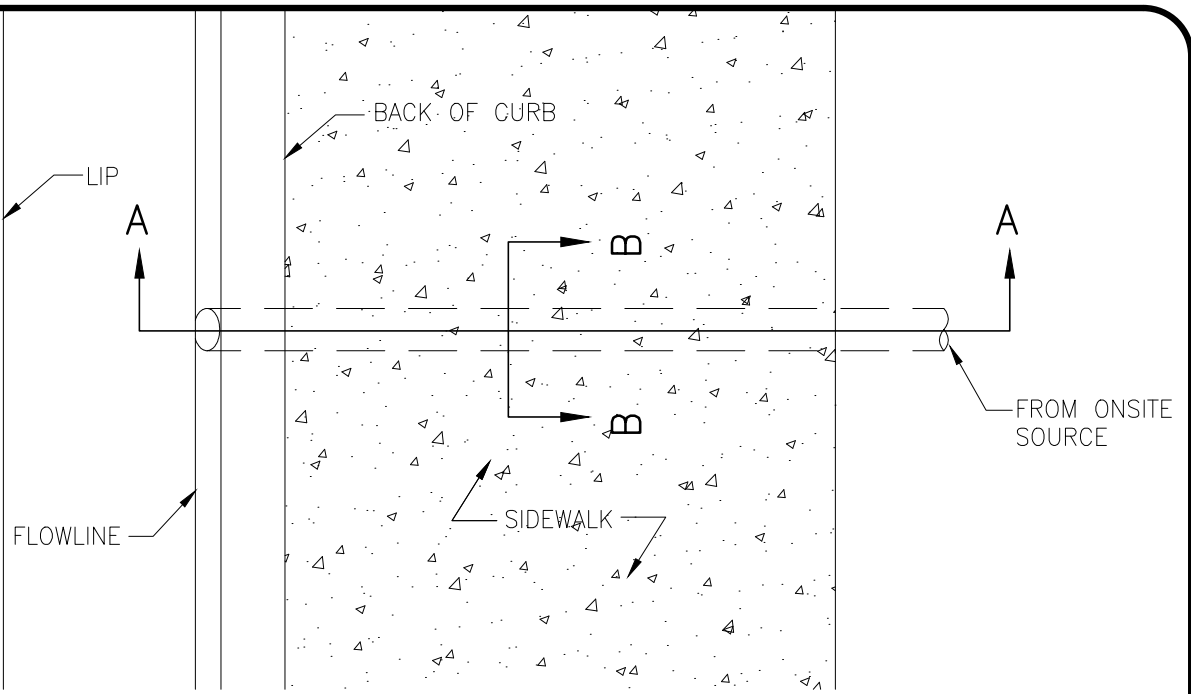
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12/05/2013

DATE

311-A

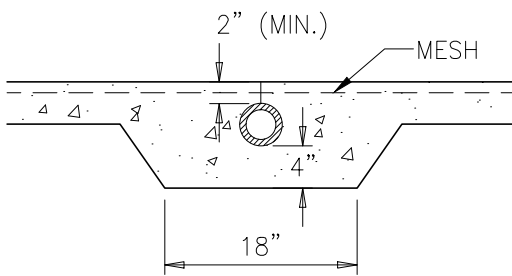


PLAN VIEW

(NOT TO SCALE)

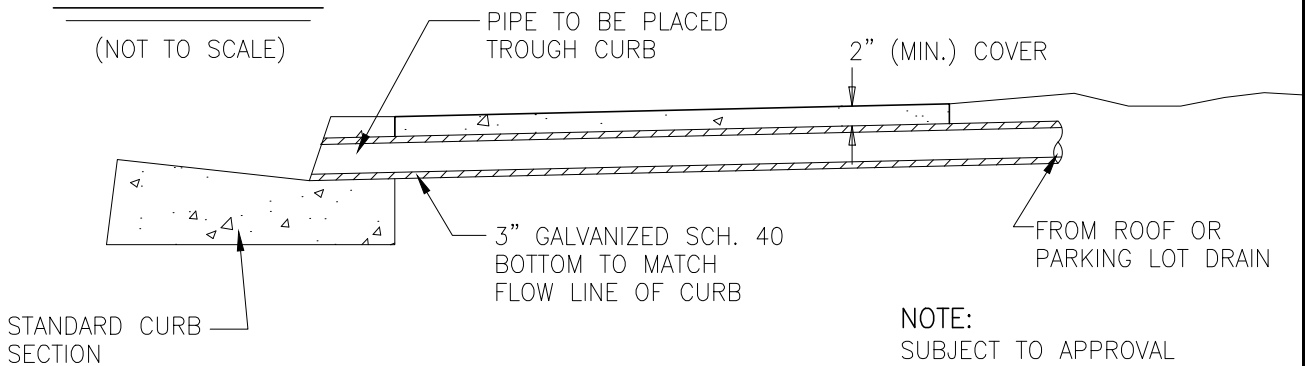
NOTE:

FIBERMESH OR WIRE MESH
TO BE ADDED TO CONCRETE



SECTION B-B

(NOT TO SCALE)



SIDEWALK SECTION A-A

(NOT TO SCALE)

NOTE:

SUBJECT TO APPROVAL
OF CITY ENGINEER



CURB DRAIN UNDER SIDEWALK

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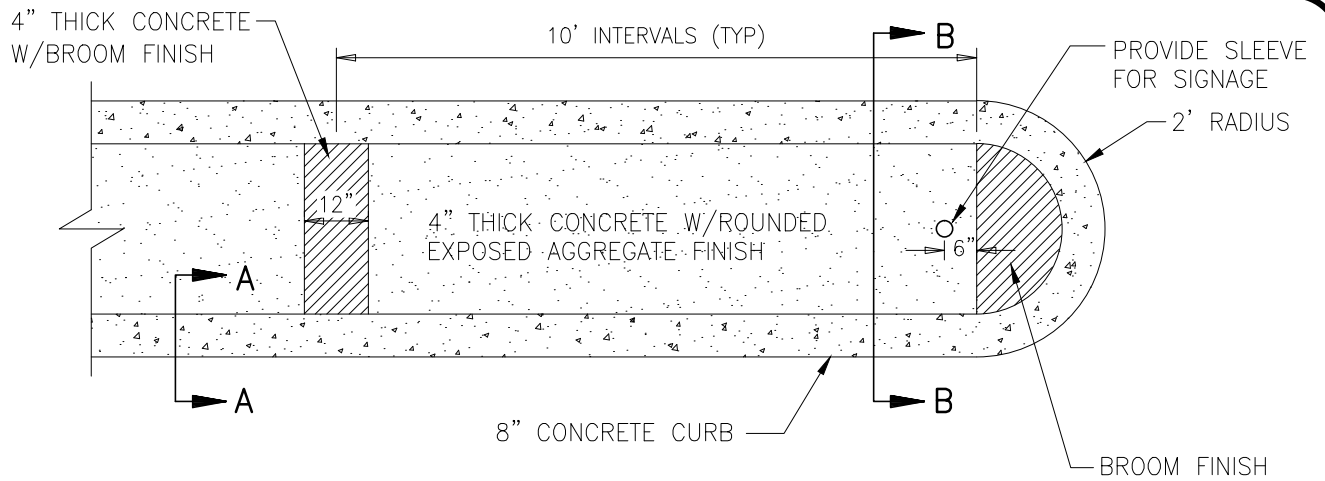
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12/05/2013

DATE

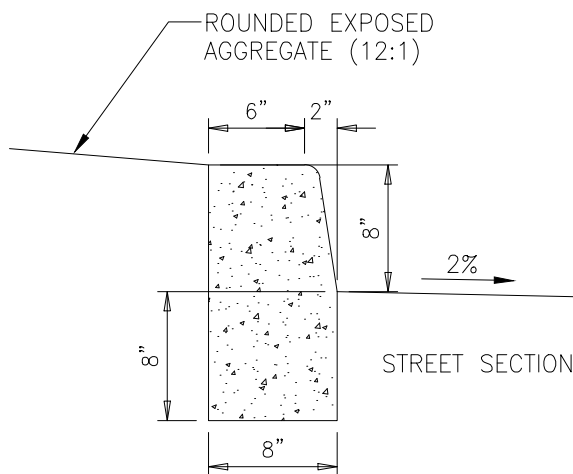
313

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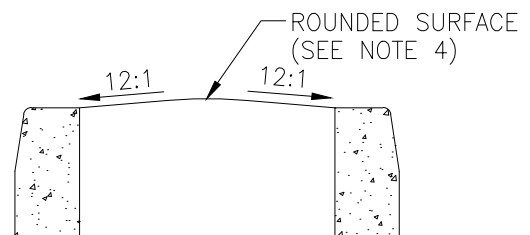
PLAN VIEW

(NOT TO SCALE)



SECTION A-A

(NOT TO SCALE)



SECTION B-B

(NOT TO SCALE)

NOTES:

1. ON LANDSCAPED MEDIANS CURB SHALL EXTEND TO BOTTOM OF AGGREGATE BASE.
2. PROVIDE WEAKENED PLANE JOINTS IN ACCORDANCE WITH CONSTRUCTION STANDARDS AND AT END OR RETURNS.
3. LANDSCAPED MEDIANS SHALL BE A MINIMUM OF 8' WIDE.
4. ROUND SURFACE OF MEDIAN TO GIVE A 2" RAISED ELEVATION IN THE CENTER OF A 4' MEDIAN, A 4" RAISED ELEVATION IN A 8' MEDIAN, AND A 8" RAISED ELEVATION IN A 16' MEDIAN.



MEDIAN DETAIL

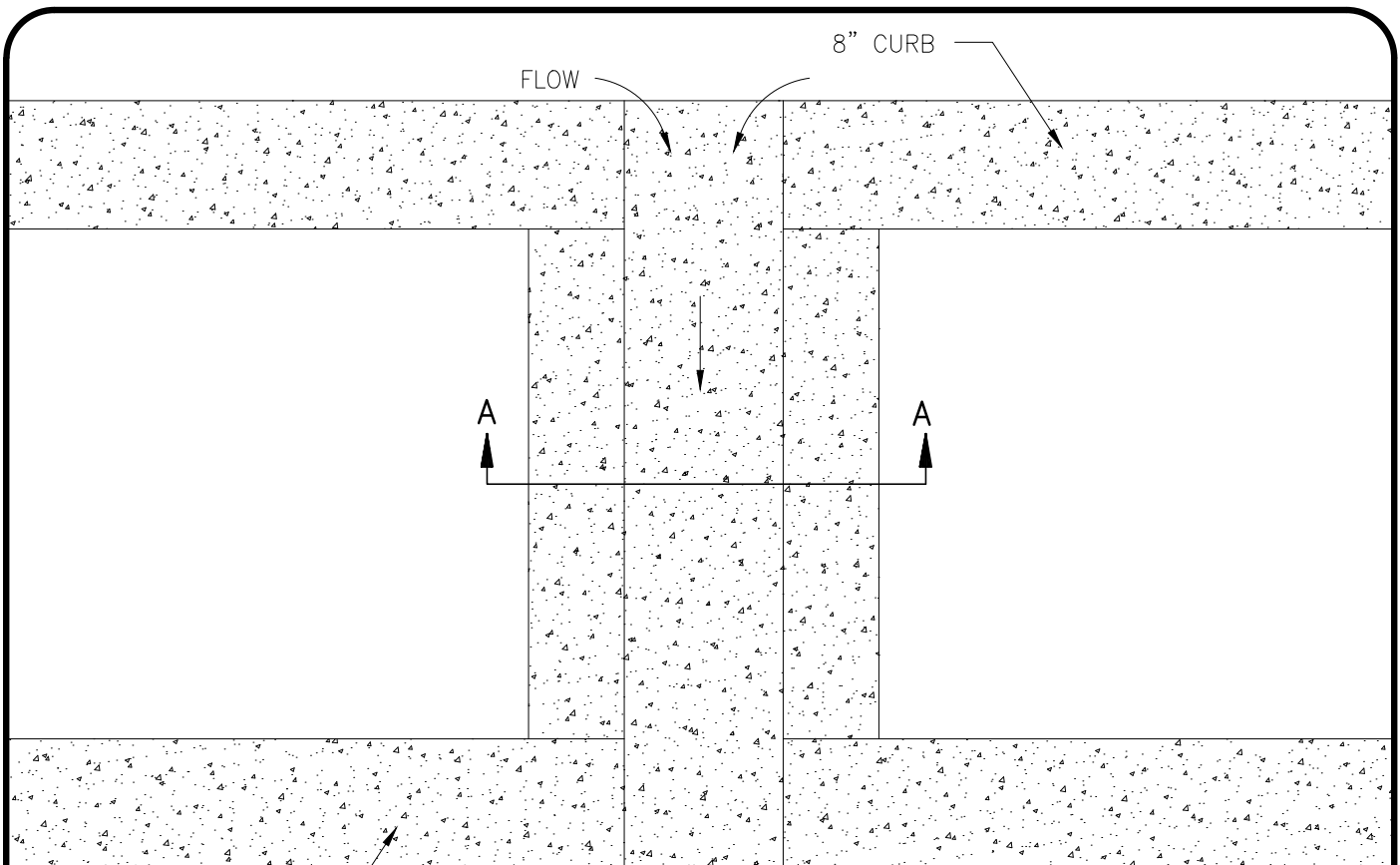
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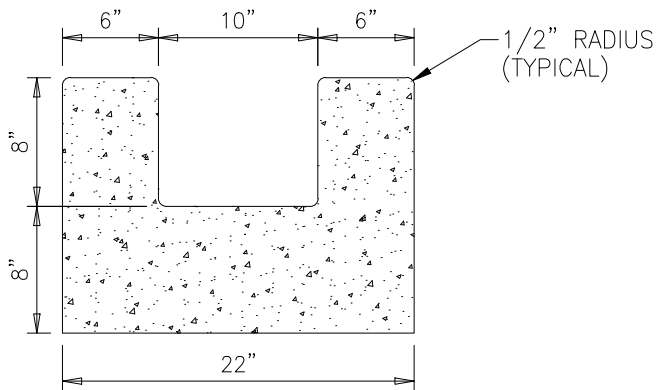
DATE

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PLAN VIEW

(NOT TO SCALE)



SECTION A-A

(NOT TO SCALE)

NOTES:

1. SPACING SHALL BE 100' ON CENTER (MAX) UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER.



THRU DRAIN DETAIL FOR MEDIANS

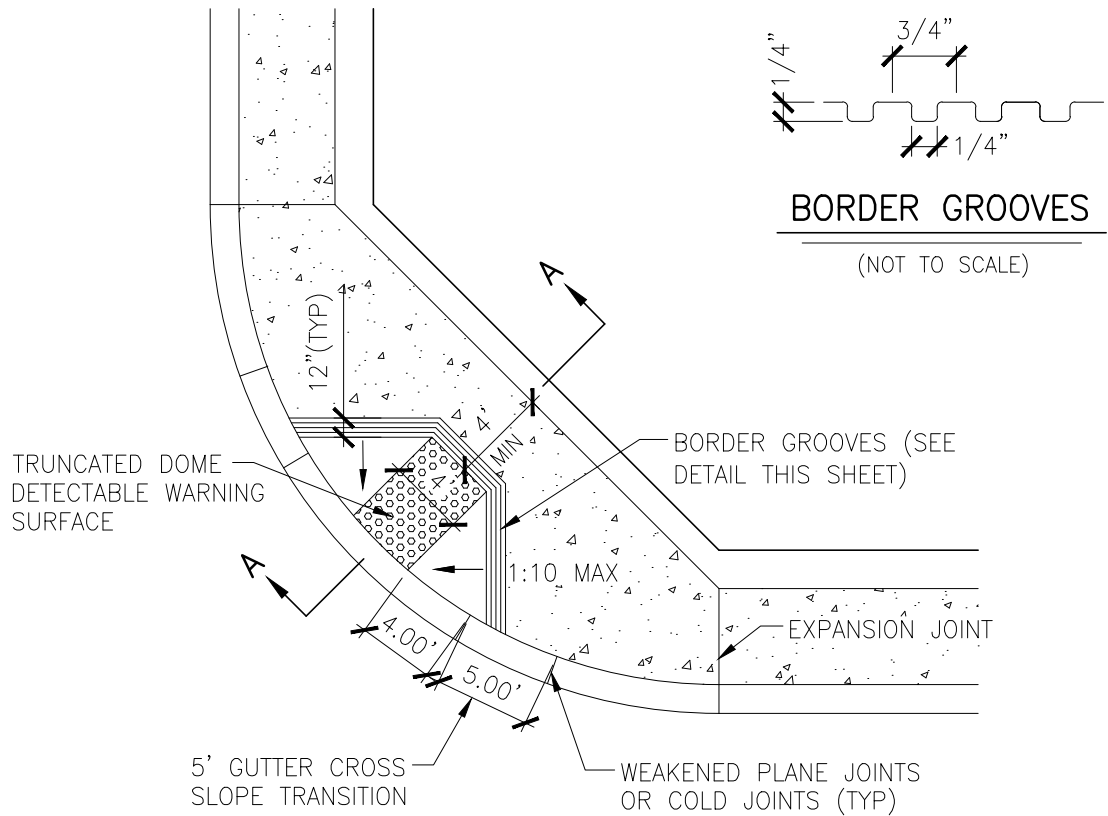
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12/05/2013

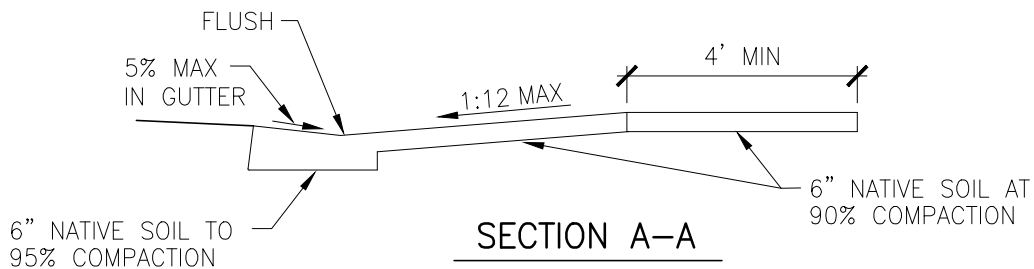
DATE

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PLAN VIEW

(NOT TO SCALE)



SECTION A-A

(NOT TO SCALE)

NOTES:

1. THE LOWER END OF THE RAMP SHALL BE FLUSH WITH THE GUTTER PAN.
2. RAMP SHALL HAVE A 12" WIDE BORDER WITH 1/4" GROOVES AT 3/4" OC. THE SURFACE SHALL BE BROOM FINISHED ROUGHER THAN THE SURROUNDING SIDEWALK.
3. TRANSITION GUTTER PAN CROSS SLOPE TO 5% MAX 4' OUTSIDE OF BOTTOM OF RAMP.
4. IF THE DISTANCE FROM THE BACK OF THE SIDEWALK TO THE BACK OF THE RAMP IS LESS THAN 4 FEET, THEN THE SLOPE OF THE FLARED SIDES SHALL NOT EXCEED 1:12.



PEDESTRIAN RAMP CASE "A"

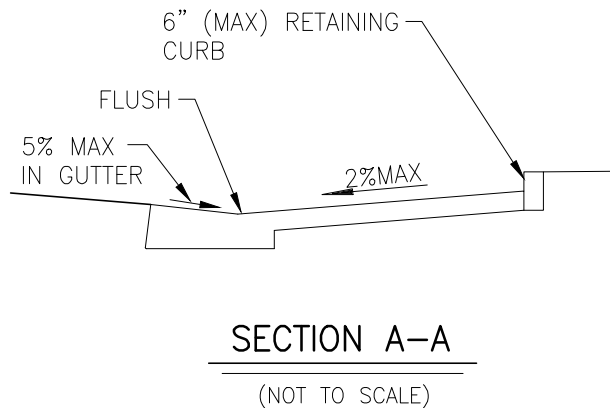
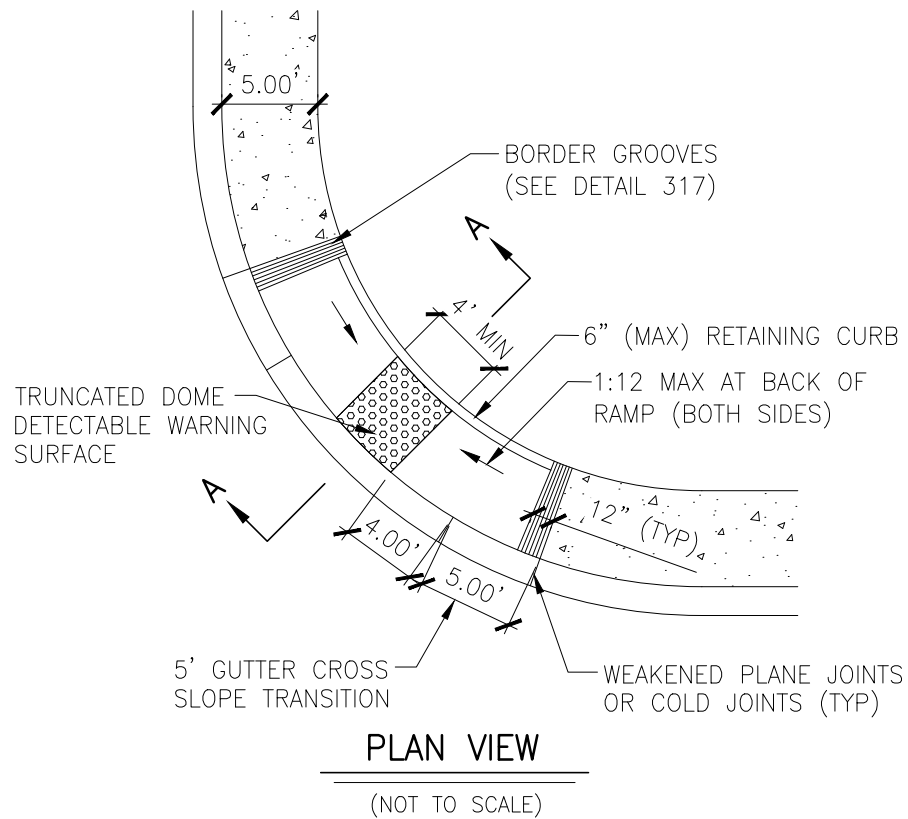
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12/05/2013

DATE

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NOTES:

1. THE LOWER END OF THE RAMP SHALL BE FLUSH WITH THE GUTTER PAN.
2. RAMP SHALL HAVE A 12" WIDE BORDER WITH 1/4" GROOVES AT 3/4" OC. THE SURFACE SHALL BE BROOM FINISHED ROUGHER THAN THE SURROUNDING SIDEWALK.
3. TRANSITION GUTTER PAN CROSS SLOPE TO 5% MAX 4' OUTSIDE OF BOTTOM OF RAMP.



**PEDESTRIAN RAMP
CASE "B"**

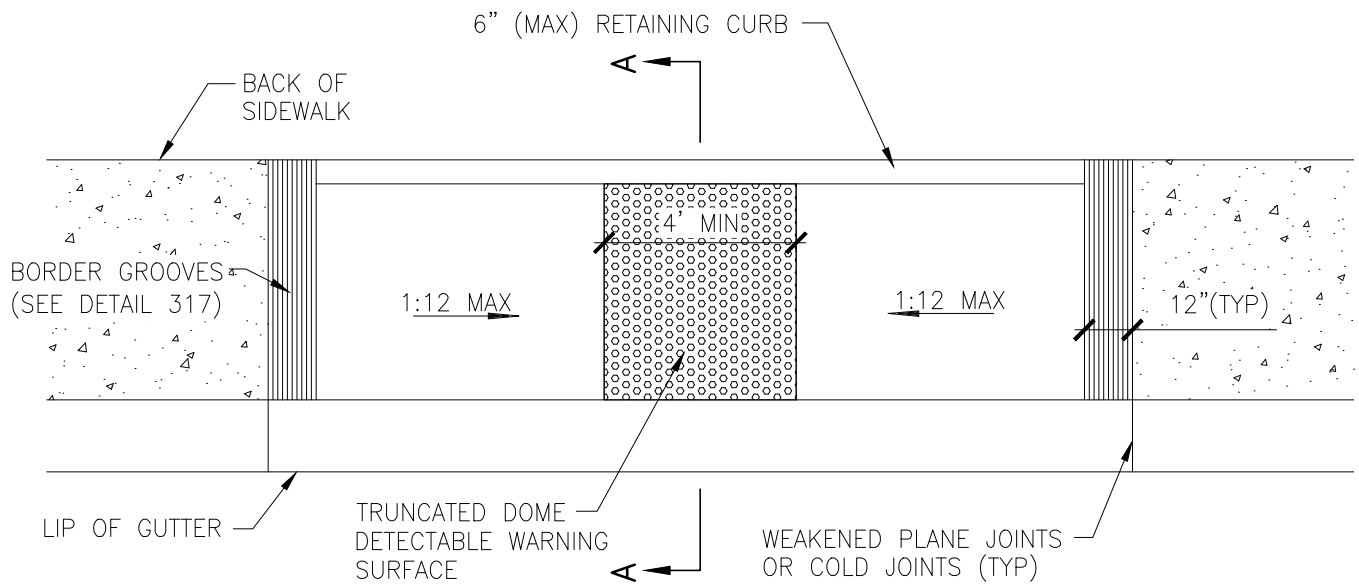
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12/05/2013

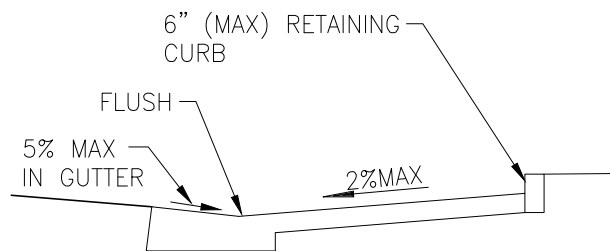
DATE

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PLAN VIEW

(NOT TO SCALE)



SECTION A-A

(NOT TO SCALE)

NOTES:

1. THE LOWER END OF THE RAMP SHALL BE FLUSH WITH THE GUTTER PAN.
2. RAMP SHALL HAVE A 12" WIDE BORDER WITH 1/4" GROOVES AT 3/4" OC. THE SURFACE SHALL BE BROOM FINISHED ROUGHER THAN THE SURROUNDING SIDEWALK.
3. TRANSITION GUTTER PAN CROSS SLOPE TO 5% MAX 4' OUTSIDE OF BOTTOM OF RAMP.



PEDESTRIAN RAMP CASE "C"

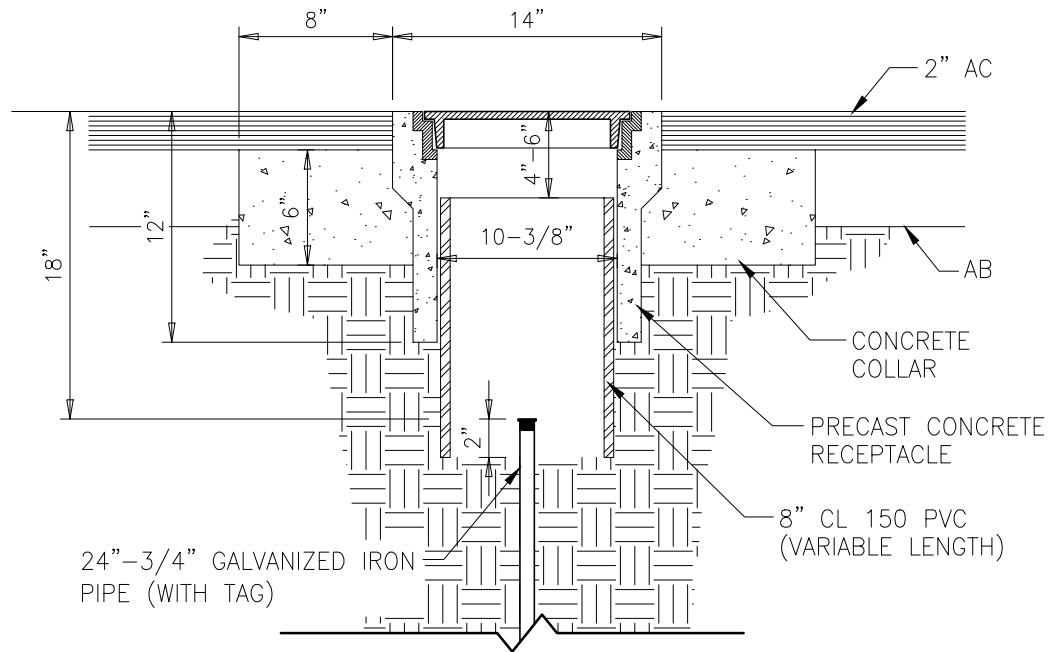
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12/05/2013

DATE

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NOTES:

1. SET MONUMENT, FRAME AND COVER AFTER PAVEMENT IS IN PLACE.
2. MONUMENT FRAMES AND COVERS SHALL BE TOUGH GREY IRON CASTING CONFORMING TO THE LATEST A.S.T.M. REQUIREMENTS. EACH COVER SHALL BE GROUND OR OTHERWISE FINISHED SO THAT IT WILL FIT IT'S FRAME WITHOUT ROCKING.
3. FRAME AND COVER TO BE CHRISTY G-5 WITH C-275 LID MARKED "MONUMENT".
4. MONUMENTS TO BE SET AT ALL INTERSECTIONS, ENDS OF CUL-DE-SACS, AT B.C. & E.C. OF CURVES AND AS DIRECTED BY THE CITY ENGINEER.

-NOT TO SCALE-



STREET MONUMENT

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STANDARD STREET LIGHT

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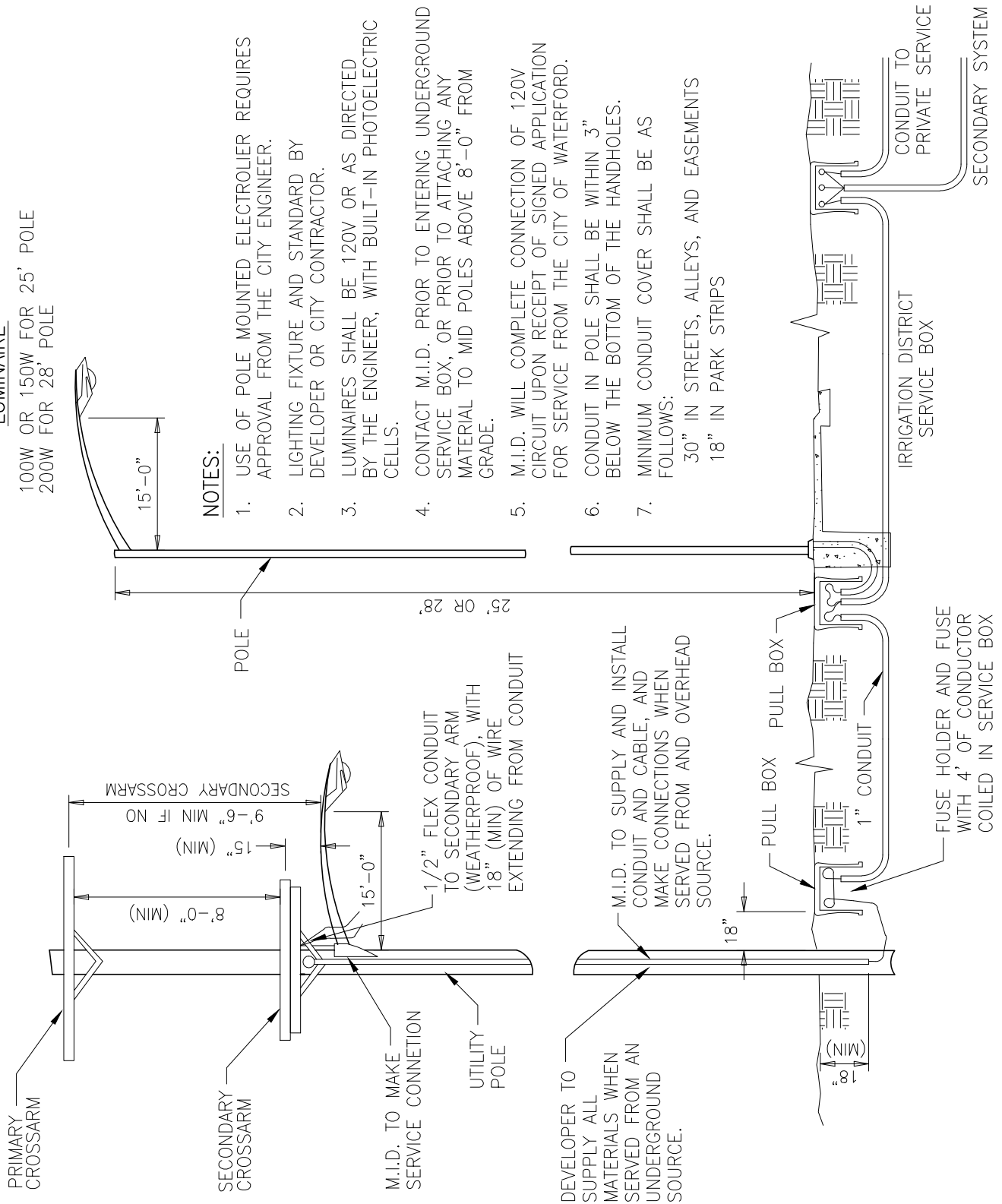
12/05/2013

DATE

401

LUMINAIRE

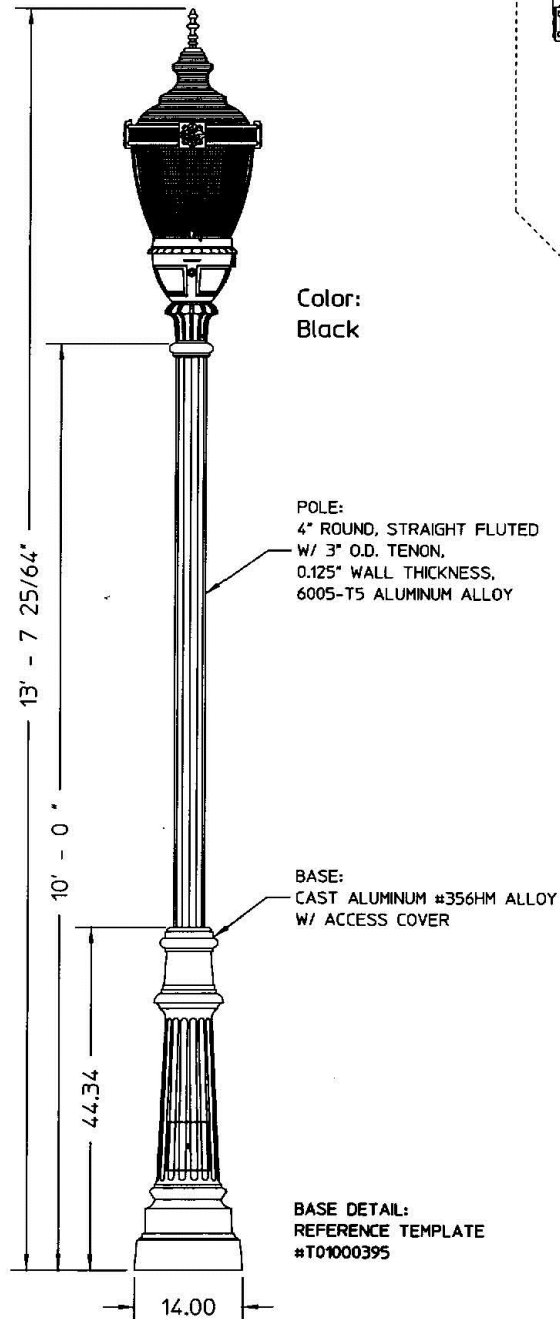
100W OR 150W FOR 25' POLE
200W FOR 28' POLE



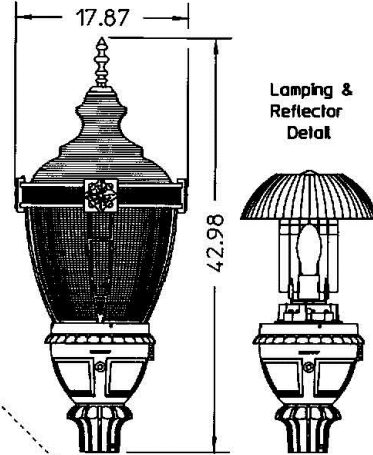
NOTES:

1. USE OF POLE MOUNTED ELECTROLIER REQUIRES APPROVAL FROM THE CITY ENGINEER.
2. LIGHTING FIXTURE AND STANDARD BY DEVELOPER OR CITY CONTRACTOR.
3. LUMINAIRE SHALL BE 120V OR AS DIRECTED BY THE ENGINEER, WITH BUILT-IN PHOTOELECTRIC CELLS.
4. CONTACT M.I.D. PRIOR TO ENTERING UNDERGROUND SERVICE BOX, OR PRIOR TO ATTACHING ANY MATERIAL TO MID POLES ABOVE 8'-0" FROM GRADE.
5. M.I.D. WILL COMPLETE CONNECTION OF 120V CIRCUIT UPON RECEIPT OF SIGNED APPLICATION FOR SERVICE FROM THE CITY OF WATERFORD.
6. CONDUIT IN POLE SHALL BE WITHIN 3" BELOW THE BOTTOM OF THE HANDHOLES.
7. MINIMUM CONDUIT COVER SHALL BE AS FOLLOWS:
30" IN STREETS, ALLEYS, AND EASEMENTS
18" IN PARK STRIPS

Ordering Guide:
C6607: LUMINAIRE
CP6607: POLE



Luminaire Detail
Scale 1:16



Luminaire Matrix

GLOBE:
X TYPE V NARROW ACRYLIC

FASTENERS:
X HEX HEAD BOLTS
_ ALLEN HEAD SCREWS

COLOR:
X BLACK
_ WHITE
_ VERDE
_ BRONZE
_ GREEN

REFLECTOR:
_ SM REFLECTOR
_ SM REFLECTOR W/ H.S.S.
X FULL TOP W/ H.S.S.
_ H.S.S.
_ INTERNAL LOUVER ASSY.
_ FULL TOP
_ NONE

PHOTO CONTROL:
X BUTTON-EYE
_ TWIST-LOCK RECEPT.
_ NONE

SOCKET:
_ MEDIUM
X MOGUL
_ INDUCTIVE

WATTAGE:
_ 70W MH
_ 100W MH
_ 150W MH
_ 250W MH
_ 50W HPS
_ 70W HPS
_ 100W HPS
X 150W HPS
_ 200W HPS
_ 250W HPS
_ 55W INDUCTION
_ 85W INDUCTION
_ 165W INDUCTION

VOLTAGE:
X 120V
_ 208V
_ 240V
_ 277V
_ 347V



**DECORATIVE STREET LIGHT
(DOWNTOWN IMPROVEMENT DISTRICT)**

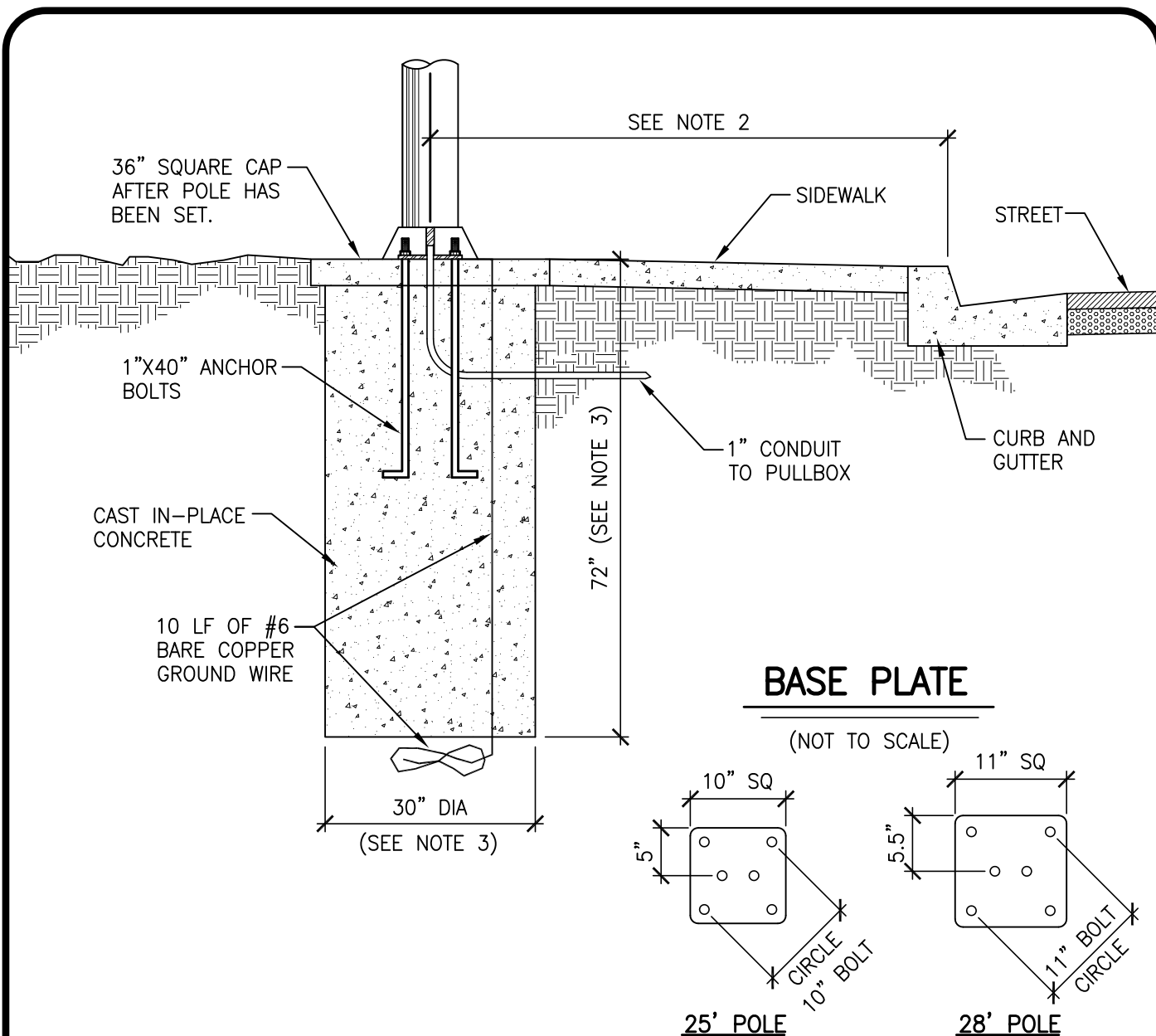
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12/05/2013

DATE

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NOTES:

1. TYPICAL FOR 25' AND 28' POLES.
2. WHERE THE SIDEWALK IS SEPARATED FROM THE CURB, OR WHERE SIDEWALK IS GREATER THAN 5' WIDE, THE POLE SHALL BE PLACED 18" FROM BACK OF CURB. WHERE 5' SIDEWALK JOINS THE BACK OF CURB, THE POLE SHALL BE PLACED 18" FROM BACK OF SIDEWALK.
3. FOUNDATIONS MAY BE 36" SQUARE BY 60" DEEP. CONCRETE SHALL BE PLACED AGAINST UNDISTURBED EARTH.

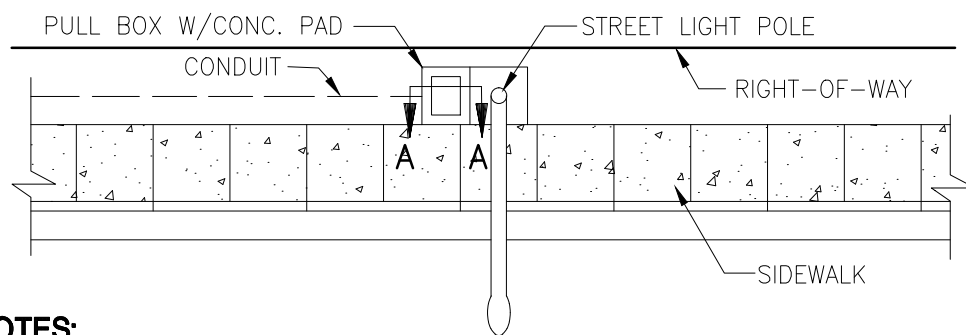


POLE FOUNDATION

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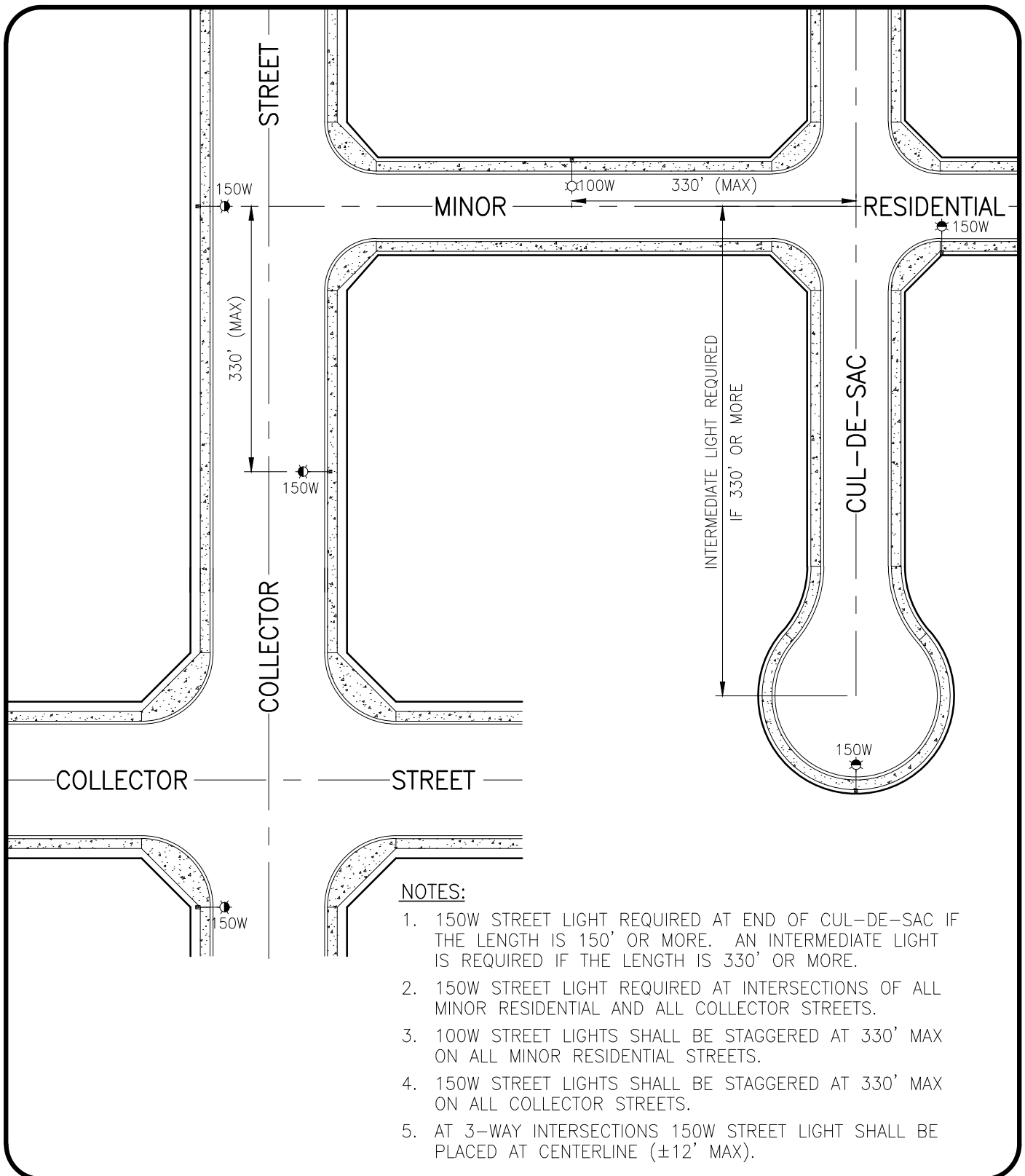
403



1. CONDUIT SHALL BE A MINIMUM DEPTH OF 18" BELOW SIDEWALK GRADE IN PARK STRIPS, AND 30" BELOW TOP OF CURB GRADE IN STREETS, ALLEYS AND EASEMENTS NOT ADJACENT TO CURB OR SIDEWALK. DEPTH SHALL NOT EXCEED 48".
2. CONDUIT MAY BE INSTALLED AT DEPTHS LESS THAN 30" IN STREETS, ALLEYS AND EASEMENTS WITH PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER. SUCH APPROVAL MAY BE GRANTED ONLY UPON SPECIFIC REQUEST FROM THE DEVELOPER OR CITY CONTRACTOR. CONCRETE-ENCASED PVC CONDUIT MAY ALSO BE APPROVED UPON SPECIAL REQUEST.
3. WHERE SIDEWALK IS AGAINST PROPERTY LINE, THE CONDUIT SHALL BE PLACED 6" BEHIND CURB.
4. REPLACE SOD IN LAWN AREA.
5. PULL BOX MAY BE SET ADJACENT OR BEHIND POLE IN THE RIGHT-OF-WAY.
6. IF PULL BOX IS M.I.D.-CIRCUIT, LEAVE 4' OF SLACK CONDUCTOR IN BOX.
7. IF PULL BOX IS A CIRCUIT TERMINUS AT POWER SOURCE, INSTALL FUSE HOLDER (PER SPEC.) WITH 4' OF SLACK CONDUCTOR. TAPE FUSE TO CONDUCTOR IN BOX.
8. CONDUIT ENTERING M.I.D. SERVICE BOX SHALL CONFORM TO DISTRICT SPECIFICATIONS.
9. THE BONDING WIRE SHALL BE AT LEAST THE SAME GAUGE AS THE LARGEST CIRCUIT CONDUCTOR. (MIN. OF NO. 8 AWG COPPER WIRE)



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LOCATION OF 25' POLES

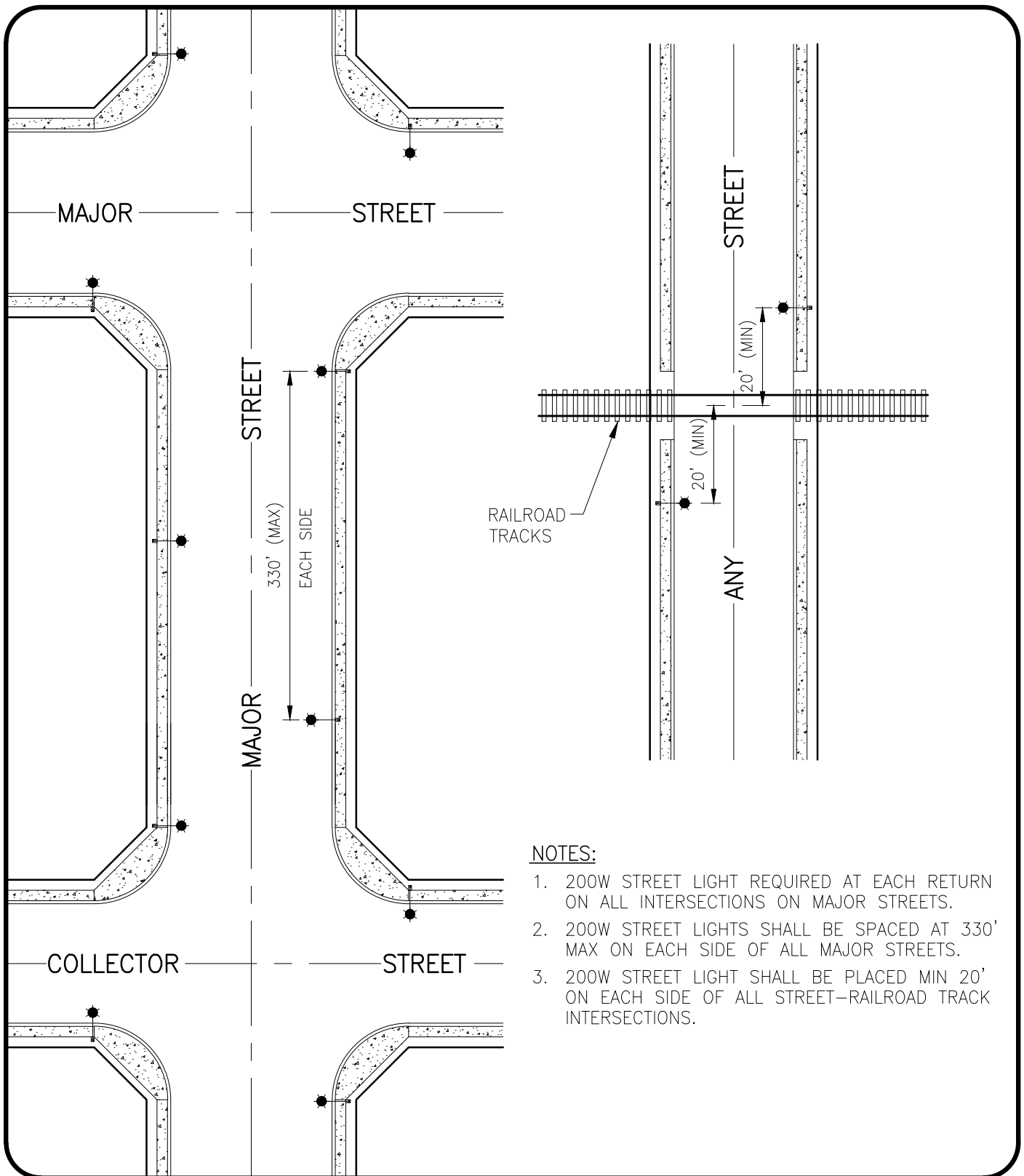
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NOTES:

1. 200W STREET LIGHT REQUIRED AT EACH RETURN ON ALL INTERSECTIONS ON MAJOR STREETS.
2. 200W STREET LIGHTS SHALL BE SPACED AT 330' MAX ON EACH SIDE OF ALL MAJOR STREETS.
3. 200W STREET LIGHT SHALL BE PLACED MIN 20' ON EACH SIDE OF ALL STREET-RAILROAD TRACK INTERSECTIONS.



LOCATION OF 28' POLES

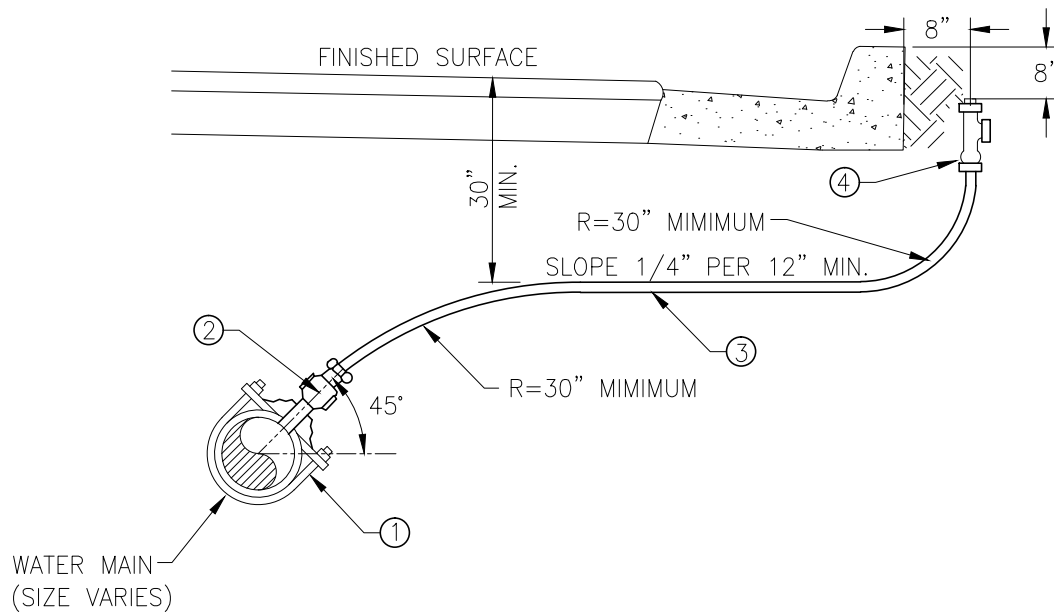
tony Marshall

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- ① DOUBLE STRAP SERVICE SADDLE, FOR ALL PIPE EXCEPT C900 – JONES 979 (F.I.P.)
DOUBLE STRAP SERVICE SADDLE, FOR C900 PIPE – JONES 969 (F.I.P.)
- ② 1" CORP STOP – JONES J-1936 (M.I.P. x COMPRESSION)
- ③ 1" POLYETHYLENE PIPE
- ④ ANGLE METER STOP – JONES J-4201 (COMPRESSION x METER COUPLING)

NOTE:

- 1. USE A LINER ON ALL COMPRESSION CONNECTIONS WITH POLYETHYLENE PIPE.
- 2. ANGLE METER STOP TO BE EITHER 1" x 3/4" OR 1" x 1" TO FIT METER SIZE.
- 3. ALL FITTING SUBSTITUTIONS MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO CONSTRUCTION.



1" STANDARD SERVICE INSTALLATION

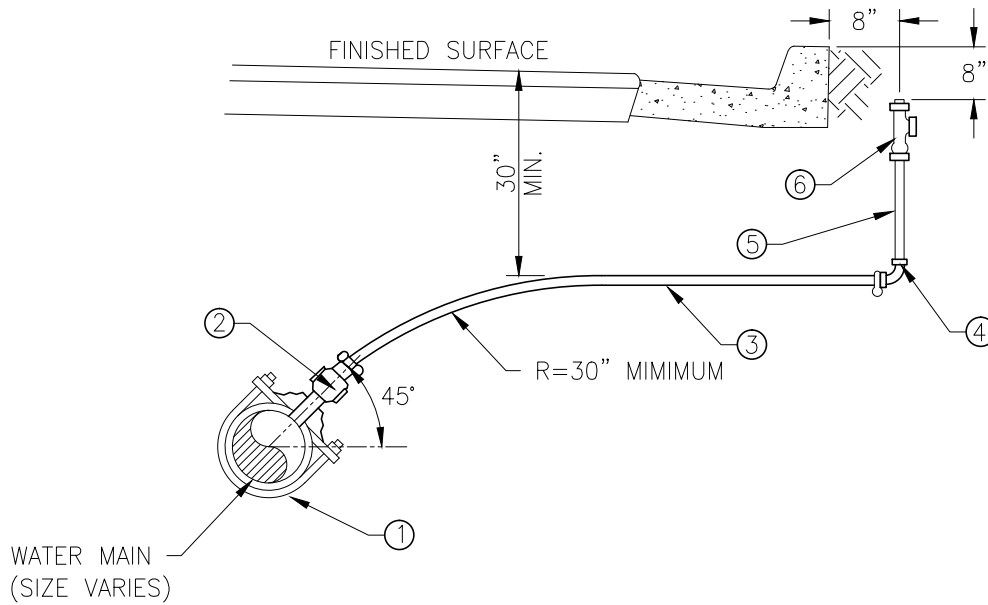
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- ① DOUBLE STRAP SERVICE SADDLE, FOR ALL PIPE EXCEPT C900 – JONES 979 (F.I.P.)
DOUBLE STRAP SERVICE SADDLE, FOR C900 PIPE – JONES 969 (F.I.P.)
- ② 1" CORP STOP – JONES J-1936 (M.I.P. x COMPRESSION)
- ③ 1" POLYETHYLENE PIPE
- ④ 1" ELL – JONES J-2621(F.I.P. x COMPRESSION)–FOR USE WITH BRASS NIPPLE
1" ELL – JONES J-2611(COMPRESSION x COMPRESSION)–FOR USE WITH POLYETHYLENE NIPPLE
- ⑤ 1" BRASS NIPPLE MINIMUM 12", OR 1" POLYETHYLENE PIPE
- ⑥ ANGLE METER STOP – JONES J-1527W (F.I.P. x METER COUPLING)

NOTE:

- 1. USE A LINER ON ALL COMPRESSION CONNECTIONS WITH POLYETHYLENE PIPE.
- 2. ANGLE METER STOP TO BE EITHER 1" x 3/4" OR 1" x 1" TO FIT METER SIZE.
- 3. ALL FITTING SUBSTITUTIONS MUST BE SUBMITTED AND APPROVED BY THE GENERAL MANAGER PRIOR TO CONSTRUCTION.



1" ALTERNATE SERVICE INSTALLATION

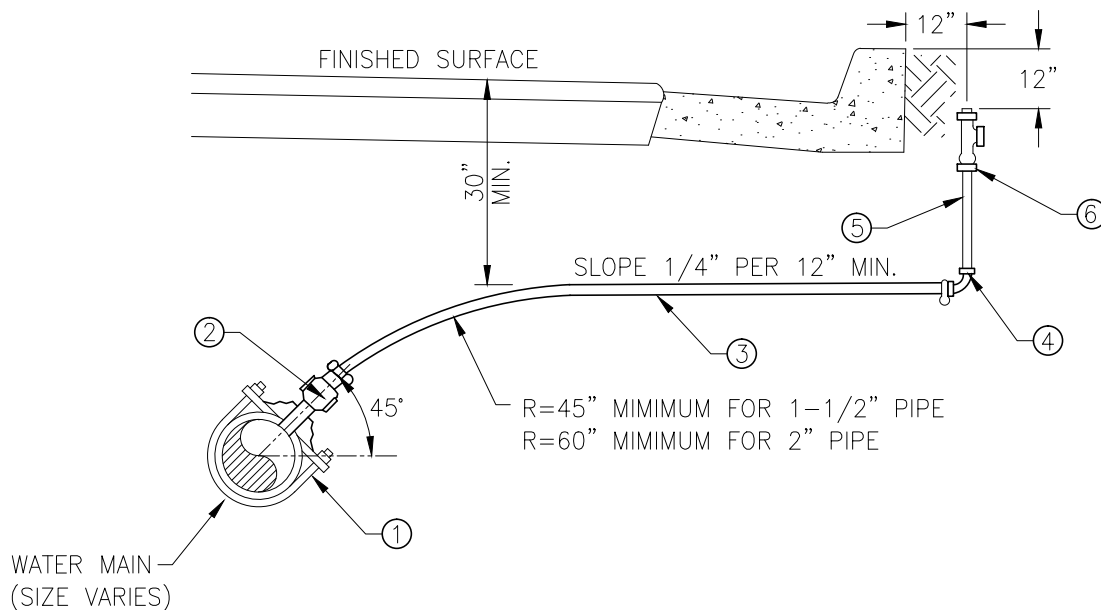
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- ① DOUBLE STRAP SERVICE SADDLE, FOR ALL PIPE EXCEPT C900 – JONES 979 (F.I.P.)
DOUBLE STRAP SERVICE SADDLE, FOR C900 PIPE – JONES 969 (F.I.P.)
- ② CORP STOP – JONES J-1936 (M.I.P. x COMPRESSION)
- ③ POLYETHYLENE PIPE
- ④ ELL – JONES J-2621(F.I.P. x COMPRESSION)–FOR USE WITH BRASS NIPPLE,
ELL – JONES J-2611(COMPRESSION x COMPRESSION)–FOR USE WITH POLYETHYLENE NIPPLE
- ⑤ BRASS NIPPLE MINIMUM 12", OR POLYETHYLENE PIPE
- ⑥ ANGLE CURB STOP – JONES J-1527-F (F.I.P. x FLG.)

NOTE:

- 1. USE A LINER ON ALL COMPRESSION CONNECTIONS WITH POLYETHYLENE PIPE.
- 2. ANGLE STOP TO BE EITHER 1-1/2" x 1-1/2" OR 2" x 2" TO FIT METER SIZE.
- 3. ALL FITTING SUBSTITUTIONS MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO CONSTRUCTION.



1-1/2" & 2" STANDARD SERVICE INSTALLATION

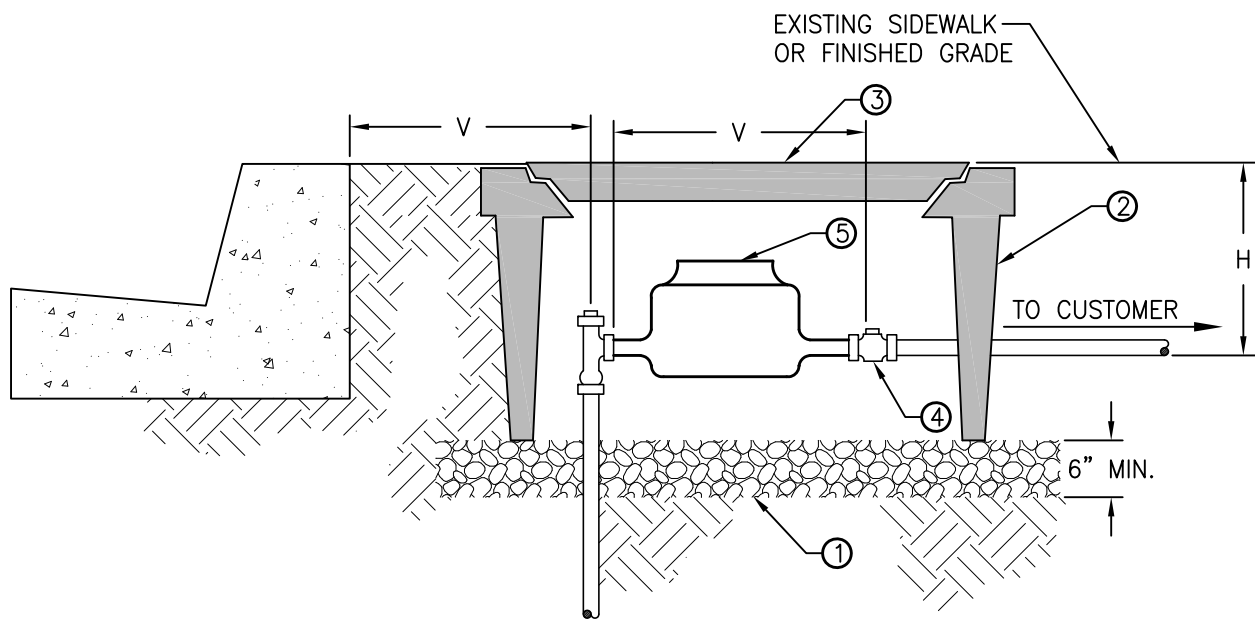
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- ① 3/4" CRUSHED AGGREGATE BASE
- ② WATER METER BOX
- ③ CONCRETE LID
- ④ 1" JONES 1925
1-1/2" & 2" JONES 1939
- ⑤ METER TO BE FURNISHED BY THE CITY

SIZES	METER BOX	COVER	V	H
1"	CHRISTY B-30	CHRISTY B-30D	8"	8"
1-1/2" & 2"	CHRISTY B-36	CHRISTY B-36D	12"	12"

NOTES:

1. USE A LINER ON ALL COMPRESSION CONNECTIONS WITH POLYETHYLENE PIPE.
2. ALL FITTING SUBSTITUTIONS MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO CONSTRUCTION.

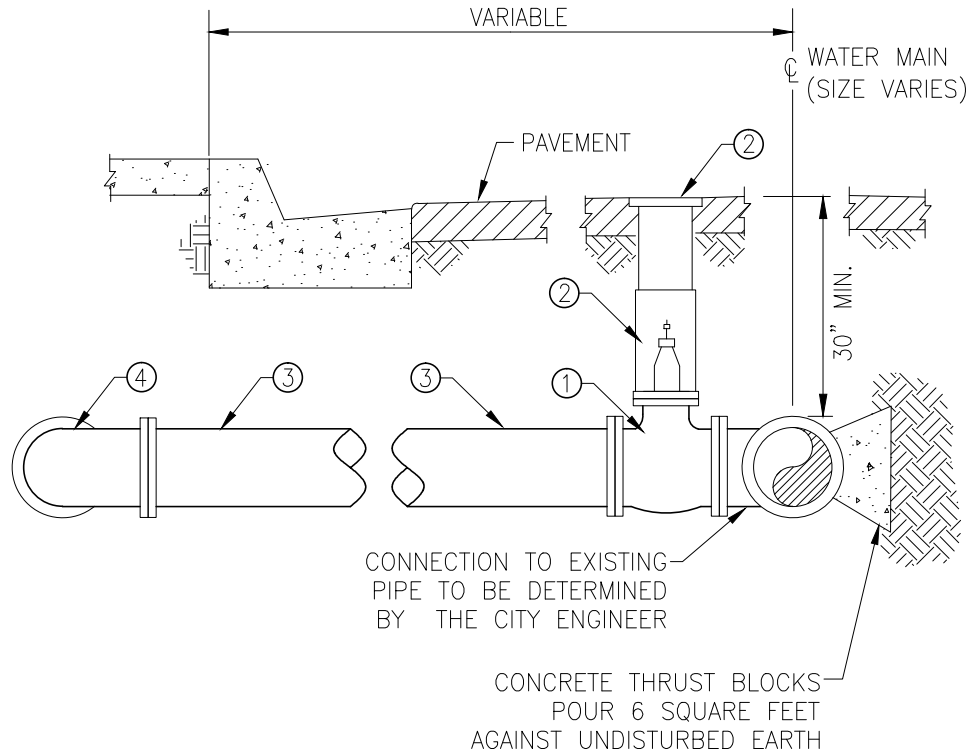


1", 1-1/2", & 2" METER ASSEMBLY

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- ① 6" GATE VALVE (FLG. x FLG.) ON NEW OR REPLACEMENT PIPES OR TAPPING VALVE ON EXISTING PIPE
- ② CITY STANDARD VALVE BOX, STD. DWG. 512
- ③ DUCTILE IRON OR STANDRAD STEEL ML&C (FLG. x FLG.)
- ④ LONG RADIUS 90° BEND (FLG. x FLG.) – USE ONLY FOR PARALLEL INSTALLATION

NOTES:

- 1. DEPTH VARIES, WITH 42" MINIMUM, DEPENDENT ON REQUIREMENTS FOR METER AND VALVE SIZES
- 2. DISTANCE BEHIND CURB VARIES TO MEET REQUIREMENTS FOR PERPENDICULAR OR PARALLEL METER INSTALLATION
- 3. ALL FITTINGS AND PIPES MUST MEET AWWA STANDARDS



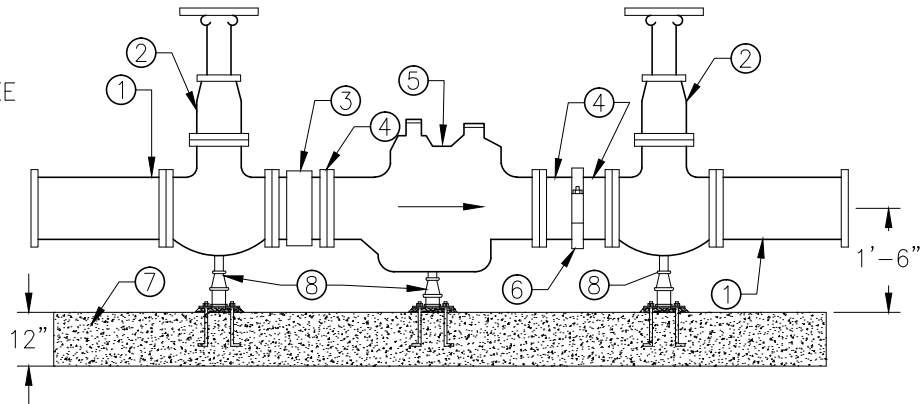
4" TO 8" SERVICE INSTALLATION

DR *tony marshall*
TONY B. MARSHALL, CITY ENGINEER

12/05/2013
DATE

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FOR SERVICE
CONNECTION SEE
STD. DWG. 505



SIDE VIEW

- ① DUCTILE IRON SPOOL (FLG. x FLG.)
- ② GATE VALVE N.R.S. WITH HANDWHEEL - (FLG. x FLG.)
- ③ BRONZE STRAINER (FLG. x FLG.)
- ④ DUCTILE IRON COUPLING - 4" TO 3" REDUCER FOR 3" METER - (FLG. x COUPLING)
- ⑤ COMPOUND WATER METER
- ⑥ VICTAULIC COUPLING
- ⑦ CONCRETE
- ⑧ CITY STANDARD PIPE SUPPORT, STD. DWG. 516

NOTES:

1. METER REGISTER TO BE SET FOR CURB SIDE READING WITH SERIAL NUMBER ON REGISTER
2. PRECAST CONCRETE VAULTS SHALL HAVE GALVANIZED COVER WITH TWO 7" x 14" READING LID
3. CAST-IN-PLACE CONCRETE OR CONCRETE BLOCK VAULTS MAY BE USED IN PLACE OF PRECAST CONCRETE VAULTS WITH PRIOR APPROVAL OF CITY ENGINEER
4. METER TO BE INSTALLED IN PRIVATE PROPERTY REQUIRES AN EASEMENT TO THE CITY OF WATERFORD



TYPICAL 3" TO 8" WATER METER INSTALLATION

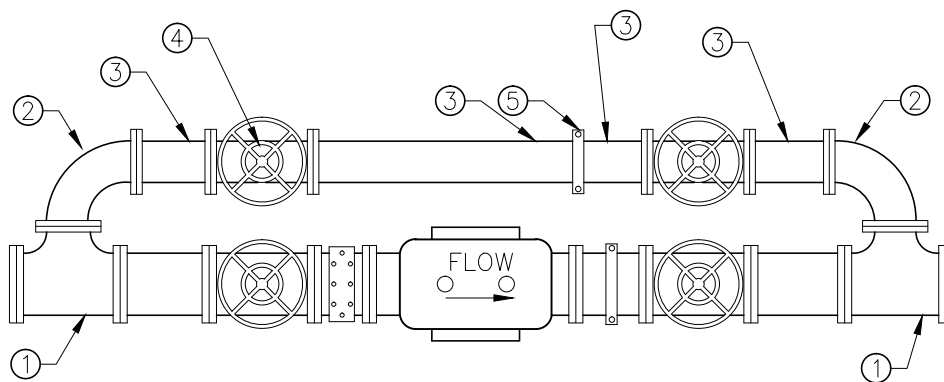
tony marshall

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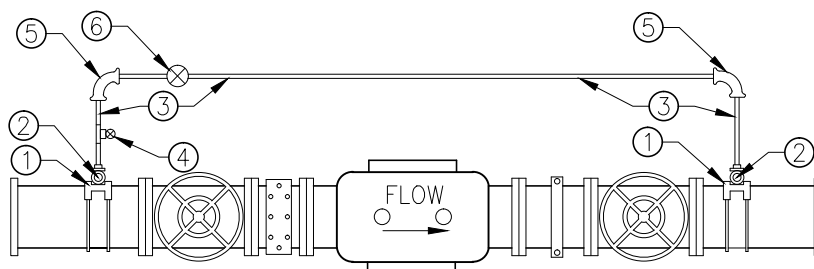
DATE

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6" AND 8" BYPASS

- | | |
|---|--|
| ① DUCTILE IRON TEE (FLG. x FLG. x FLG.) | ④ 4" GATE VALVE N.R.S. WITH HAND WHEEL (FLG. x FLG.) |
| ② 4" LONG RADIUS SPOOL (FLG. x FLG.) | ⑤ VICTAULIC COUPLING |
| ③ 4" DUCTILE IRON SPOOL (FLG. x FLG.) | |



3" AND 4" BYPASS

- | | |
|--|---|
| ① DOUBLE STRAP SERVICE SADDLE – JONES J-979 (F.I.P.) | ④ BRASS HOSE BIB |
| ② 2" CORP STOP – JONES J-1935 (M.I.P. x COMPRESSION) | ⑤ 2" ELL (COMPRESSION X COMPRESSION) |
| ③ 2" COPPER PIPE | ⑥ 2" BALL VALVE WITH LOCKING CAP – JONES J-1949 (COMPRESSION X COMPRESSION) |



TYPICAL BYPASS ON LARGE METERS

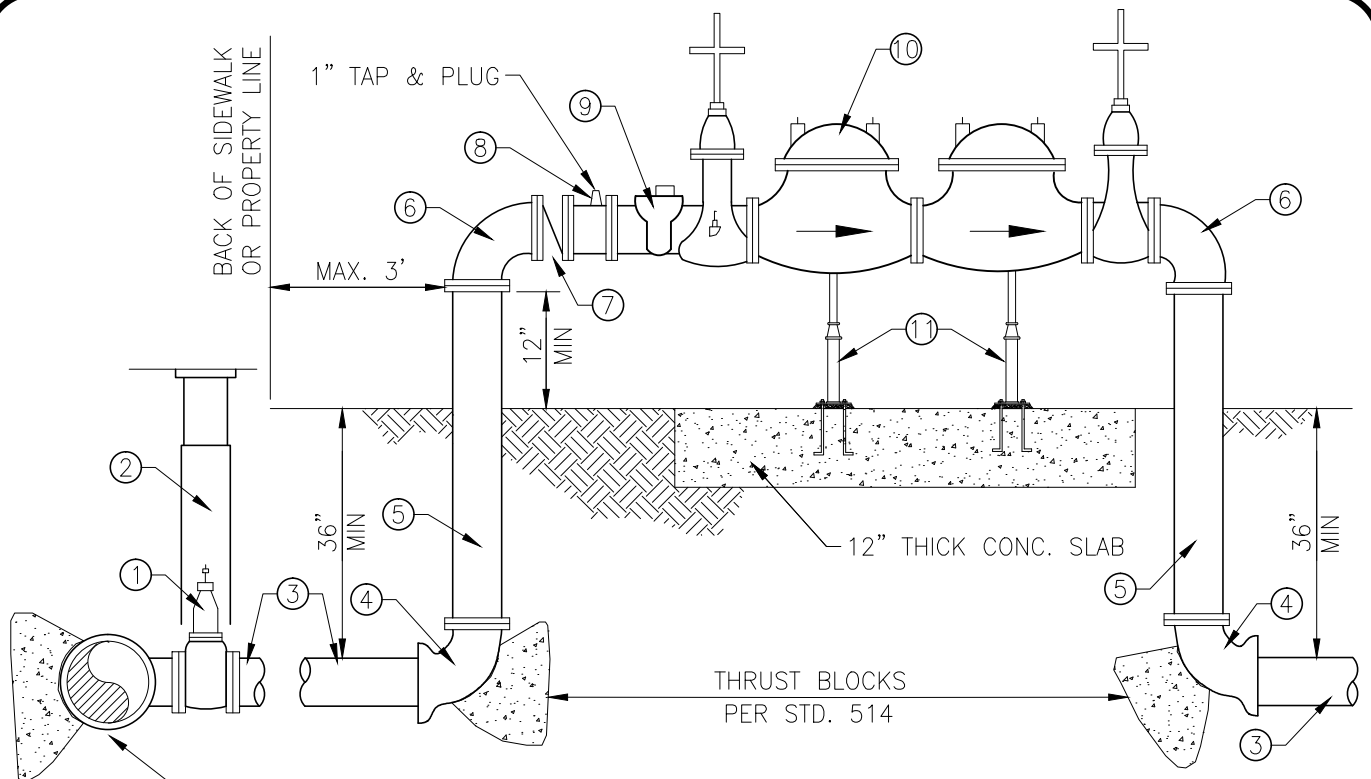
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CONNECTION TO EXISTING PIPE TO BE DETERMINED BY THE CITY ENGINEER

- ① 6" GATE VAVLE, ON NEW OR REPLACMENT PIPES OR TAPPING VALVE ON EXISTING PIPE (FLG. x FLG.)
- ② VALVE BOX (STD. DWG. 512)
- ③ STANDARD STEEL PIPE ML&C OR DUCTILE IRON
- ④ 90° ELBOW BEND (M.J. x FLG.)
- ⑤ DUCTILE IRON ON SCHEDULE 40 ML&C (SEE NOTE)
- ⑥ 90° BEND (FLG. x FLG.)
- ⑦ CITY APPROVED GATE VALVE (FLG. x FLG.)
- ⑧ SPOOL WITH 1" TAP AND PLUG (FLG. x FLG.)
- ⑨ CITY APPROVED METER WITH STRAINER
- ⑩ CITY APPROVED REDUCED PRESSURE BACK FLOW PREVENTION DEVICE
- ⑪ PIPE SUPPORT (STD. DWG. 516)

NOTE: FDC, CHECK VALVE, AND PIV TO BE LOCATED ON SITE AND APPROVED BY STANISLAUS CONSOLIDATED FIRE PROTECTION DISTRICT.



TYPICAL 4", 6", 8", & 10" METERED IRRIGATION SERVICE

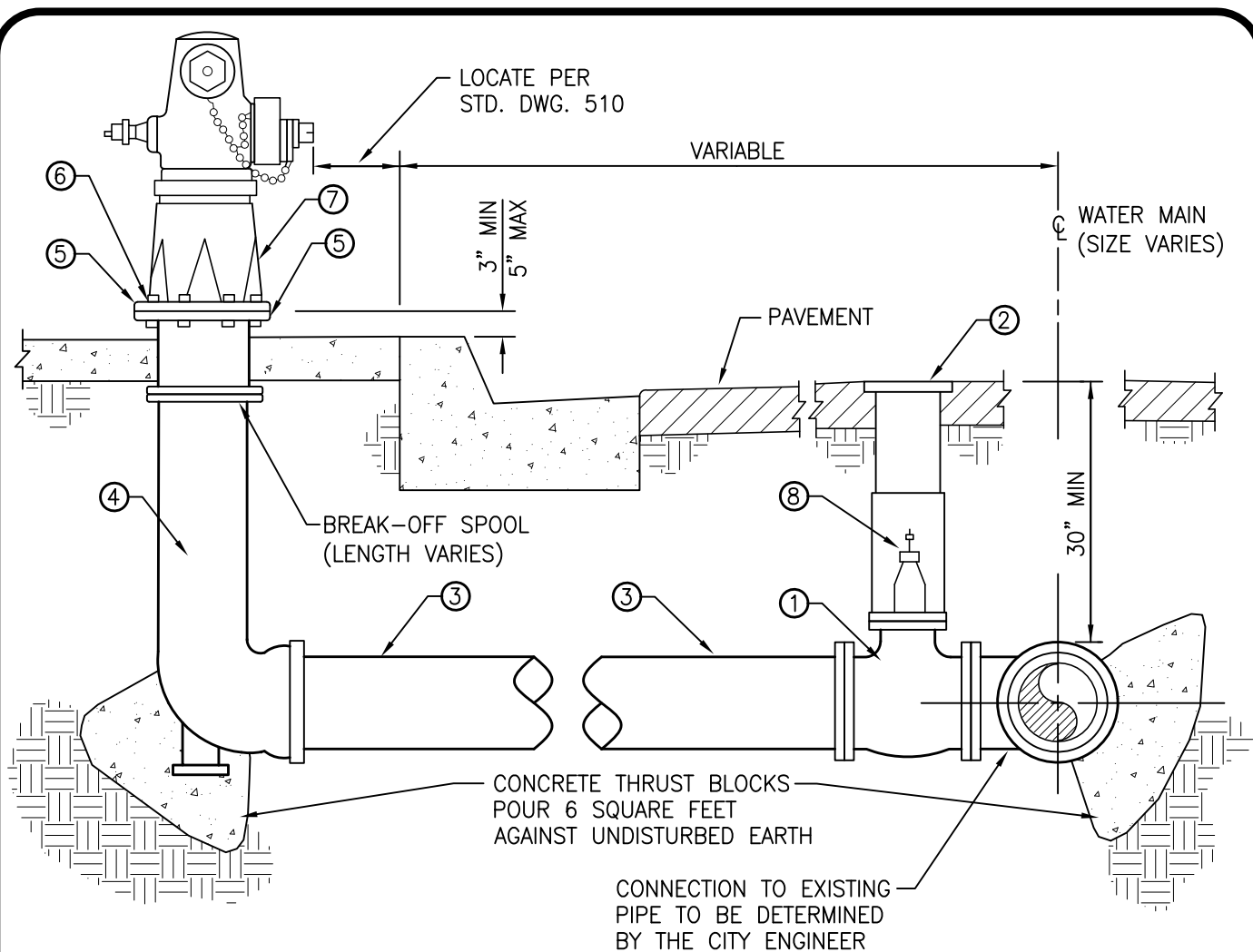
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- ① 6" GATE VALVE ON NEW OR REPLACEMENT PIPES OR TAPPING VALVE ON EXISTING PIPE – (FLG. x FLG.)
- ② VALVE BOX PER CITY STANDARD 512
- ③ 6" STANDARD STEEL PIPE ML&C OR DUCTILE IRON
- ④ 6" DUCTILE IRON BURY WITH FOOT AND M.J.
- ⑤ BREAKAWAY SPOOL
- ⑥ BREAKAWAY BOLTS
- ⑦ JONES J-4040 FIRE HYDRANT OR APPROVED EQUAL
- ⑧ SHUT-OFF VALVES SHALL BE A MINIMUM OF 10 FEET FROM THE HYDRANT



FIRE HYDRANT INSTALLATION

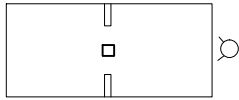
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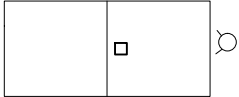
509

REFLECTOR MARKERS:

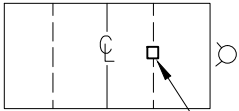
1. ALL FIRE HYDRANTS SHALL HAVE REFLECTORS.
2. LOCATION OF ALL REFLECTORS SHALL BE AS CLOSE TO THE CENTERLINE OF THE STREET AS POSSIBLE, OR LANE LINES, BUT NEVER IN THE TRAVEL LANE.



TWO LANE STREET WITH PAINTED BROKEN LINE:
PLACE IN THE LINE WITH PAINTED LINE



TWO WAY LANE WITH PAINTED SOLID LINE:
PLACE AS CLOSE TO PAINTED LINE AS POSSIBLE



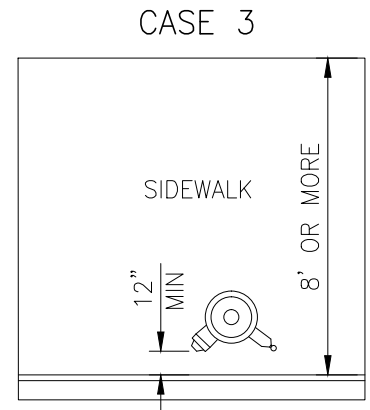
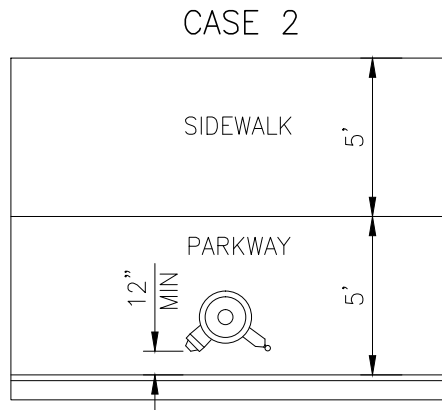
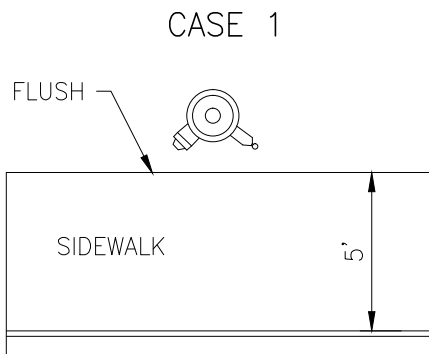
FOUR WAY STREET:
PLACE IN LINE WITH PAINTED LINE

REFLECTOR

OTHER MARKERS IN THE STREET:
WHEN THERE ARE TRAFFIC MARKERS ALREADY IN THE STREET, FIRE DEPARTMENT REFLECTORS SHOULD NOT BE USED ON THIS STREET AT ALL.

BLUE REFLECTIVE MARKERS SHALL BE HAWKINS V16C-DB OR EQUAL

REFLECTOR LOCATION



HYDRANT LOCATION



**FIRE HYDRANT AND
REFLECTOR LOCATION**

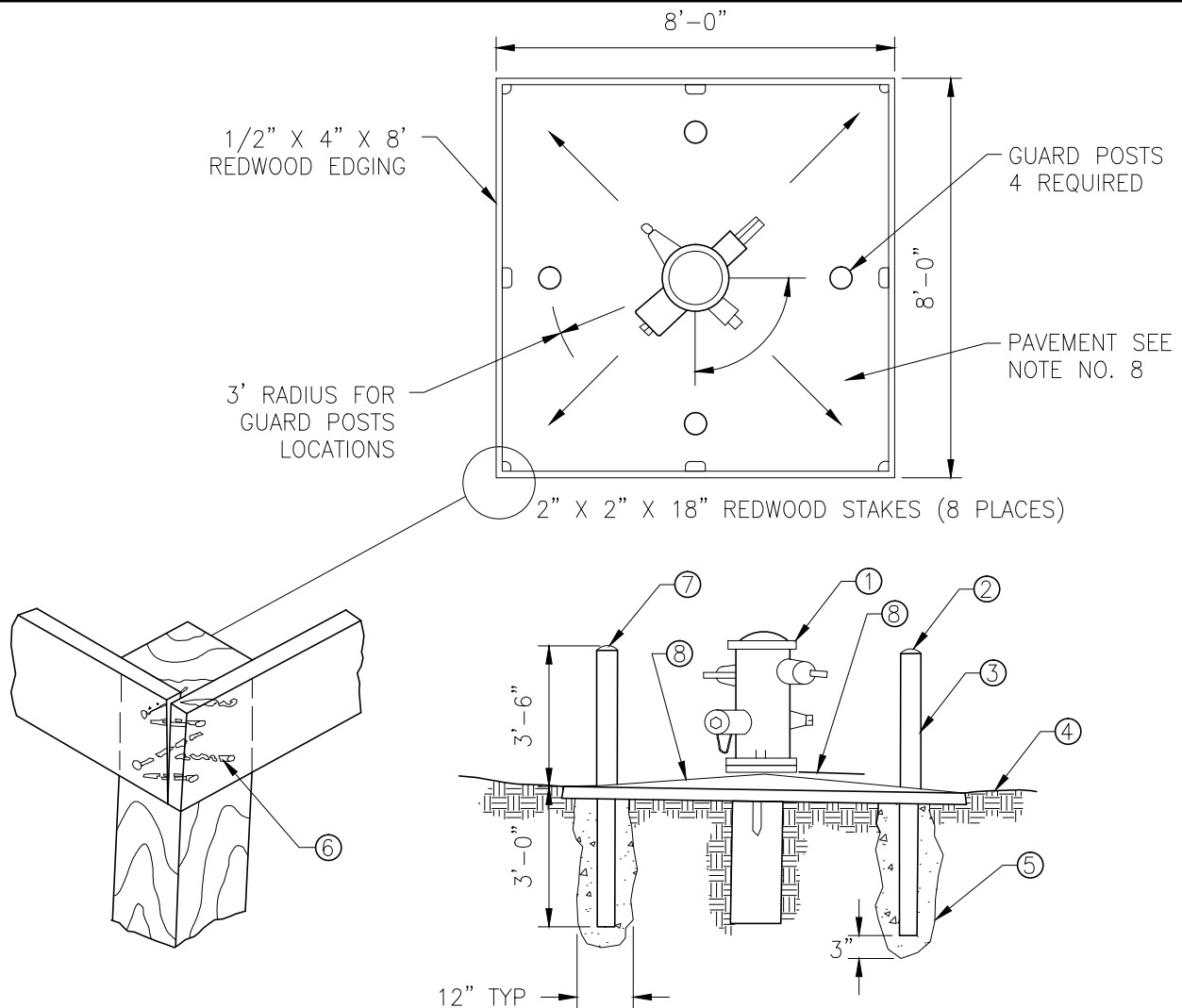
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- ① INSTALL FIRE HYDRANT PER CITY STANDARD DRAWING 510
- ② FILL ALL GUARD POST WITH 2000# CONCRETE, ROD TO REMOVE AIR VOIDS, DOME FINISH TOP
- ③ 4" O.D. X 8 GA. STEEL POSTS (TYP.)
- ④ HAND TAMP EXSITING EARTH AROUND FROM PRIOR TO PAVING MATCH EXISTING GROUND LEVEL
- ⑤ SET GUARD POSTS IN 1'-0" DIAMETER HOLE WITH 2000# CONCRETE
- ⑥ LAP ENDING TOE NAIL DRIVE - 3D-14 GA. NAIL AS SHOWN
- ⑦ RED OXIDE PRIMER PIPE & PAINT RUST-O-LEUM 659 YELLOW
- ⑧ PLACE 1-1/2" PEAGRAVEL - HAND FINISH WITH HOT ASPHALT TO TOP OF FORMS AND 2" AROUND HIGHER

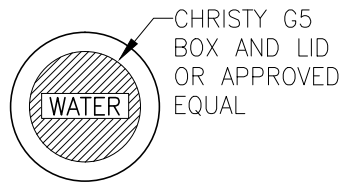


FIRE HYDRANT PROTECTION IN UNIMPROVED AREAS

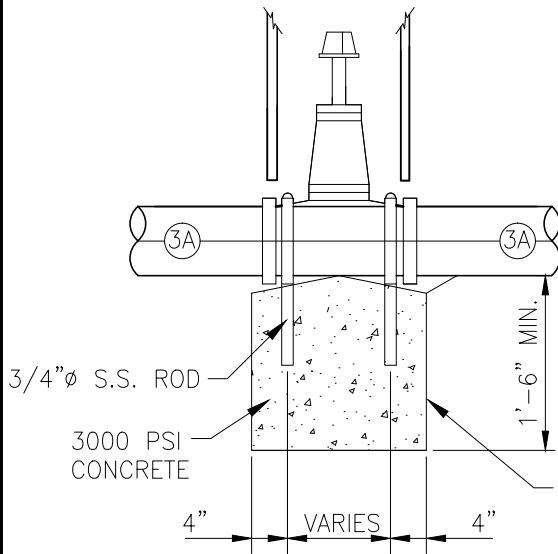
By *tony marshall*
TONY B. MARSHALL, CITY ENGINEER

12/05/2013
DATE

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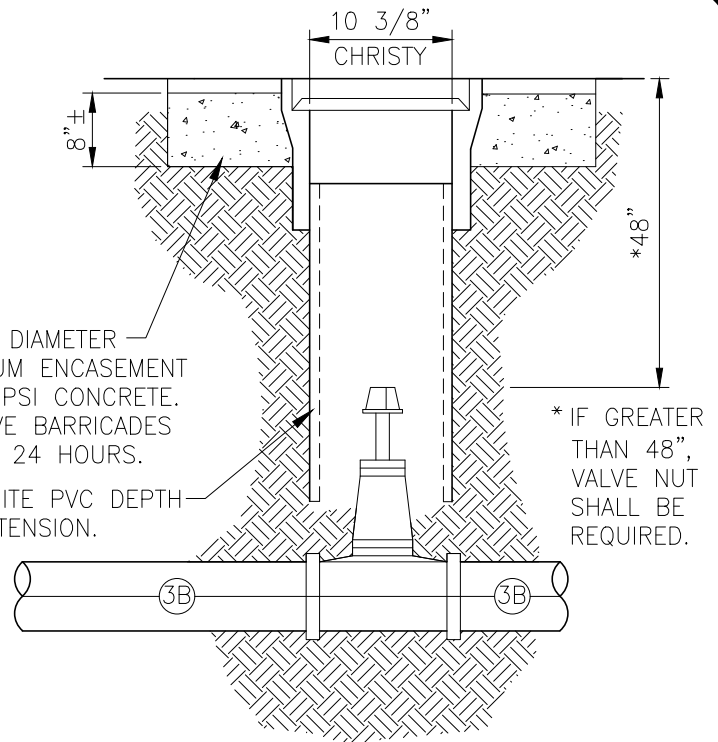
VALVE BOX COVER



2'-6" DIAMETER
MINIMUM ENCASEMENT
3000 PSI CONCRETE.
REMOVE BARRICADES
AFTER 24 HOURS.

WHITE PVC DEPTH
EXTENSION.

AREA BEARING AGAINST
UNDISTURBED EARTH SHALL
BE A MIN. OF 9' SQUARE.



TYPICAL SECTION 12" VALVE AND SMALLER

TYPICAL SECTION GREATER THAN 12" VALVE

NOTES:

1. VALVE BOX AND COVER SHALL BE CHRISTY CONCRETE PRODUCTS NO. G-5 OR EQUAL WITH DEPTH EXTENSIONS AS REQUIRED.
2. ALL VALVES SHALL HAVE FLANGED CONNECTIONS AT ALL TEES AND CROSSES.
3. ALL VALVES SHALL BE SEPARATED FROM COLLARS AS NOTED:
 - A. 6'6" (1/2 SECTION)
 - B. 3'3" (1/4 SECTION)
4. VALVE SHALL BE RESILIENT SEAT GATE (12" OR LESS) OR BUTTERFLY (GREATER THAN 12") PER CITY SPECIFICATION.
5. CLEAN INSIDE OF EXTENSIONS SO STEM IS CLEAN OF DIRT.
6. SET VALVE BOX TO FINISH GRADE.
7. COMPACT EARTH AROUND BASE WITH MECHANICAL TAMPER TO 95% RELATIVE COMPACTION AND ENCASE IN 8" OF CONCRETE.
8. AFTER CONCRETE SETS, PATCH WITH 2" AC.
9. VALVE BOXES IN DIRT OR UNDEVELOPED AREAS SHALL HAVE CONCRETE ENCASEMENT POURED TO 6" ABOVE GRADE (NO 2" AC).



VALVE BOX INSTALLATION

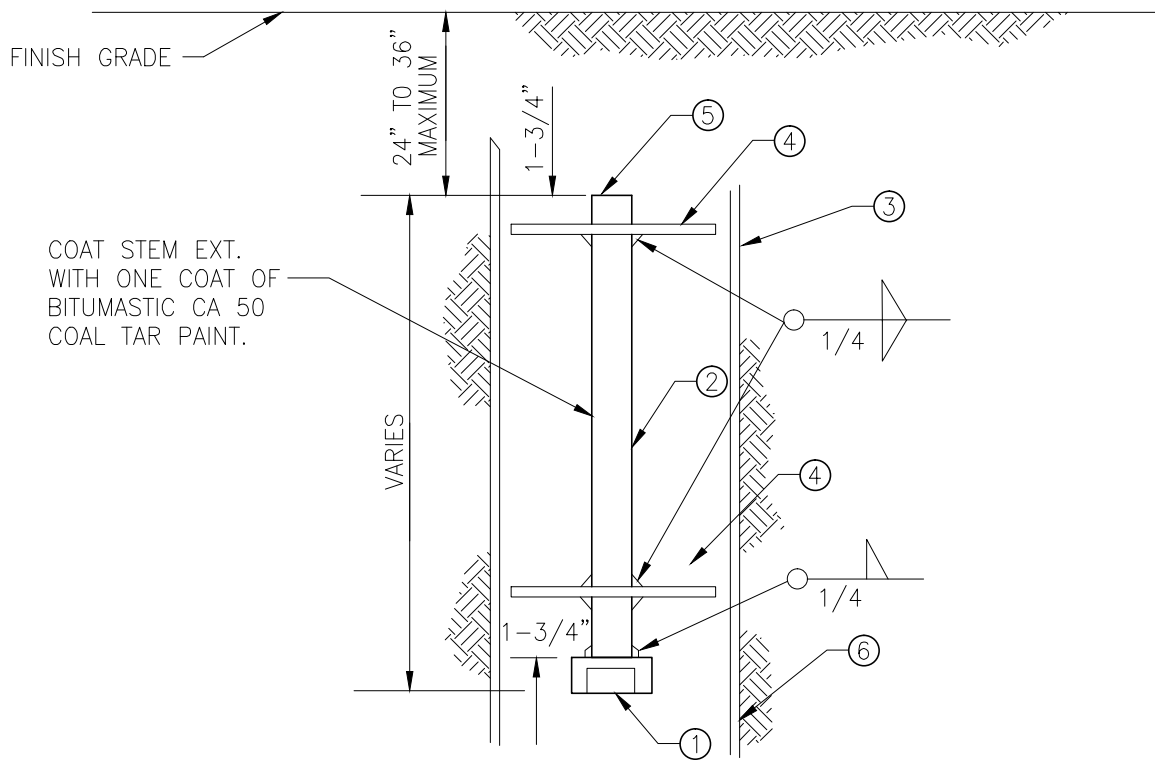
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12/05/2013

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- ① 2" SQUARE STEEL SOCKET
- ② 1-1/2" STD. STEEL PIPE
- ③ VALVE BOX SLEEVE PVC SDR 35
- ④ 1/4" STEEL PLATE X 5-1/2" DIA.
- ⑤ 2" SQUARE STEEL OPERATING NUT
- ⑥ CITY STANDARD 512

NOTES

1. COAT STEM EXTENSION WITH ONE COAT BITUMASTIC 50 COAL TAR PAINT
2. PROVIDE VALVE STEM EXTENSION WHEN DEPTH TO OPERATING NUT EXCEEDS 48 INCHES
3. EXTENSION SHALL BE FIELD FABRICATED



VALVE STEM EXTENSION

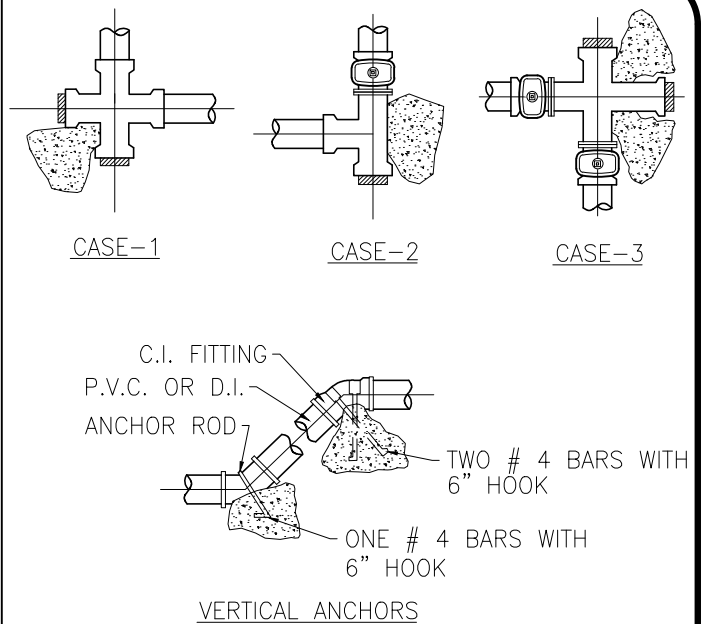
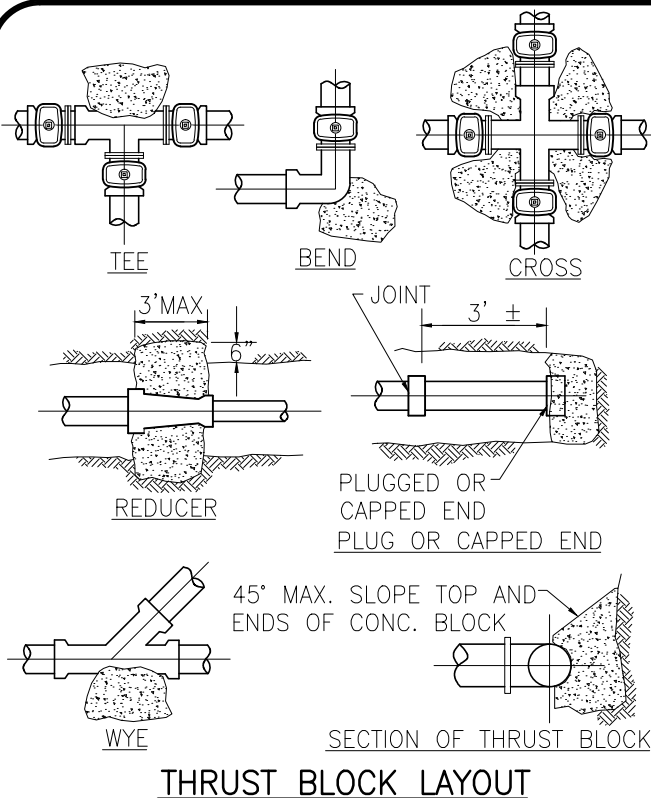
tony marshall

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12/05/2013

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PIPE DIA.	PIPE CLASS	PRESS P.S.I.	AREA SQ. FT.									
			TEE	90° BEND	45° BENDS AND WYES	ALL BENDS 22-1/2° AND LESS	CROSSES (EACH)	CAP	CASE 1 AND 2 (EACH)	CASE 3 (EACH)	LINE VALVE	VERTICAL ANCHORS (EACH)
4	150	150	3	4	3	2	1	3	3	4	3	3
	200	200	4	6	3	2	1	4	4	6	4	4
6	150	150	6	9	5	3	2	6	6	9	6	6
	200	200	8	11	6	3	2	8	8	11	8	8
8	150	150	10	14	8	4	3	10	10	14	10	10
	200	200	14	19	11	6	3	14	14	19	14	14
10	150	150	17	23	23	7	5	17	17	23	17	17
	200	200	22	31	17	9	5	22	22	31	22	2
12	150	150	23	33	18	9	7	23	23	33	23	23
	200	200	31	44	24	12	7	31	31	44	31	1

NOTE:

1. THRUST BLOCK BEARING FACES SHALL BE PLACED AGAINST UNDISTURBED EARTH, APPROVED COMPACTED FILL OR APPROVED SLURRY MIX.
2. CONCRETE TO BE KEPT CLEAR OF BOLTS NUTS AND END OF FITTING.
3. PLACE 6 MIL VISQUEEN TO COVER BOLTS OF ALL FITTINGS AND CONCRETE.



THRUST BLOCK SIZES

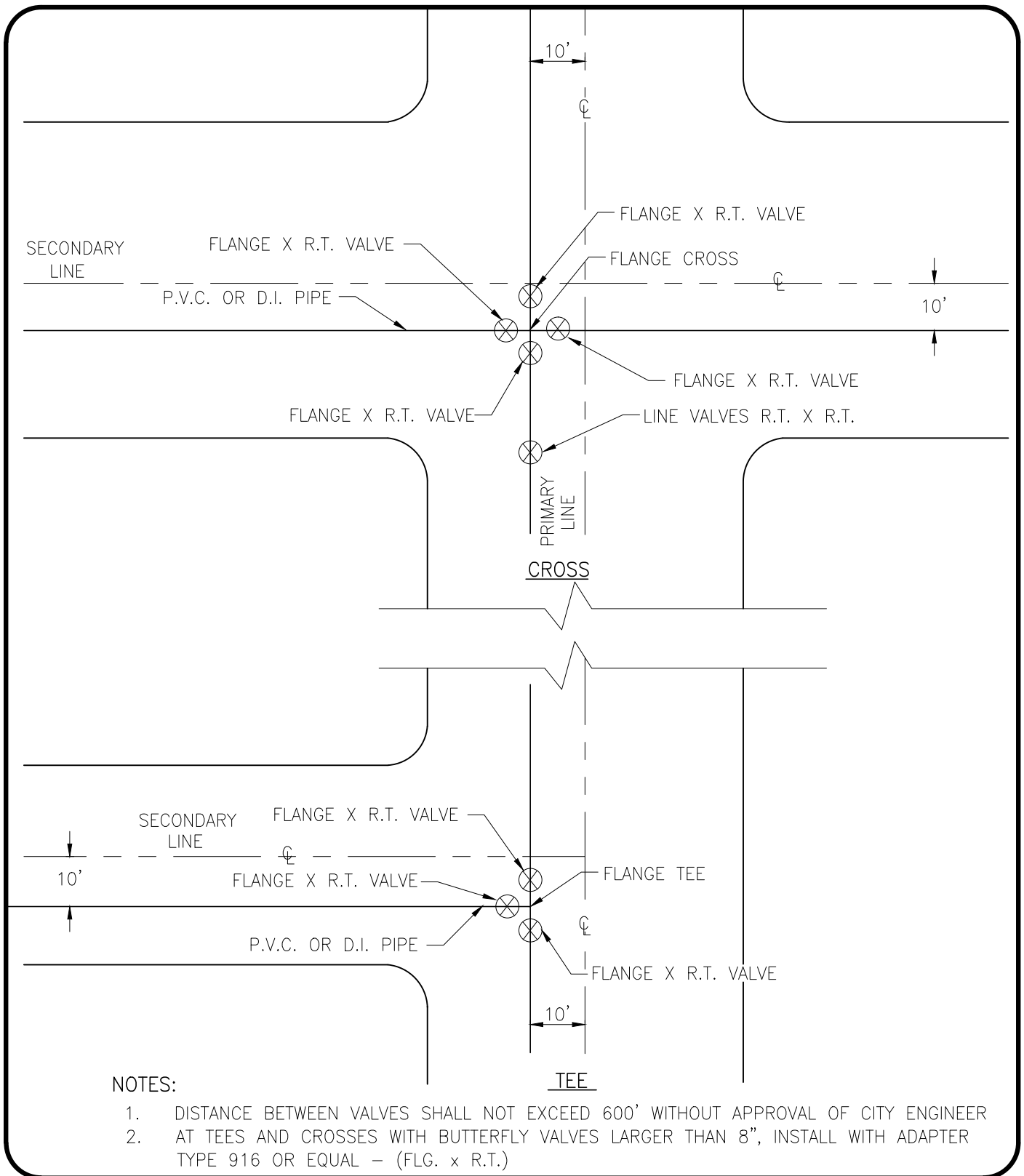
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INTERSECTION CONNECTIONS AND VALVE LOCATIONS

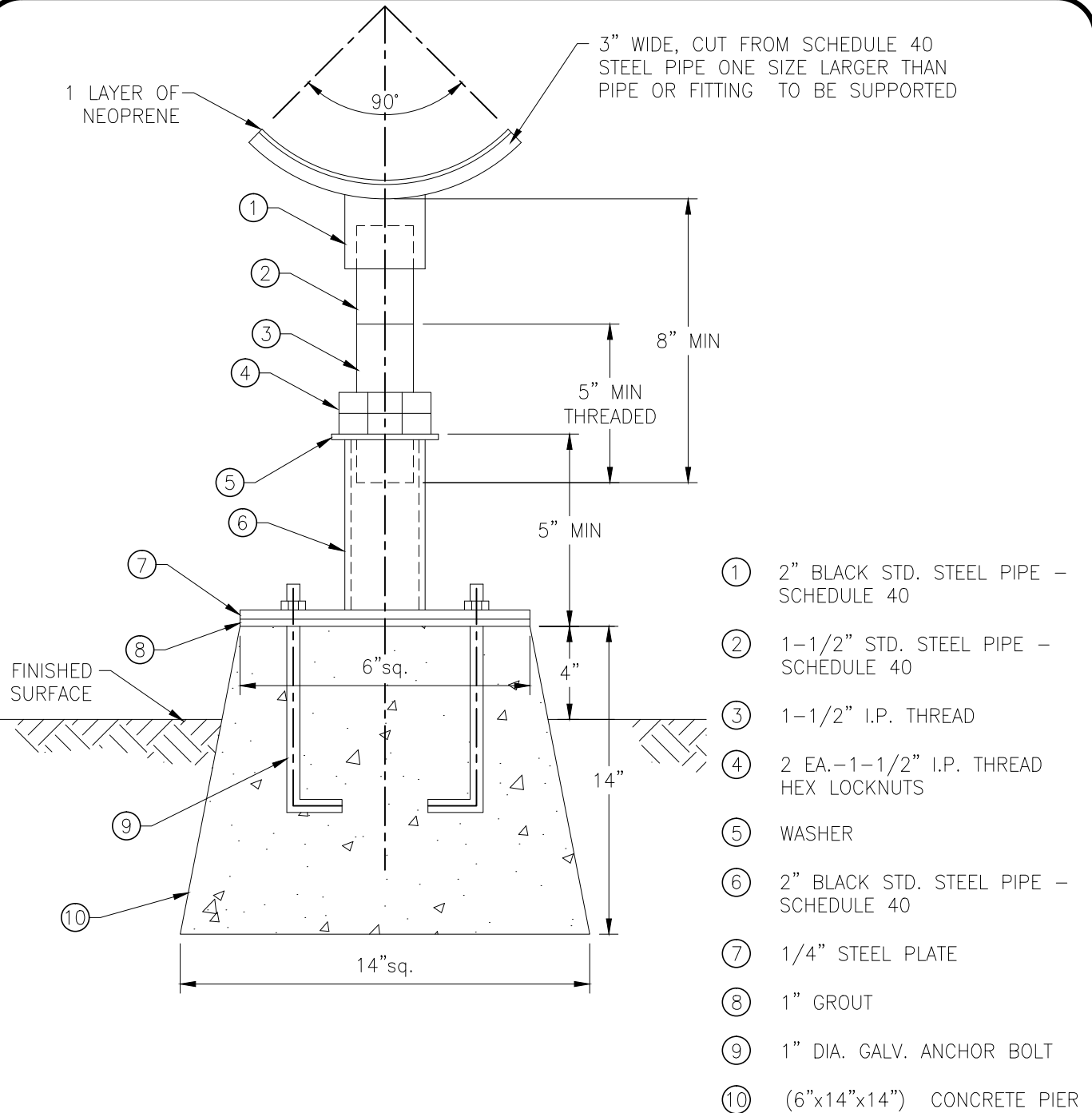
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ADJUSTABLE PIPE SUPPORT

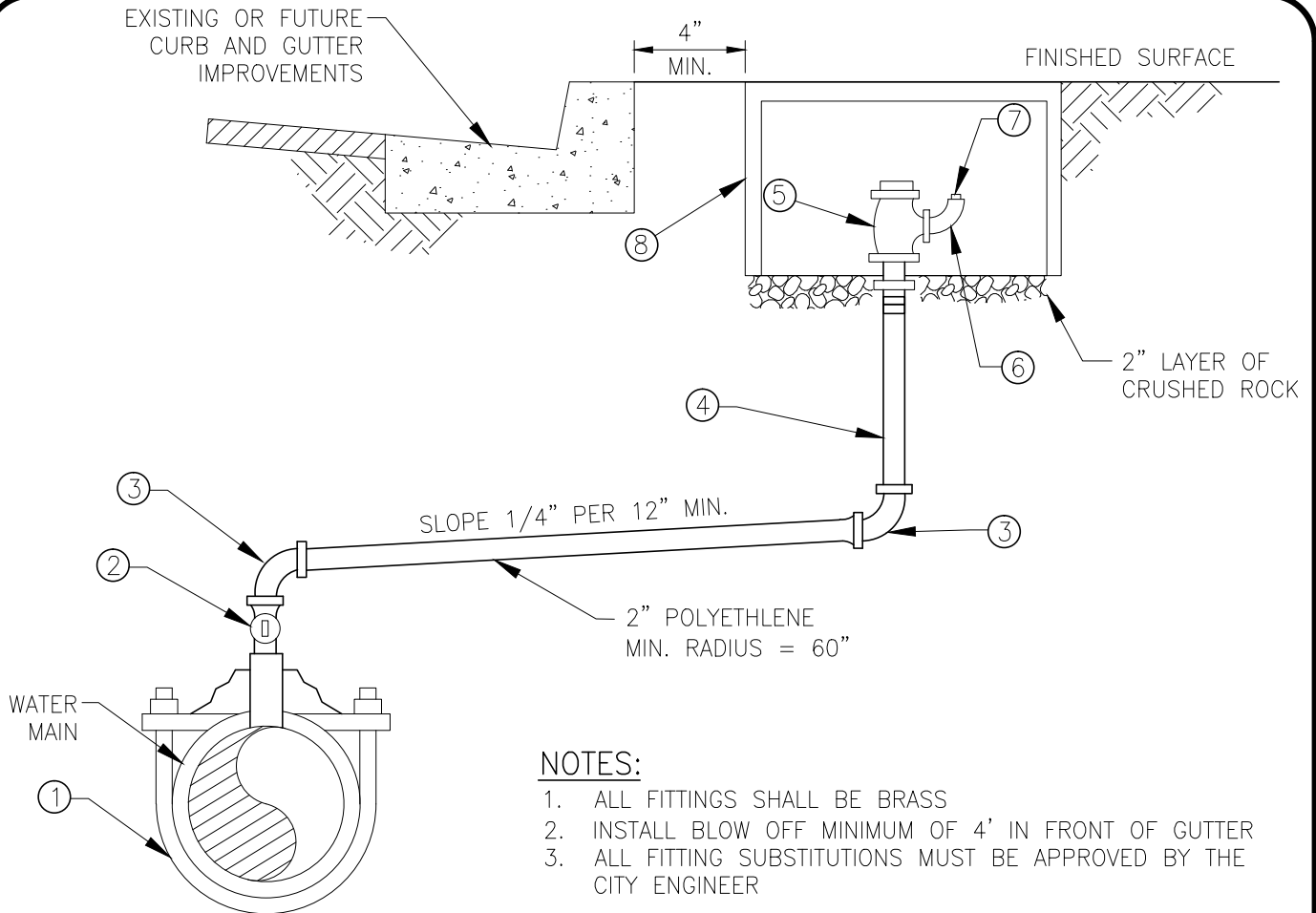
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- ① DOUBLE STRAP SERVICE SADDLE, FOR ALL PIPE EXCEPT C900 – JONES 979–F.I.P.
DOUBLE STRAP SERVICE SADDLE, FOR C900 PIPE – JONES 969–F.I.P.
- ② JONES J-1955, 2" CORPORATION STOP (M.I.P. x M.I.P.)
- ③ 2" ELL – JONES J-2621 (F.I.P. x COMPRESSION) FOR USE WITH BRASS NIPPLE,
2" ELL – JONES J-2611 (COMPRESSION x COMPRESSION) FOR USE WITH
POLYETHYLENE NIPPLE
- ④ 2" BRASS NIPPLE – 12" MINIMUM LENGTH, OR POLYETHYLENE PIPE
- ⑤ ELL – FORD LF 31-77 (FLG. x F.I.P.)
- ⑥ CURB STOP (F.I.P.)
- ⑦ BRONZE PLUG
- ⑧ ARMORCAST METER BOX A6001946PCX, WITH COVER A6001866



TEMPORARY AIR RELEASE AND CLEANOUT

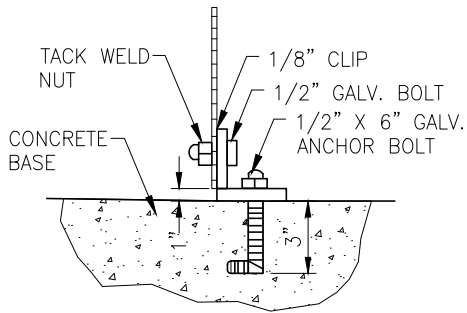
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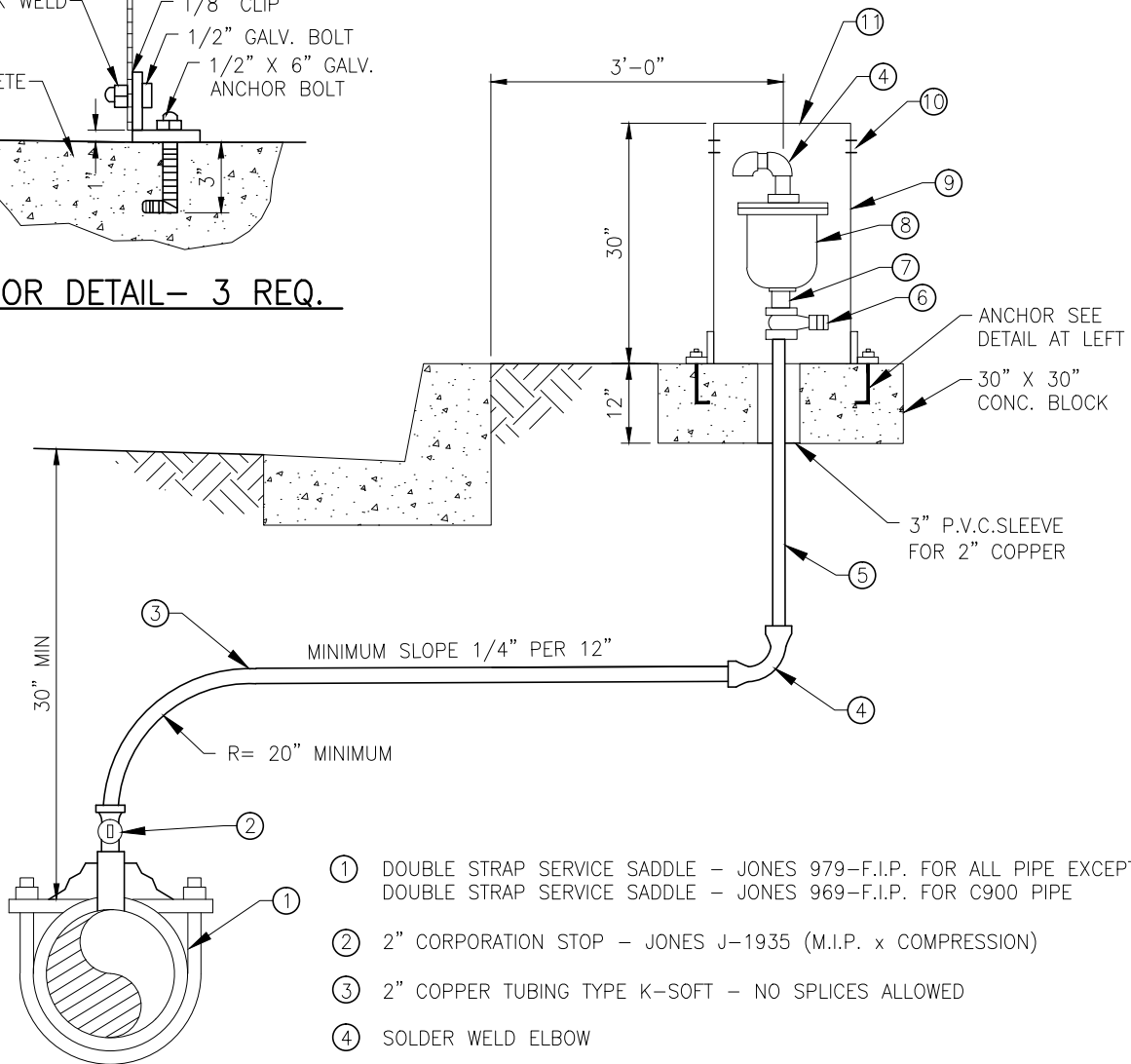
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ANCHOR DETAIL- 3 REQ.



NOTE:

FOR 2" VACUUM AIR RELEASE USE 2" FITTING WITH SWEAT JOINTS. DO NOT BEND 2" TUBING.

- ① DOUBLE STRAP SERVICE SADDLE - JONES 979-F.I.P. FOR ALL PIPE EXCEPT C900
DOUBLE STRAP SERVICE SADDLE - JONES 969-F.I.P. FOR C900 PIPE
- ② 2" CORPORATION STOP - JONES J-1935 (M.I.P. x COMPRESSION)
- ③ 2" COPPER TUBING TYPE K-SOFT - NO SPLICES ALLOWED
- ④ SOLDER WELD ELBOW
- ⑤ 2" BRASS NIPPLE MINIMUM 12"
- ⑥ 2" CORP STOP - JONES J-200 (F.I.P. x F.I.P.)
- ⑦ 2" BRONZE NIPPLE
- ⑧ AIR VACUUM RELEASE VALVE CRISPIN UL-10 OR UL-20
- ⑨ 16" O.D. 12 GA. STEEL PIPE - USE "DUNES TAN" PAINT INSIDE AND OUTSIDE
- ⑩ 8-3/4" EQUALLY SPACED HOLES
- ⑪ 16" O.D. 3/4" PLATE WELDED TO PIPE - PAINTED INSIDE AND OUTSIDE



2" AIR RELEASE AND VACUUM VALVE

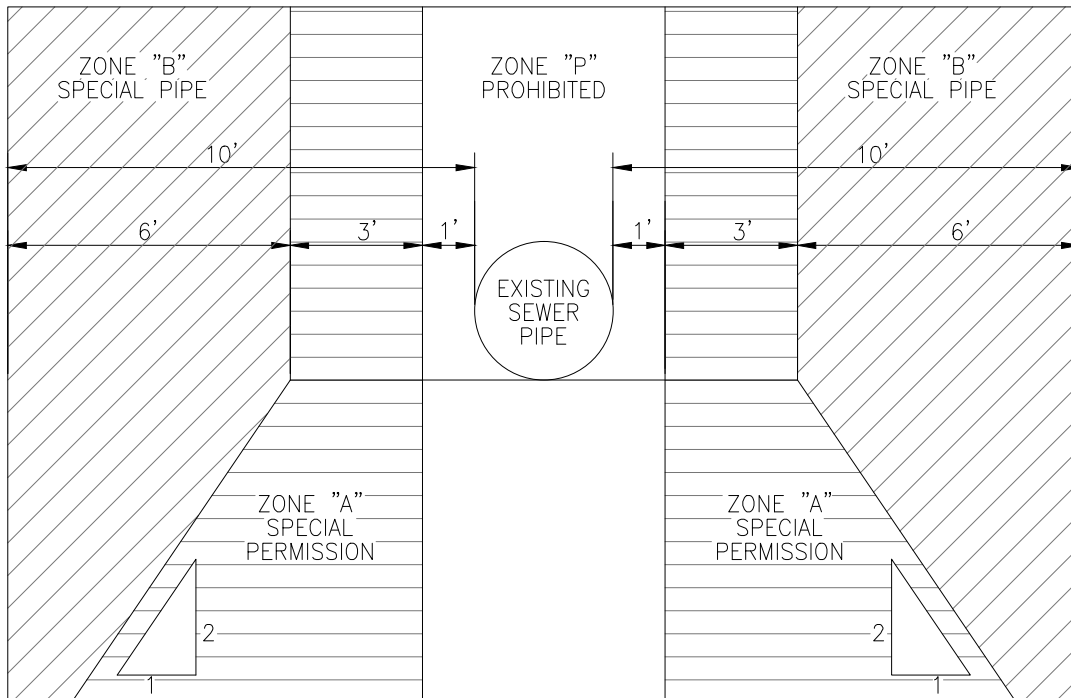
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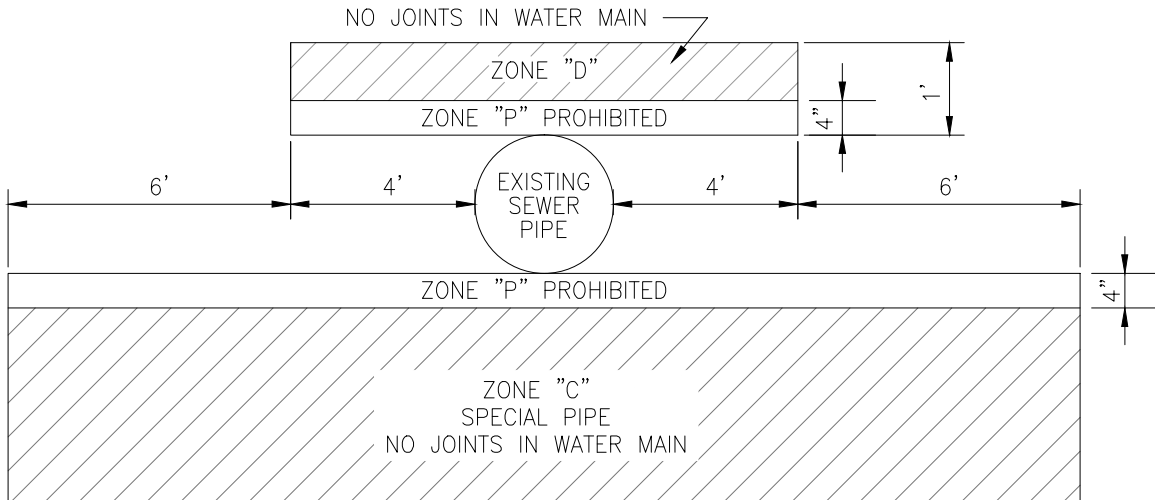
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PARALLEL CONSTRUCTION



PERPENDICULAR CONSTRUCTION



NEW WATER MAIN AND EXISTING SEWER SEPARATION REQUIREMENTS

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12/05/2013

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519-A

REQUIREMENTS

- ZONE "A" NO WATER MAINS PARALLEL TO SEWERS SHALL BE CONSTRUCTED WITHOUT APPROVAL FROM THE DEPARTMENT OF HEALTH SERVICES.
- ZONE "B" IF THE SEWER PARALLELING THE WATER MAIN DOES NOT MEET THE CRITERIA FOR NEW SEWER MAIN IN ZONE "B", THE WATER MAIN SHALL BE CONSTRUCTED OF:
1. DUCTILE IRON PIPE WITH POLYETHYLENE ENCASEMENT.
 2. MORTAR COATED ONE-FOURTH INCH THICK WELDED STEEL PIPE.
 3. CLASS 200 PRESSURE RATED PVC PIPE PER AWWA C900-97.
 4. REINFORCED CONCRETE PRESSURE PIPE, STEEL CYLINDER TYPE, PER AWWA C300-97 OR C301-99 OR C302-87 OR C303-87.
- ZONE "C" IF THE SEWER CROSSING THE WATER MAIN DOES NOT MEET THE CRITERIA FOR NEW SEWER MAIN IN ZONE "C", THE WATER MAIN SHALL HAVE NO JOINTS IN ZONE "C" AND BE CONSTRUCTED OF:
1. DUCTILE IRON PIPE WITH POLYETHYLENE ENCASEMENT.
 2. MORTAR COATED ONE-FOURTH INCH THICK WELDED STEEL PIPE.
 3. CLASS 200 PRESSURE RATED PVC PIPE PER AWWA C900-97.
 4. REINFORCED CONCRETE PRESSURE PIPE, STEEL CYLINDER TYPE, PER AWWA C300-97 OR C301-99 OR C302-87 OR C303-87.
- ZONE "D" IF THE SEWER CROSSING THE WATER MAIN DOES NOT MEET THE CRITERIA FOR NEW SEWER MAIN IN ZONE "C", THE WATER MAIN SHALL HAVE NO JOINTS WITHIN 4 FEET OF EITHER SIDE OF SEWER IN ZONE "C" AND BE CONSTRUCTED OF:
1. DUCTILE IRON PIPE WITH POLYETHYLENE ENCASEMENT.
 2. MORTAR COATED ONE-FOURTH INCH THICK WELDED STEEL PIPE.
 3. CLASS 200 PRESSURE RATED PVC PIPE PER AWWA C900-97.
 4. REINFORCED CONCRETE PRESSURE PIPE, FOR WATER OR OTHER LIQUIDS, PER AWWA C300-97 OR C301-99 OR C302-87 OR C303-87.

NOTES:

1. IN ADDITION TO THESE STANDARDS ALL CROSSINGS SHALL MEET DEPARTMENT OF HEALTH SERVICE STANDARDS.
2. IF A SANITARY SEWER IS TO BE LOCATED WITHIN 10 FEET OF A WATER MAIN OR SERVICE LATERAL WITHIN ANY OF THE ABOVE-INDICATED ZONES, SPECIAL SEWER CONSTRUCTION WILL BE REQUIRED AS SHOWN.
3. IF SANITARY SEWER OR HOUSE SEWER LATERAL CROSSES A WATER MAIN OR SERVICE LATERAL WITHIN ANY OF THE ABOVE-INDICATED ZONES, SPECIAL CONSTRUCTION WILL BE REQUIRED AS SHOWN.
4. "P" IS A PROHIBITED CONSTRUCTION ZONE.



NEW WATER MAIN AND EXISTING SEWER SEPARATION REQUIREMENTS

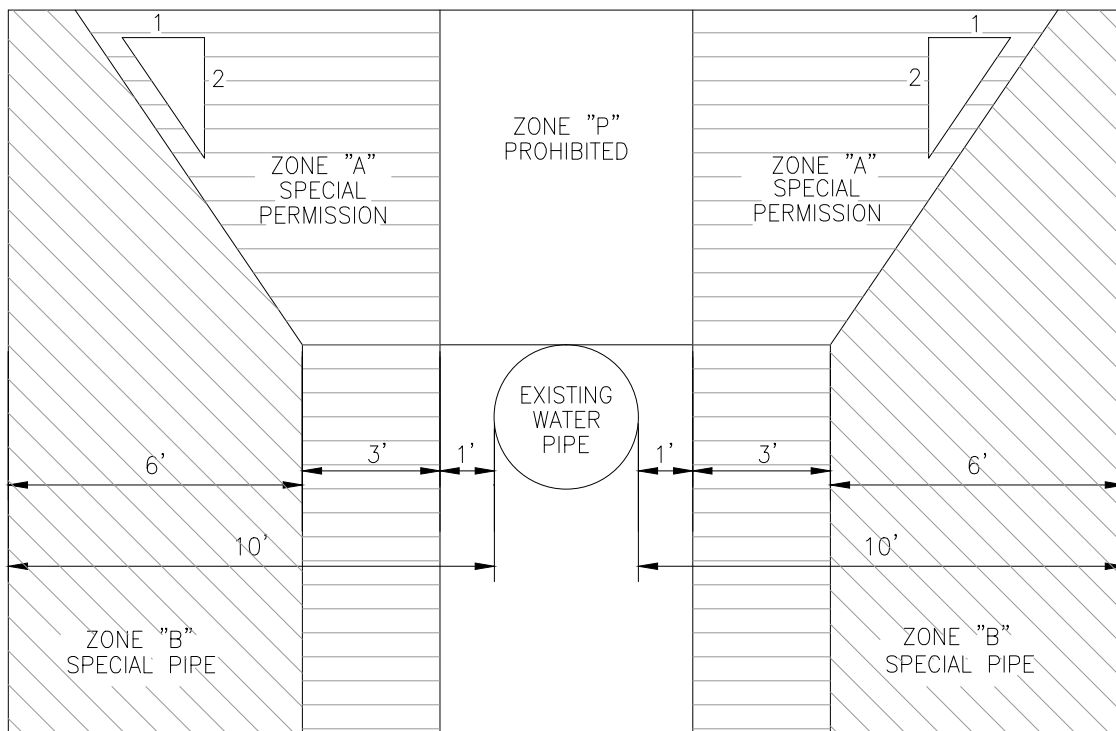
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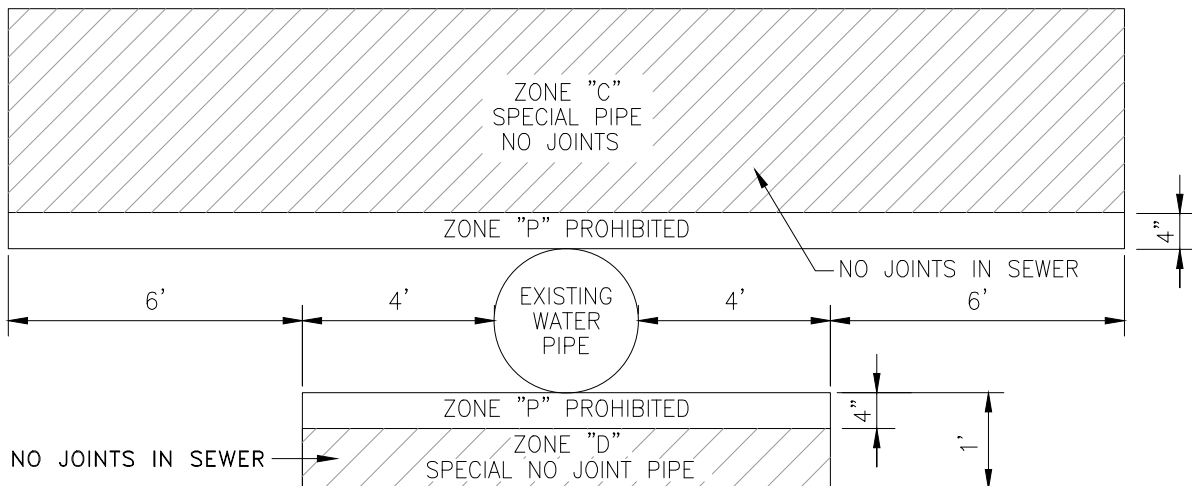
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519-B



PARALLEL CONSTRUCTION



PERPENDICULAR CONSTRUCTION



EXISTING WATER MAIN AND NEW SEWER SEPARATION REQUIREMENTS

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520-A

REQUIREMENTS

ZONE "A" SEWER LINES PARALLEL TO WATER MAINS SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT APPROVAL FROM THE DEPARTMENT OF HEALTH SERVICES AND THE CITY ENGINEER

ZONE "B" A SEWER LINE PLACED PARALLEL TO A WATER LINE SHALL BE CONSTRUCTED OF:

1. EXTRA STRENGTH VITRIFIED CLAY PIPE WITH COMPRESSION JOINTS.
2. PLASTIC SEWER PIPE WITH RUBBER RING JOINTS (PER ASTM D3034) OR EQUIVALENT.
3. DUCTILE IRON PIPE WITH COMPRESSION JOINTS, AND WITH POLYETHYLENE ENCASEMENT.
4. REINFORCED CONCRETE PRESSURE PIPE WITH COMPRESSION JOINTS PER AWWA C302-74 OR C300-97 OR C301-99 OR C302-87 OR C303-87.

ZONE "C" A SEWER LINE CROSSING A WATER MAIN SHALL BE CONSTRUCTED OF:

1. DUCTILE IRON PIPE WITH POLYETHYLENE ENCASEMENT AND MECHANICAL JOINTS.
2. A CONTINUOUS SECTION OF CLASS 200 PVC MEETING AWWA SPEC. C900-97.
3. REINFORCED CONCRETE PRESSURE PIPE FOR WATER AND OTHER LIQUIDS, PER AWWA C300-97 OR C301-99 OR C302-87 OR C303-87
4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE EXTENDING A MINIMUM OF 10 FEET FROM THE OUTSIDE DIAMETER OF THE WHOLE LINE.

ZONE "D" A SEWER LINE CROSSING A WATER MAIN SHALL BE CONSTRUCTED OF:

1. A CONTINUOUS SECTION OF DUCTILE IRON PIPE WITH POLYETHYLENE ENCASEMENT.
2. A CONTINUOUS SECTION OF CLASS 200 PVC MEETING AWWA SPEC C900-97.
3. REINFORCED CONCRETE PRESSURE PIPE FOR WATER AND OTHER LIQUIDS, PER AWWA (C300-97 OR C301-99 OR C302-87 OR C303-87
4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE EXTENDING A MINIMUM OF 10 FEET FROM THE OUTSIDE DIAMETER OF THE WHOLE LINE.
5. ANY SEWER PIPE SEPARATED BY TEN-FOOT BY TEN-FOOT, FOUR INCH THICK REINFORCED CONCRETE SLAB.

NOTES:

1. IN ADDITION TO THESE STANDARDS ALL CROSSINGS SHALL MEET DEPARTMENT OF HEALTH SERVICES STANDARDS.
2. IF A SANITARY SEWER IS TO BE LOCATED WITHIN 10 FEET OF A WATER MAIN OR SERVICE LATERAL WITHIN ANY OF THE ABOVE-INDICATED ZONES, SPECIAL SEWER CONSTRUCTION WILL BE REQUIRED AS SHOWN.
3. IF A SANITARY SEWER OR HOUSE SEWER LATERAL CROSSES A WATER MAIN OR SERVICE LATERAL WITHIN ANY OF THE ABOVE-INDICATED ZONES, SPECIAL CONSTRUCTION WILL BE REQUIRED AS SHOWN.
4. "P" IS A PROHIBITED CONSTRUCTION ZONE.



EXISTING WATER MAIN AND NEW SEWER SEPARATION REQUIREMENTS

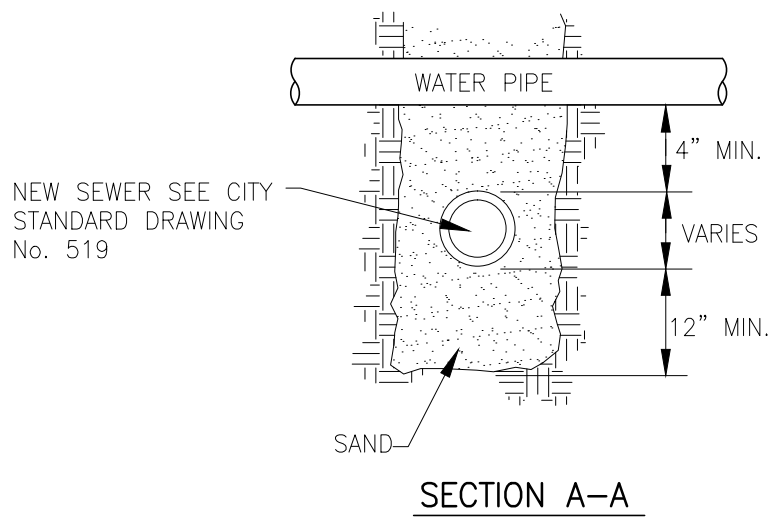
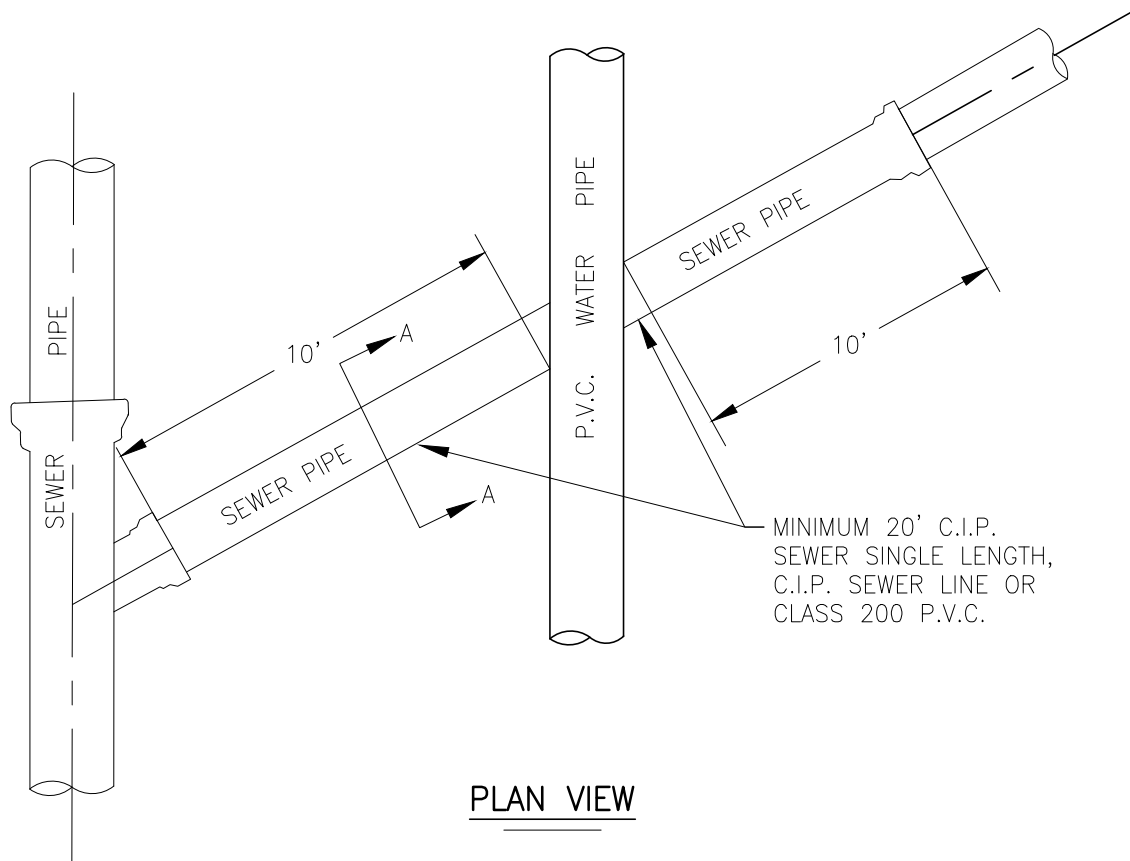
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WATER MAIN PROTECTION AT SEWER CROSSING

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ALLOWABLE LEAKAGE PER 50 JOINTS OF C-900 P.V.C. PIPE

PIPE SIZE INCHES	TEST PRESSURE AT POINT OF TEST – psi				
	100	125	150	200	225
	LEAKAGE – GPH				
4	0.27	0.30	0.33	0.38	0.41
6	0.41	0.45	0.50	0.57	0.61
8	0.54	0.60	0.66	0.76	0.81
10	0.68	0.76	0.83	0.96	1.01
12	0.81	0.91	0.99	1.15	1.22

ALLOWABLE LEAKAGE PER 1000 FEET OF DUCTILE IRON PIPING

PIPE DIAMETER INCHES	TEST PRESSURE AT LOWEST POINT IN LINE – psi				
	100	125	150	200	225
	LEAKAGE – GPH				
4	0.30	0.34	0.37	0.43	0.45
6	0.45	0.50	0.55	0.64	0.68
8	0.60	0.67	0.74	0.85	0.90
10	0.75	0.84	0.92	1.06	1.13
12	0.90	1.01	1.10	1.28	1.35
14	1.05	1.18	1.29	1.48	1.58
16	1.20	1.34	1.47	1.70	1.80
18	1.35	1.51	1.66	1.91	2.03
20	1.50	1.68	1.84	2.12	2.25
24	1.80	2.01	2.21	2.55	2.70
30	2.25	2.52	2.76	3.19	3.38
36	2.70	3.02	3.31	3.82	4.05

NOTES:

1. ALL PRESSURE TESTING TO BE DONE IN ACCORDANCE WITH AWWA SPECIFICATIONS C605-94, FOR C600-99 FOR DUCTILE IRON PIPE
2. TEST TO BE CONDUCTED AT 150% OF MAXIMUM ANTICIPATED WORKING PRESSURE BUT NOT LESS THAN 125% OF NORMAL WORKING PRESSURE AT THE HIGHEST POINT
3. THE ALLOWABLE LEAKAGE FOR A PIPELINE IS PURSUANT TO AWWA SPECIFICATION



ALLOWABLE LEAKAGE CHART FOR LINE PRESSURE TESTING

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STANDARD STORM DRAIN CROSSING

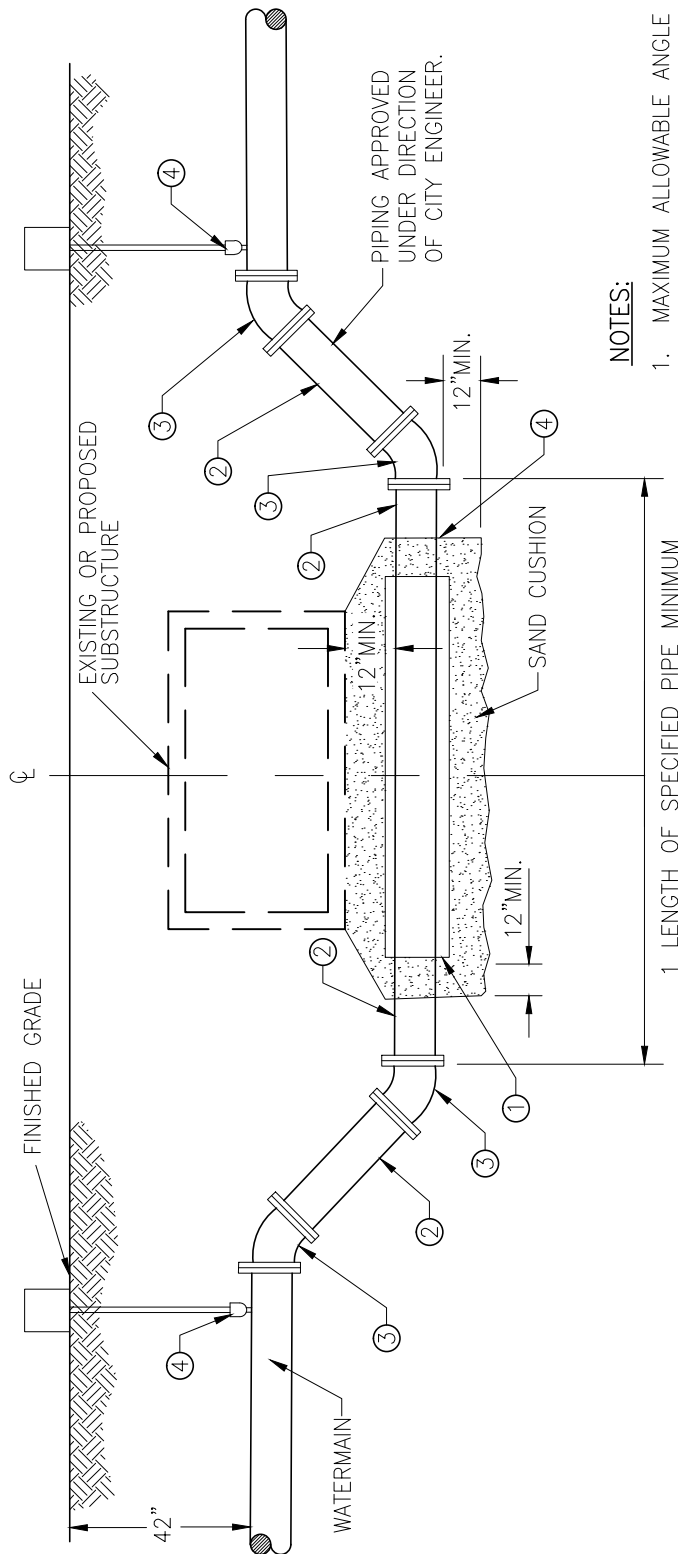
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NOTES:

1. MAXIMUM ALLOWABLE ANGLE OF FITTINGS - 45°
2. PIPE AND FITTING MAY BE EITHER DUCTILE IRON OR STANDARD STEEL ML&C

TABLE 1

WATER MAIN	CASING-INSIDE DIAMETER	WALL THICKNESS
6 INCHES	12 INCHES	1/4 INCH
8 INCHES	16 INCHES	1/4 INCH
10 INCHES	18 INCHES	3/8 INCH
12 INCHES	20 INCHES	3/8 INCH
16 INCHES	24 INCHES	3/8 INCH
LARGER THAN 16" REQUIRES CITY ENGINEER'S APPROVAL		

- ① STEEL CASING PIPE (SEE TABLE 1 FOR SIZING)
- ② DETAIL IRON OR STANDARD STEEL ML&C PIPE
- ③ 45° BEND (FLG. x FLG.)
- ④ AIR RELEASE & VACUUM VALVE STANDARD DRAWING 518



STANDARD CULVERT CROSSING

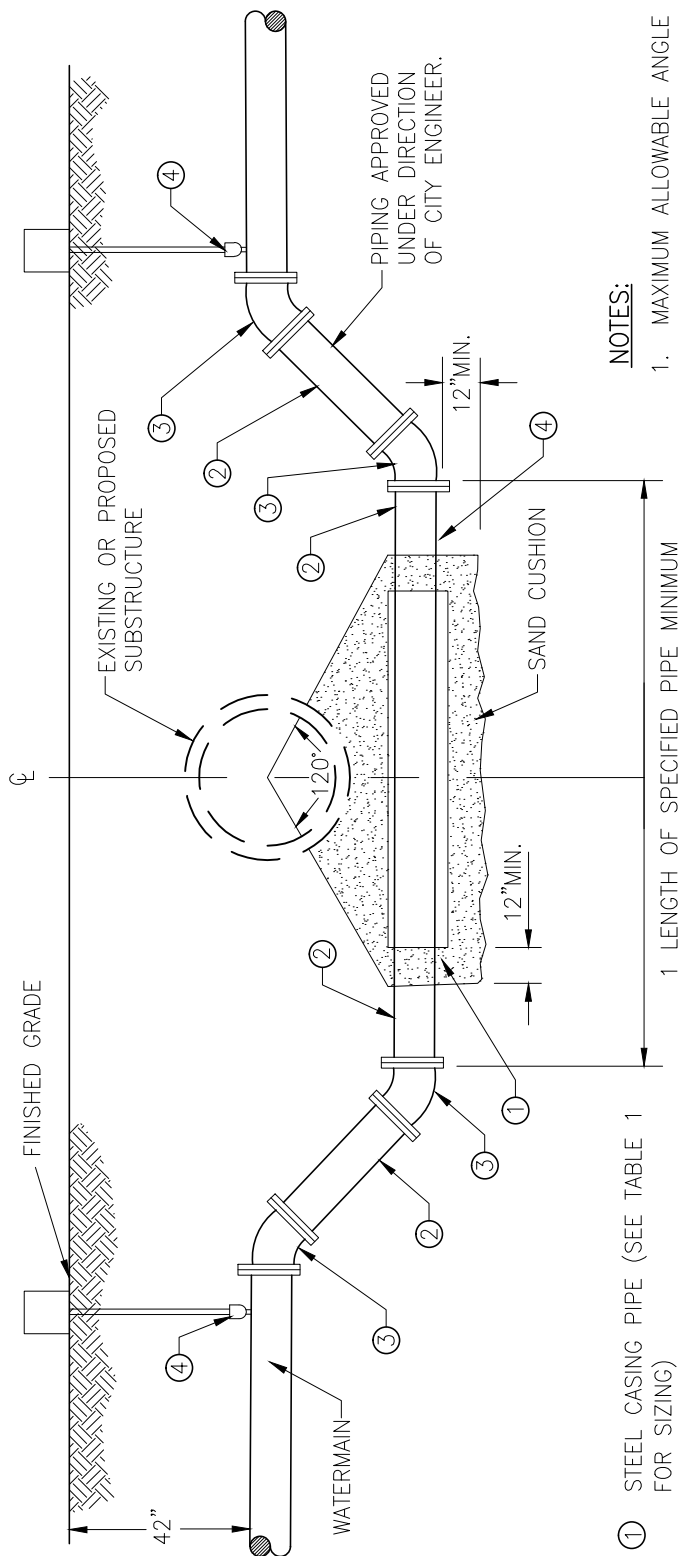
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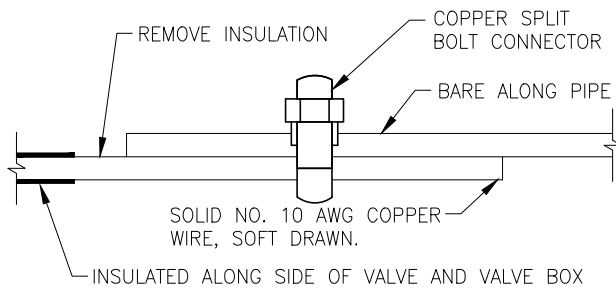


- ① STEEL CASING PIPE (SEE TABLE 1 FOR SIZING)
- ② DETAIL IRON OR STANDARD STEEL ML&C PIPE
- ③ 45° BEND (FLG. x FLG.)
- ④ AIR RELEASE & VACUUM VALVE STANDARD DRAWING 518

NOTES:

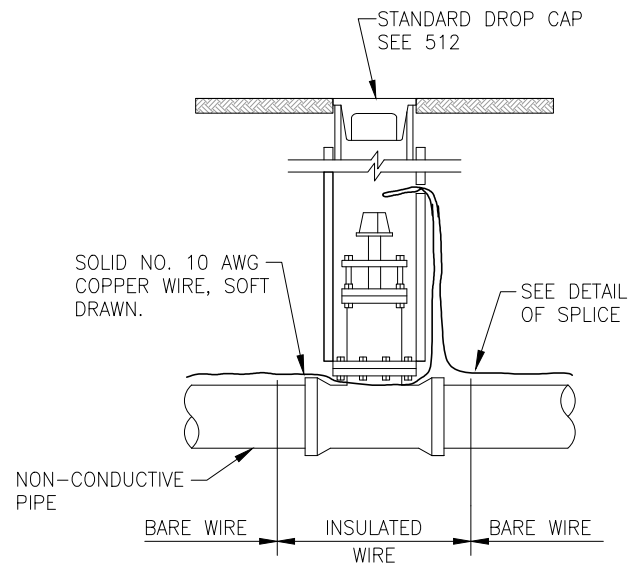
- 1. MAXIMUM ALLOWABLE ANGLE OF FITTINGS – 45°
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TABLE 1		
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LARGER THAN 16" REQUIRES CITY ENGINEER'S APPROVAL		

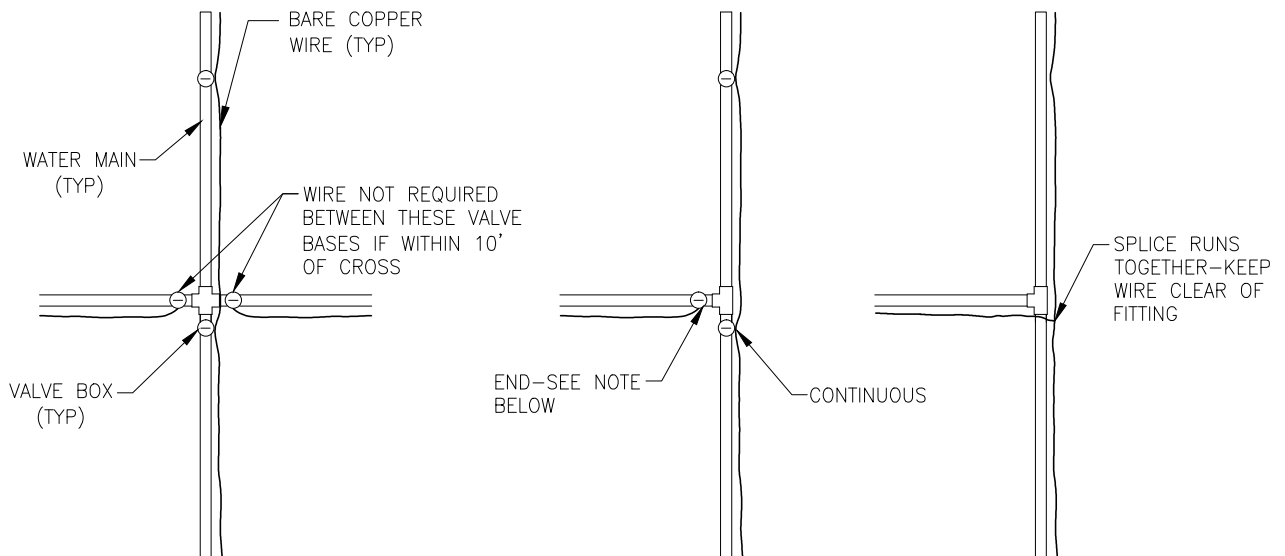


NOTE:
IF WIRE ENDS AT VALVE BOX, RUN SINGLE INSULATED LEAD UP TO 10' BELOW GROUND.

DETAIL OF CONNECTION



INSTALLATION AT VALVE BOX



TYPICAL PLACING AT MAIN INTERSECTIONS

NOTES:

1. WIRE TO BE CONTINUOUS BETWEEN VALVE BOXES, EXCEPT WHERE BOXES ARE WITHIN TEN (10') FEET OF PIPE INTERSECTION.
2. BARE WIRE NOT TO TOUCH VALVE OR FITTINGS. (COATED WIRE ONLY)
3. LOCATING WIRE TO BE LAID AT TOP OF PIPE.



PIPE LOCATING WIRE FOR WATER MAINS

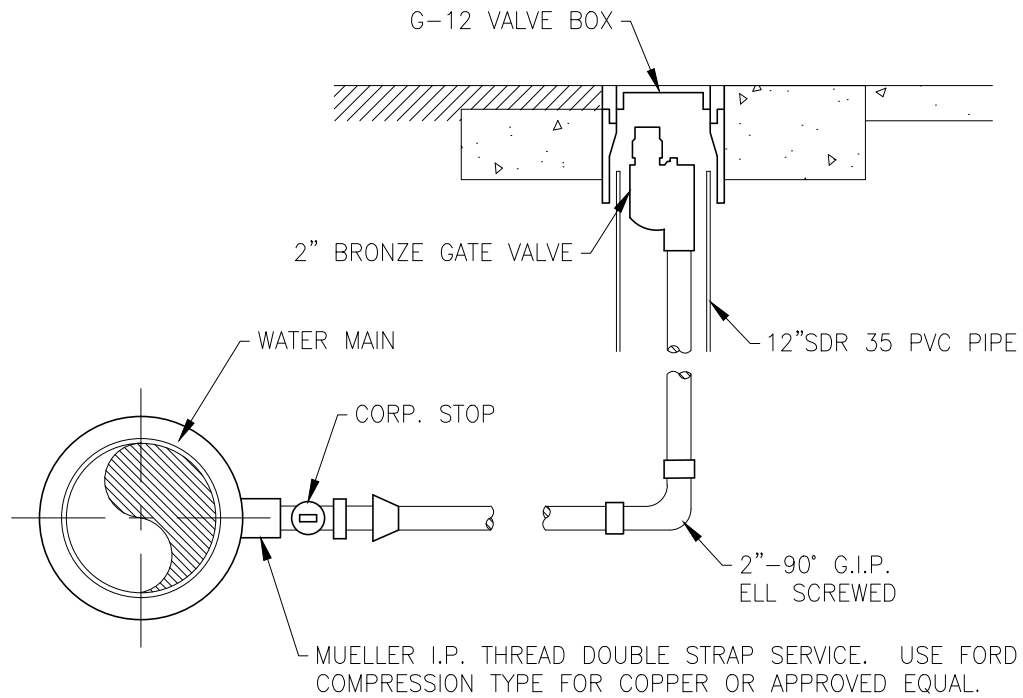
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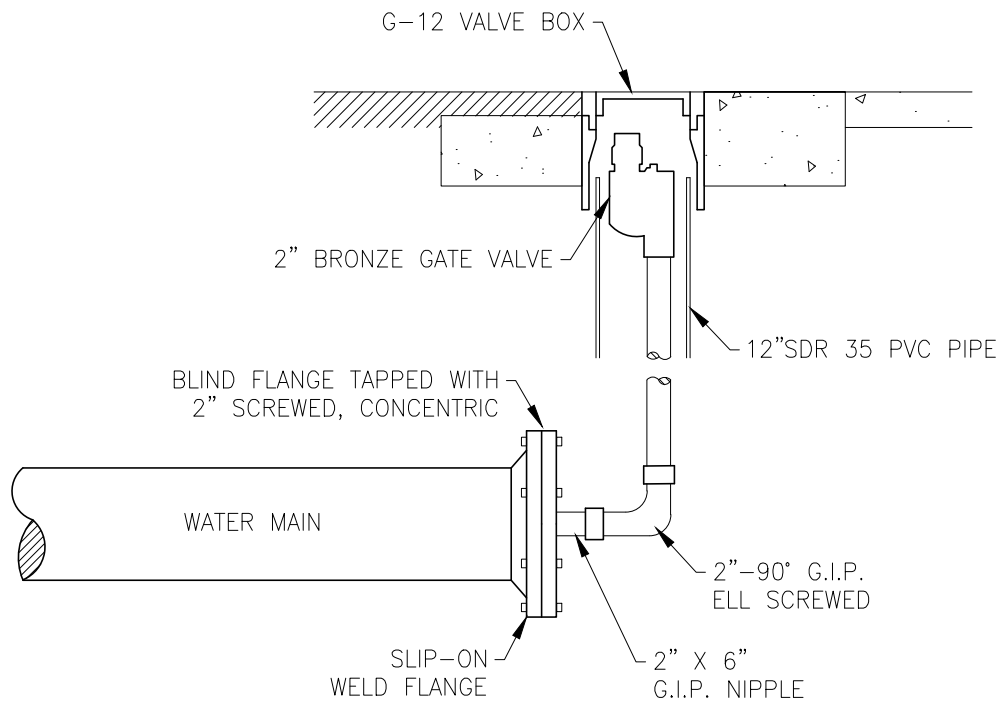
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MIDDLE OF PIPE CONNECTION



END OF PIPE CONNECTION



BLOW-OFF

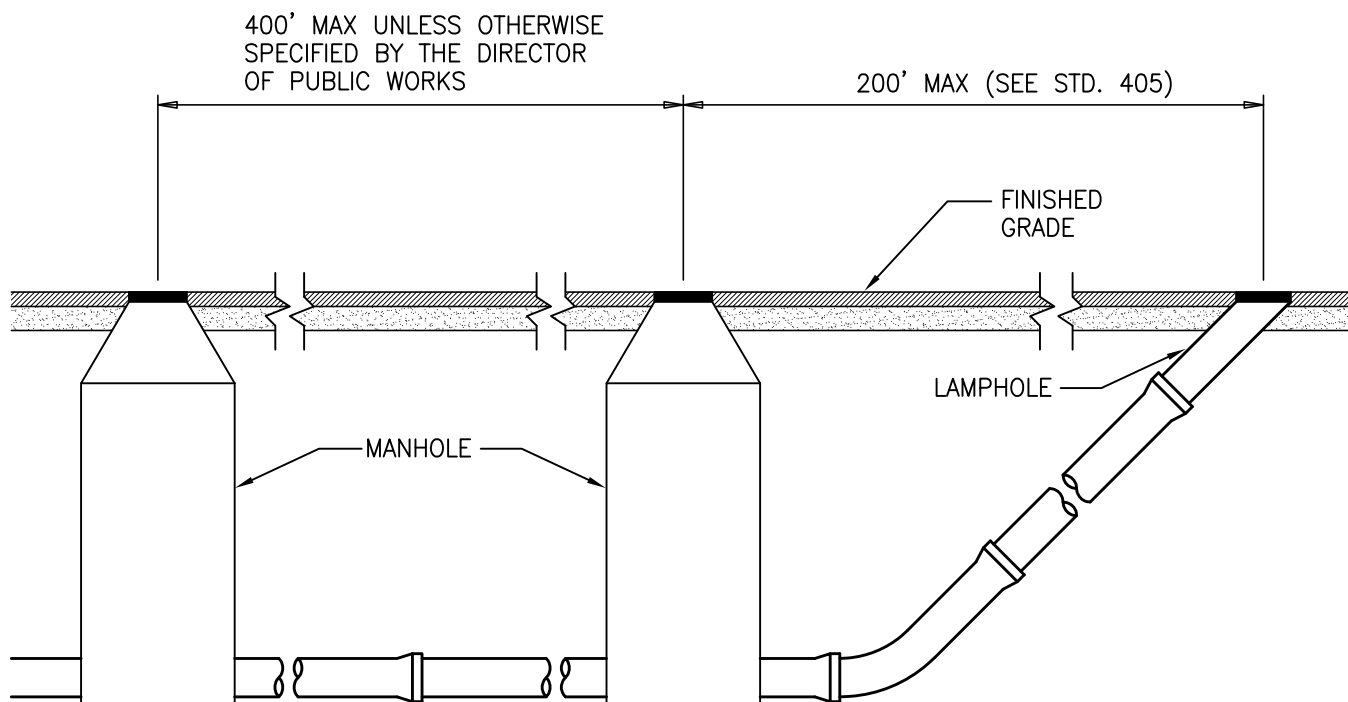
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PIPE SIZE	MANNING "N" (FOR PVC)	MINIMUM SLOPE
6"Ø	0.011	.0040
8"Ø	0.011	.0030
10"Ø	0.011	.0020
12"Ø	0.011	.0015

NOTES:

1. MINIMUM COVER AT CENTERLINE OF ROAD SHALL BE 42" UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
2. NO LATERAL SHALL HAVE LESS THAN 30" OF COVER WITHIN THE RIGHT OF WAY UNLESS APPROVED BY THE CITY ENGINEER.
3. MANHOLES SHALL BE INSTALLED AT ENDS OF ALL DEAD-END LINES AND AT ALL INTERSECTING STREETS WHERE SEWER LINES CONNECT.
4. THE DEPARTMENT OF PUBLIC WORKS SHALL BE SUPPLIED WITH A SET OF "AS-BUILTS" SHOWING THE LOCATION OF ALL LATERALS AND INVERT ELEVATIONS.
5. ANY CONNECTION TO SEWER TRUNK LINES SHALL NOT BE MADE WITHOUT THE INSTALLATION OF A MANHOLE.
6. ALL SLOPES LESS THAN MINIMUM (SHOWN ABOVE) MUST BE APPROVED BY THE CITY ENGINEER.

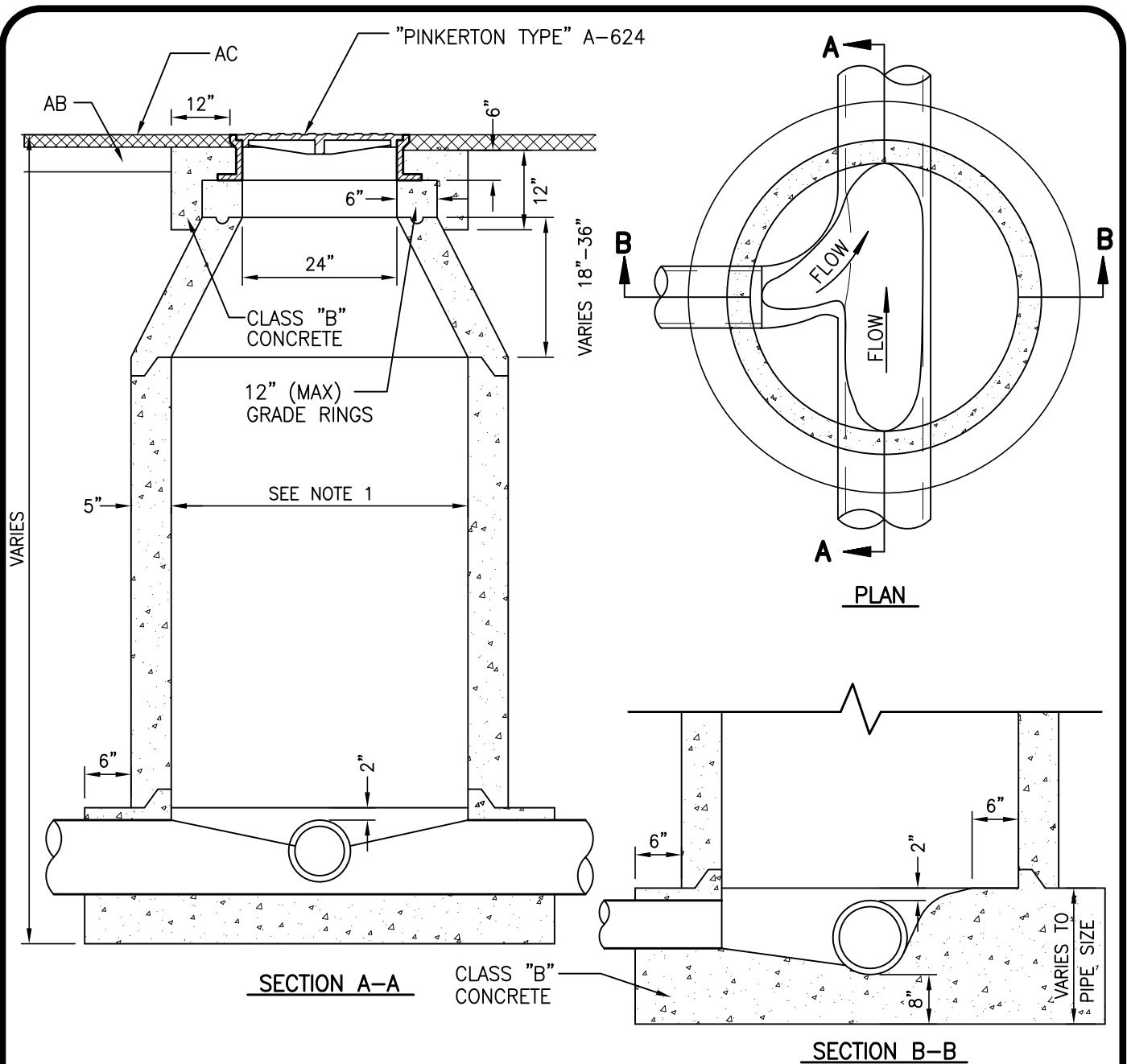


SANITARY SEWER DATA

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NOTES:

1. MANHOLE SHALL BE EITHER 48" WHEN SERVING 24"Ø PIPES OR SMALLER, OR 60" WHEN SERVING PIPES LARGER THAN 24"Ø.
2. 3"-6" CONCRETE GRADE RINGS AS REQUIRED.
3. STANDARD CONCENTRIC CONE SHALL CONFORM TO ASTM C418-61T.
4. STANDARD PRE-CAST MANHOLE SECTIONS SHALL CONFORM TO ASTM C418-61T.
5. PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET.
6. GROUT ALL JOINTS.
7. MANHOLE COVER TO BE MARKED "SEWER".
8. ADJUST FRAME TO GRADE AFTER PAVING.



SANITARY SEWER MANHOLE

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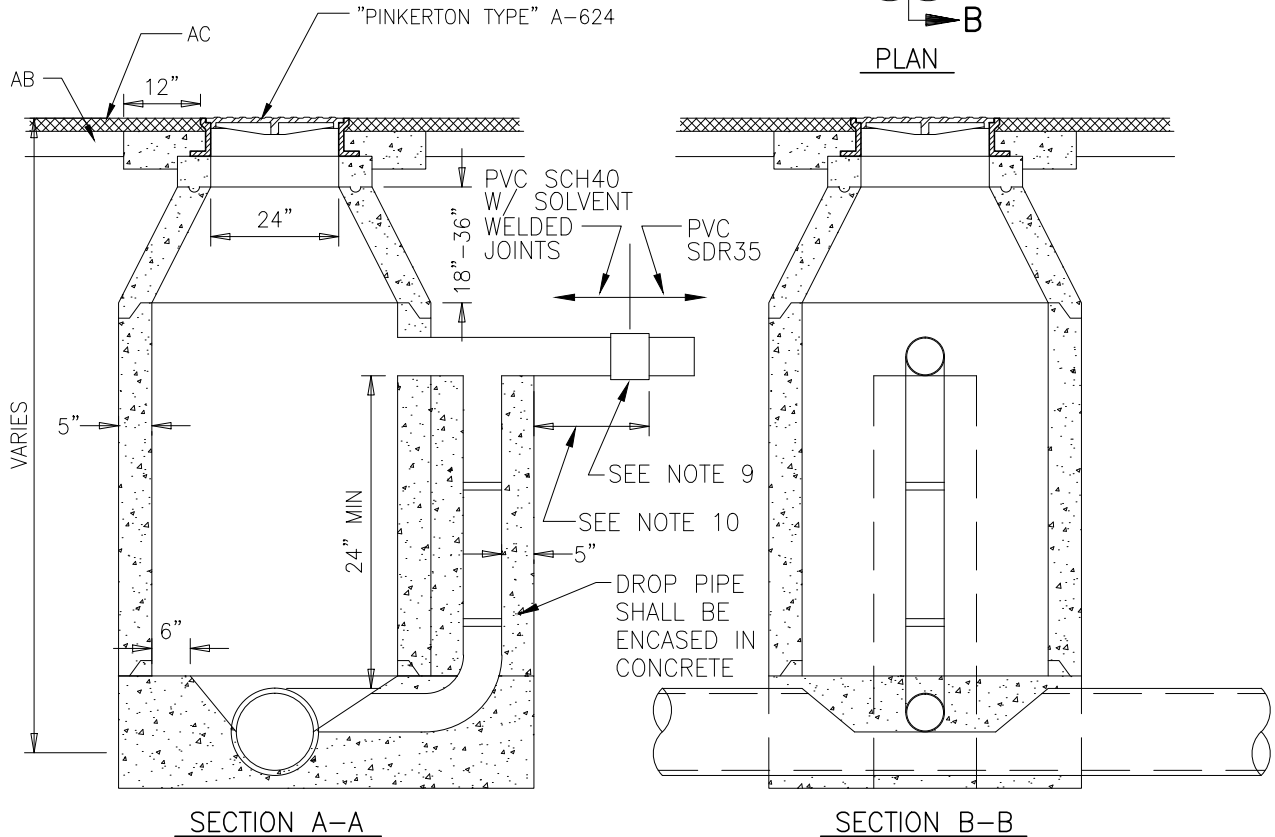
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THIS TYPE MANHOLE SHALL BE USED WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE OUTLET PIPE AND THE INVERT OF THE FEEDER OR COLLECTOR SEWER EXCEEDS 24".



NOTES:

1. PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET.
2. 3"-6" CONCRETE GRADE RINGS AS REQUIRED.
3. STANDARD CONCENTRIC CONE SHALL CONFORM TO ASTM C418-61T.
4. STANDARD PRE-CAST MANHOLE SECTIONS SHALL CONFORM TO ASTM C418-61T.
5. INCOMING SMALLER PIPES SHALL MATCH CROWNS OF THE LARGER PIPE.
6. GROUT ALL JOINTS.
7. MANHOLE COVER TO BE MARKED "SEWER".
8. ADJUST FRAME TO GRADE AFTER PAVING.
9. FLEXIBLE JOINT-BELL & SPIGOT OR ADJUSTABLE REPAIR COUPLING.
10. 12" MAX FOR PIPES 8" OR BIGGER, 24" MAX FOR PIPES SMALLER THAN 8".



SANITARY SEWER DROP IN NEW MANHOLE

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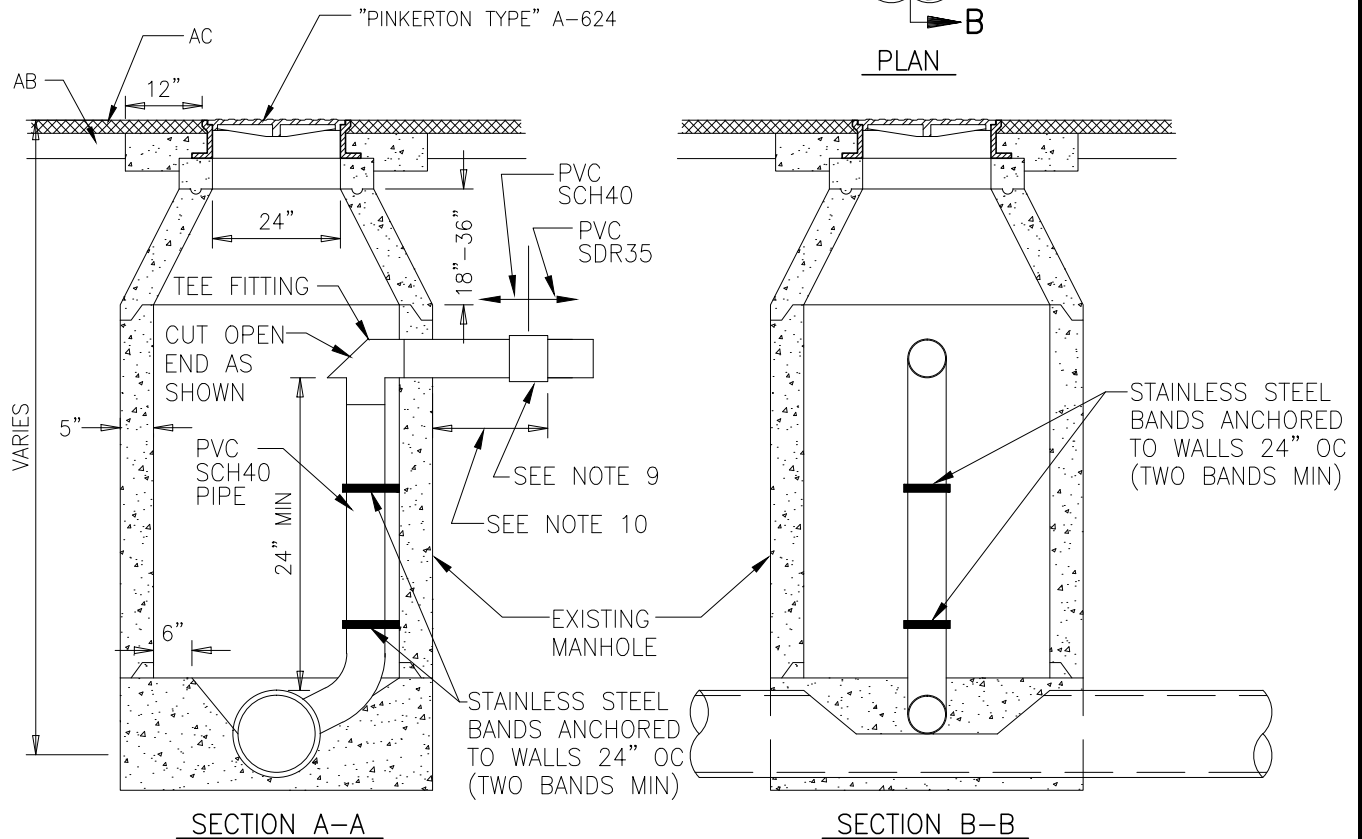
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THIS TYPE MANHOLE SHALL BE USED WHERE THE DIFFERENCE IN ELEVATION BETWEEN THE TOP OF THE OUTLET PIPE AND THE INVERT OF THE FEEDER OR COLLECTOR SEWER EXCEEDS 24".



NOTES:

1. PIPE TO BE LAID THROUGH MANHOLE AND TOP PORTION REMOVED AFTER CONCRETE HAS SET.
2. 3"-6" CONCRETE GRADE RINGS AS REQUIRED.
3. STANDARD CONCENTRIC CONE SHALL CONFORM TO ASTM C418-61T.
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6. GROUT ALL JOINTS.
7. MANHOLE COVER TO BE MARKED "SEWER".
8. ADJUST FRAME TO GRADE AFTER PAVING.
9. FLEXIBLE JOINT-BELL & SPIGOT OR ADJUSTABLE REPAIR COUPLING.
10. 12" MAX FOR PIPES 8" OR BIGGER, 24" MAX FOR PIPES SMALLER THAN 8".



SANITARY SEWER DROP IN EXISTING MANHOLE

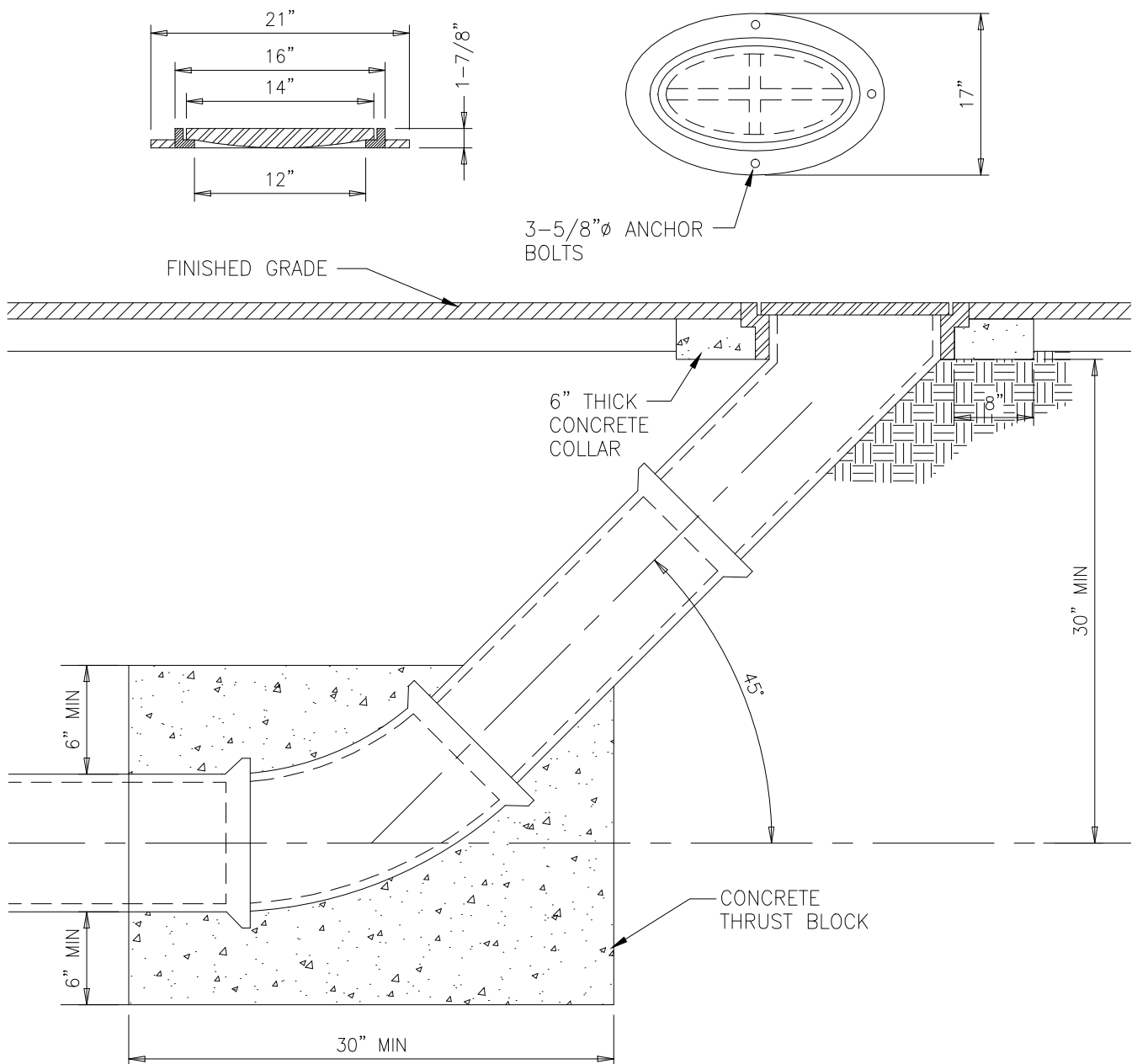
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NOTES:

1. USE OF A LAMPHOLE SHALL BE RESTRICTED TO PHASED DEVELOPMENT WHERE A MAXIMUM OF ONLY 200' AND/OR A MAXIMUM OF 3 SERVICES ARE ON THE LINE EXTENDING FROM THE LAST MANHOLE TO THE LAMPHOLE. WYES WILL NOT BE ACCEPTED.
2. LAMPHOLE CASTING SHALL BE CAST IRON.



LAMPHOLE

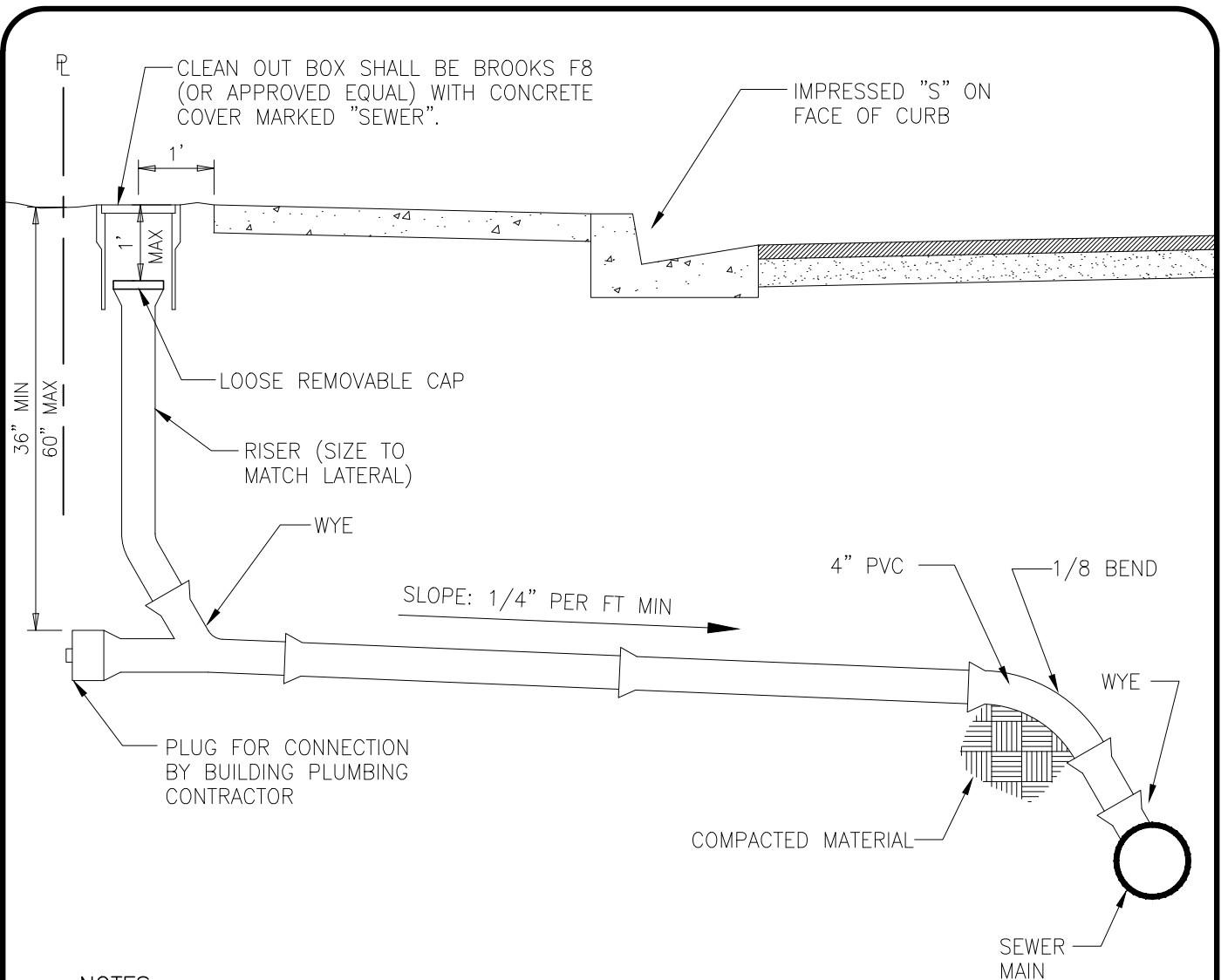
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NOTES:

1. HOUSE CONNECTION SHALL BE MADE UNDER THE SUPERVISION OF THE CITY INSPECTOR.
2. SEWER LATERAL SHALL BE CONSTRUCTED WITH A STRAIGHT GRADE AND ALIGNMENT FROM THE MAIN TO THE PROPERTY LINE UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
3. PIPE SLOPE MAY BE INCREASED TO ACCOMODATE DEEP SEWERS AND PROVIDE A MINIMUM 36" COVER AT RIGHT-OF-WAY.
4. PROPERTY OWNER WILL BE RESPONSIBLE FOR MAINTAINING THE LATERAL FROM THE CONNECTION AT THE MAIN TO THE HOUSE.
5. LATERAL MAY BE SUBJECT TO TV INSPECTION (CONTRACTOR SHALL GIVE 24 HOUR NOTICE FOR INSPECTION).
6. CONTRACTOR SHALL STAMP AN IMPRESSED LETTER "S" ON THE TOP OF CURB TO IDENTIFY THE SERVICE LOCATION.



SEWER SERVICE

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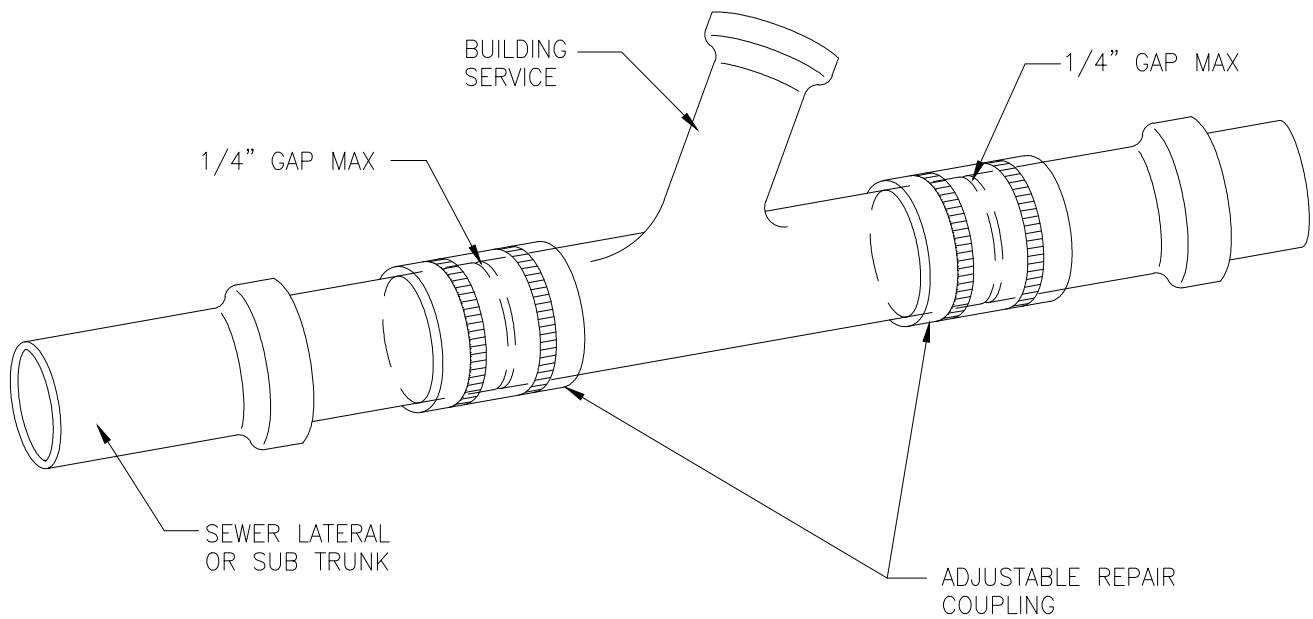
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NOTE:

TEES AND WYES INSTALLED IN MAINS UNDER CONSTRUCTION SHALL BE INSTALLED CONCURRENTLY WITH THE MAIN. ALL FITTINGS, INCLUDING THE JOINTS, SHALL BE OF THE SAME TYPE AND MATERIAL AS THE MAIN. CUT-IN TEES AND WYES WILL NOT BE PERMITTED ON A MAIN UNDER CONSTRUCTION.



NOTES:

1. THE ENGINEER SHALL BE PRESENT DURING INSTALLATION.
2. PIPE SHALL BE CUT IN SUCH A WAY AS TO ELIMINATE DAMAGE TO THE EXISTING MAIN.
3. WYE SADDLE WITH COLLAR MAY BE USED ON SEWER MAINS LESS THAN 5' DEEP.
4. A SYNTHETIC RUBBER WEDGED INSERTED TEE, "TAP-TITE", MAY BE SUBSTITUTED FOR THE ABOVE PROCEDURE.



CUT-IN SERVICE

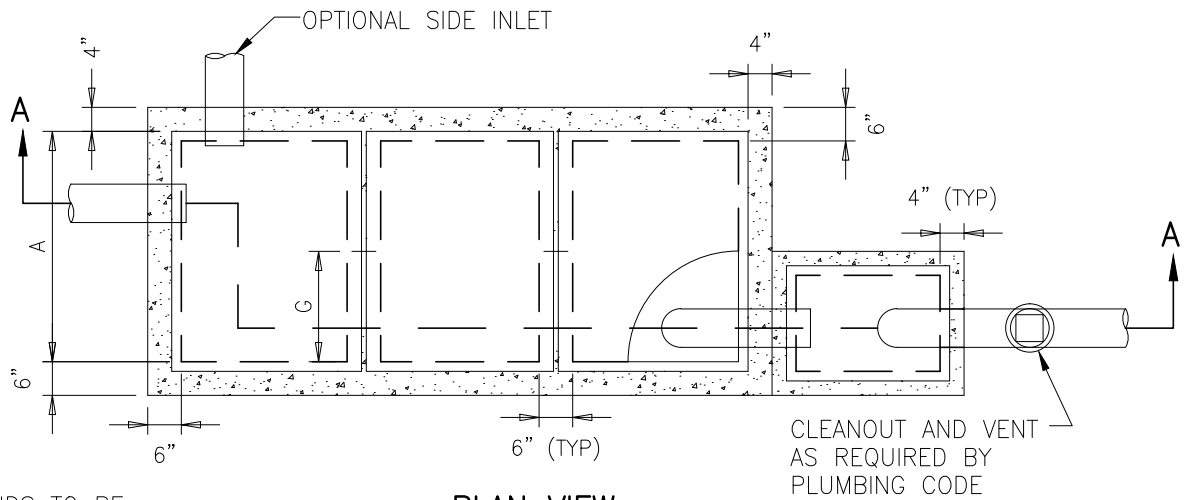
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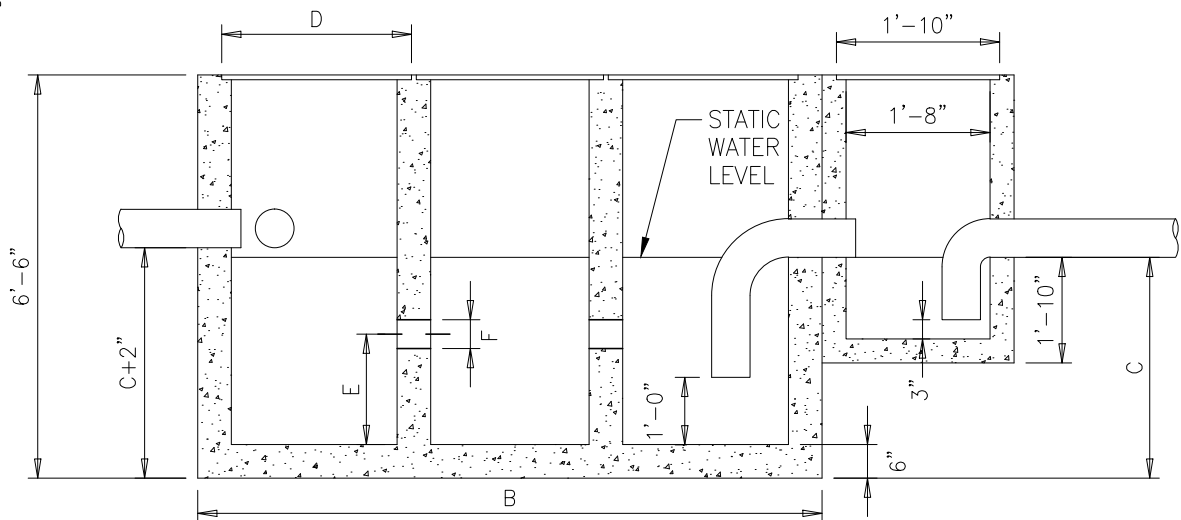
DATE

607



NOTE:
TRAFFIC LIDS TO BE
INSTALLED IN TRAFFIC
AREAS

PLAN VIEW



SECTION A-A

CAPACITY GALLONS	DIMENSIONS							COVER SIZE	METAL COVERS	PIPE SIZE
	A	B	C	D	E	F	G			
510	3'-0"	9'-6"	3'-0"	2'-6"	1'-6"	4 1/2"	1'-6"	2'-10" X 3'-4"	1/4" STEEL PLATE	4"
866	3'-5"	10'-3"	4'-0"	2'-5"	2'-0"	0'-6"	1'-9"	3'-10" X 3'-10"	3/8" ALUMINUM PLATE	4"
1260	4'-0"	12'-6"	4'-0"	3'-6"	2'-0"	0'-6"	2'-0"	3'-10" X 4'-4"	3/8" ALUMINUM PLATE	4"



SAND AND GREASE INTERCEPTOR

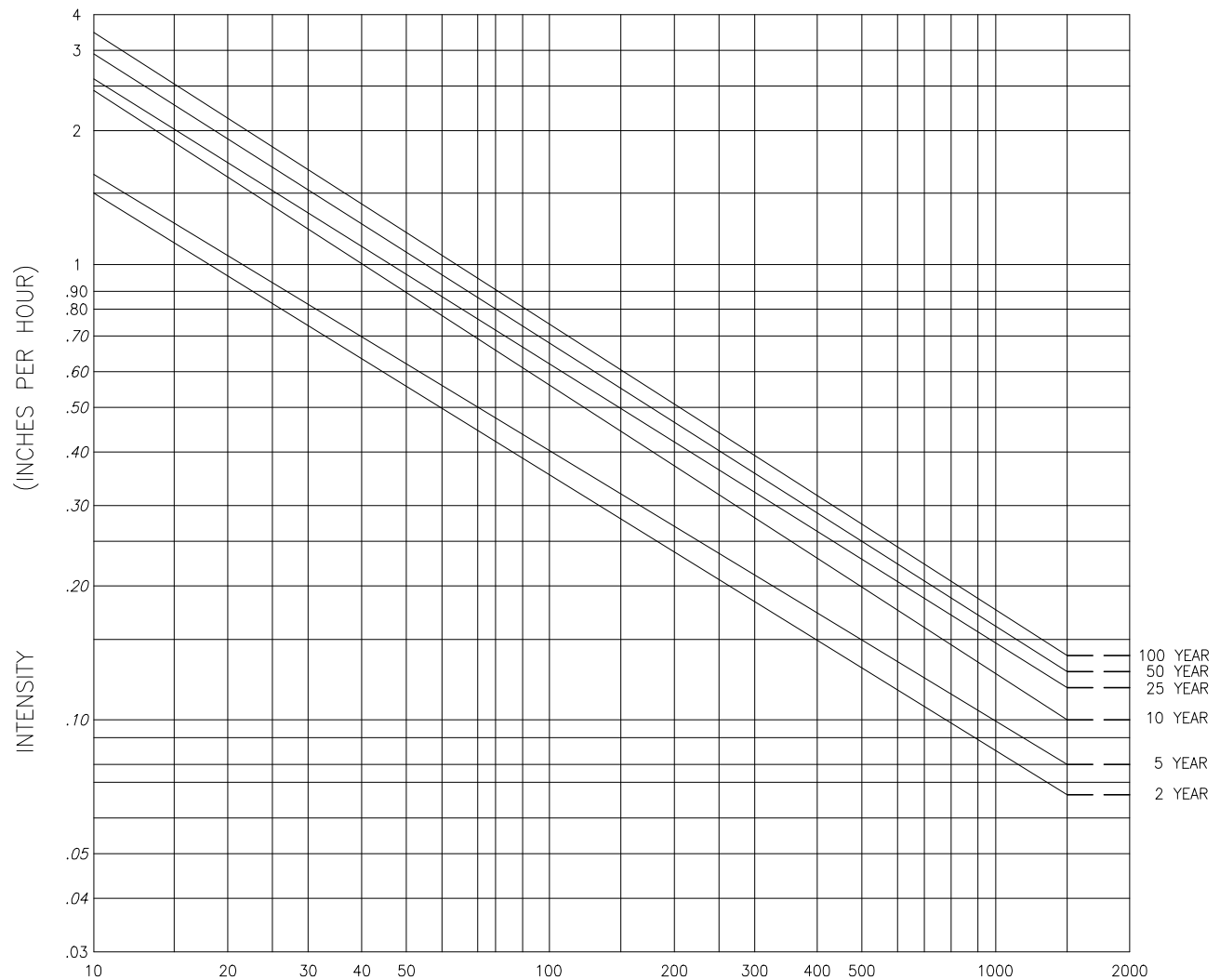
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12/05/2013

DATE

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GENERAL NOTES:

1. THESE RAINFALL INTENSITY CURVES ARE BASED ON CALIFORNIA DEPARTMENT OF WATER RESOURCES DATA ACCORDING TO COUNTY OF STANISLAUS 1989.

MINIMUM RETURN FREQUENCY:

STORM DRAINAGE COLLECTION FACILITIES	10-YEAR
CULVERTS	25-YEAR
RETENTION BASINS	100-YEAR



RAINFALL INTENSITY FREQUENCY CURVES

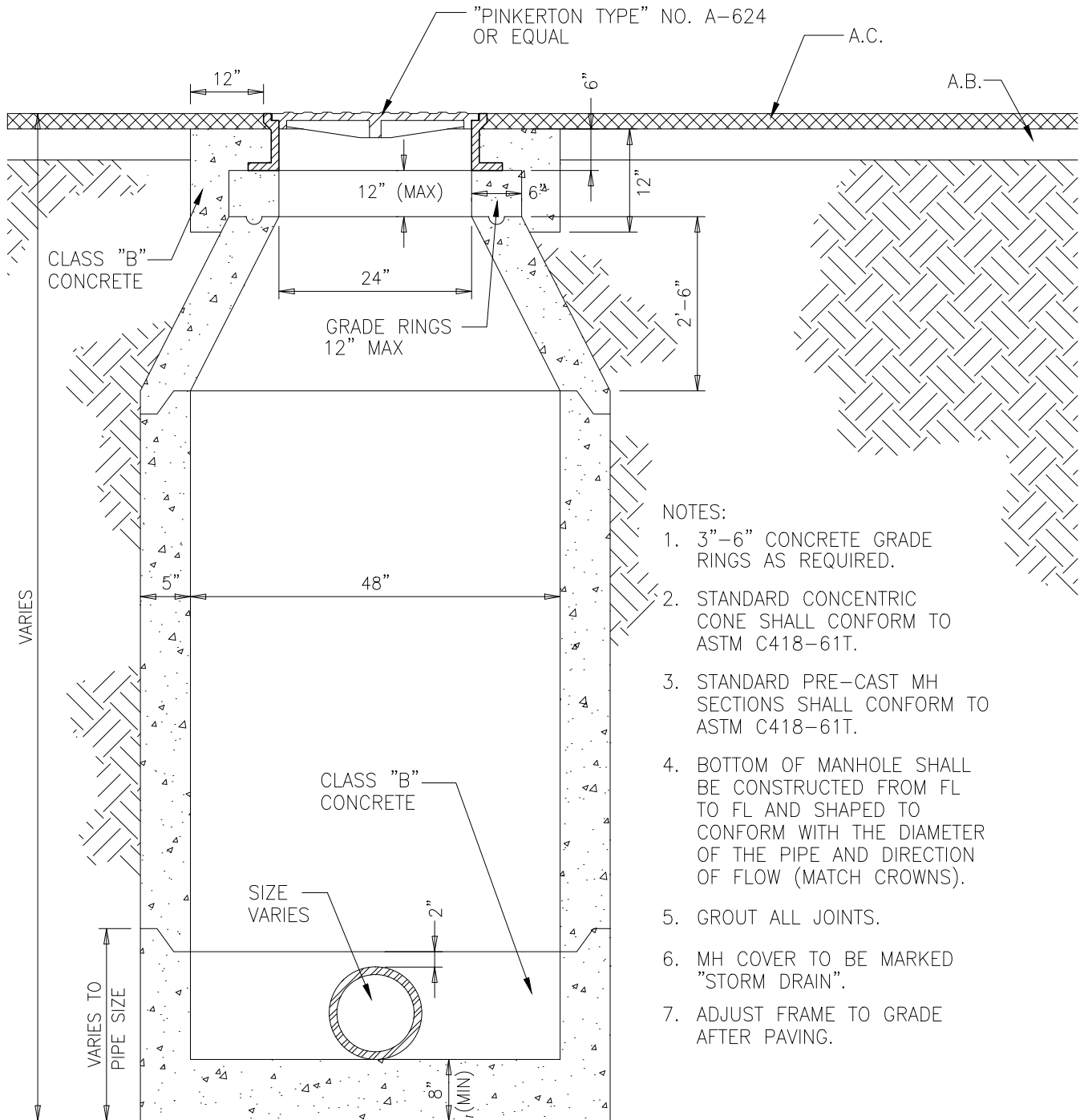
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STORM DRAIN MANHOLE

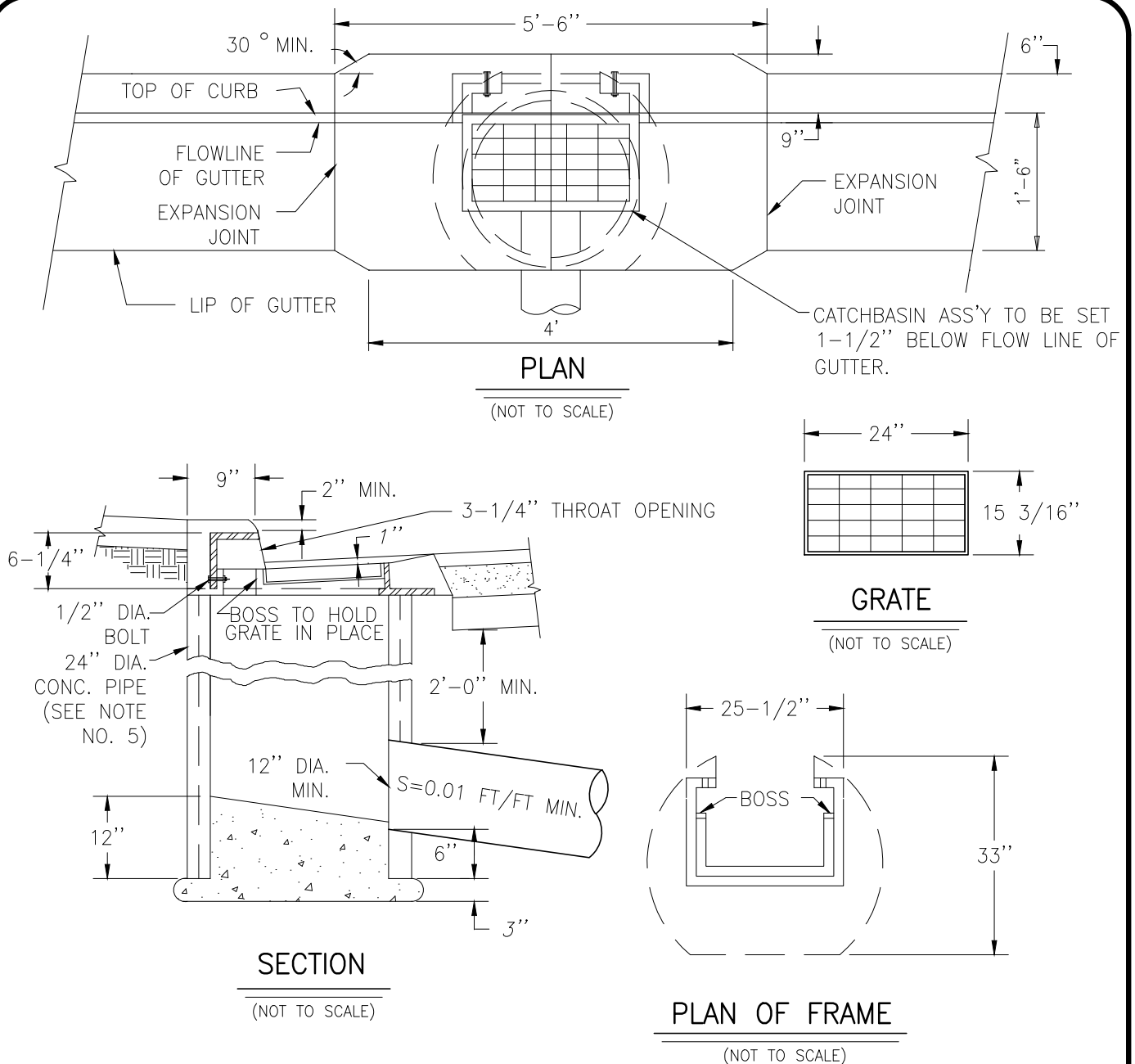
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NOTES:

1. ALL EXPOSED STEEL SHALL BE COATED WITH 2 COATS OF COAL TAR PITCH HEATED TO A MINIMUM OF 180°F OR GALVANIZED.
2. GRATE, FRAME AND MODIFIED SIDE INLET SHALL COMFORM TO PINKERTON A-645 FRAME WITH EITHER A-390 RIVETED OR A-390-M FABRICATED STEEL GRATE.
3. GRATE SHALL BE CHAINED TO FRAME.
4. GRATE SHALL BE DEPRESSED 1-1/2" BELOW GUTTER PROFILE GRADE.
5. 24" PIPE BARREL SHALL BE CLASS II R.C.P.



CATCH BASIN

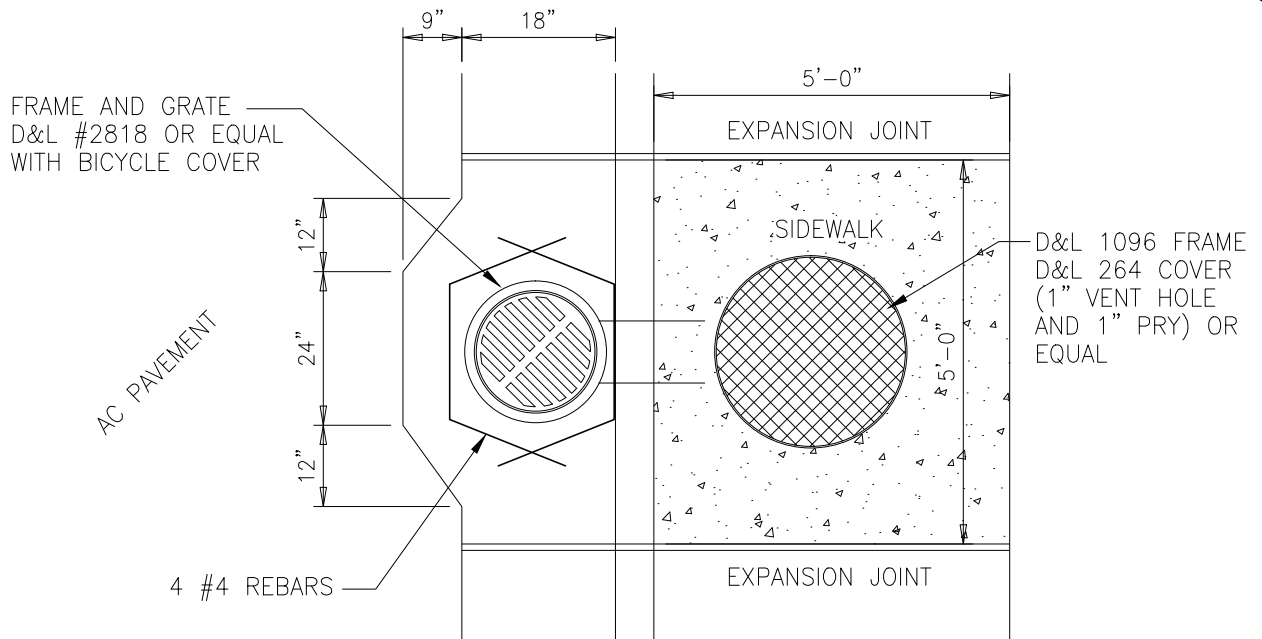
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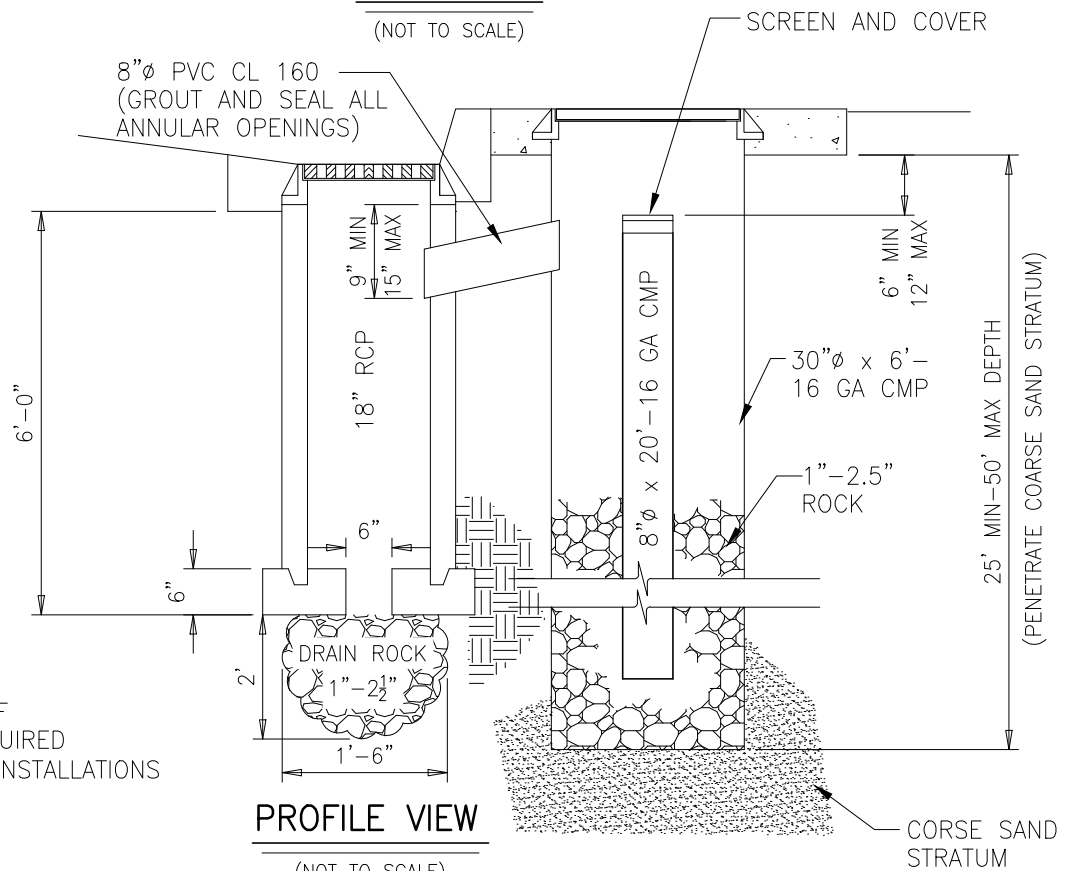
DATE

703



PLAN VIEW

(NOT TO SCALE)



PROFILE VIEW

(NOT TO SCALE)

NOTE:
PRIOR APPROVAL OF
CITY ENGINEER REQUIRED
FOR ALL DRYWELL INSTALLATIONS



CATCH BASIN AND DRYWELL

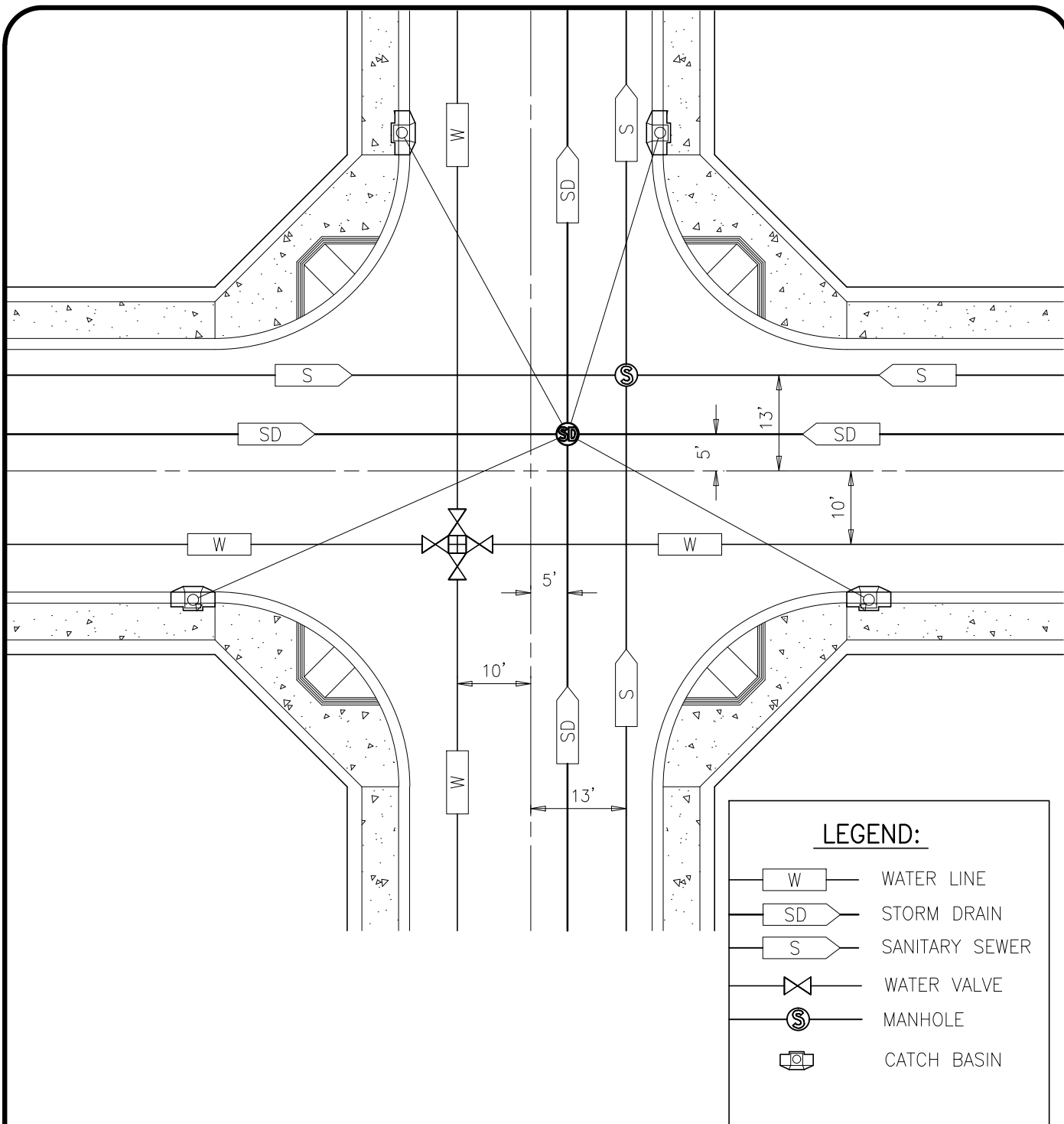
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DATE

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NOTES:

1. ANY DEVIATION FROM THE STANDARD LOCATION SHOWN MUST HAVE THE APPROVAL OF THE CITY ENGINEER.



LOCATION OF CITY UTILITIES

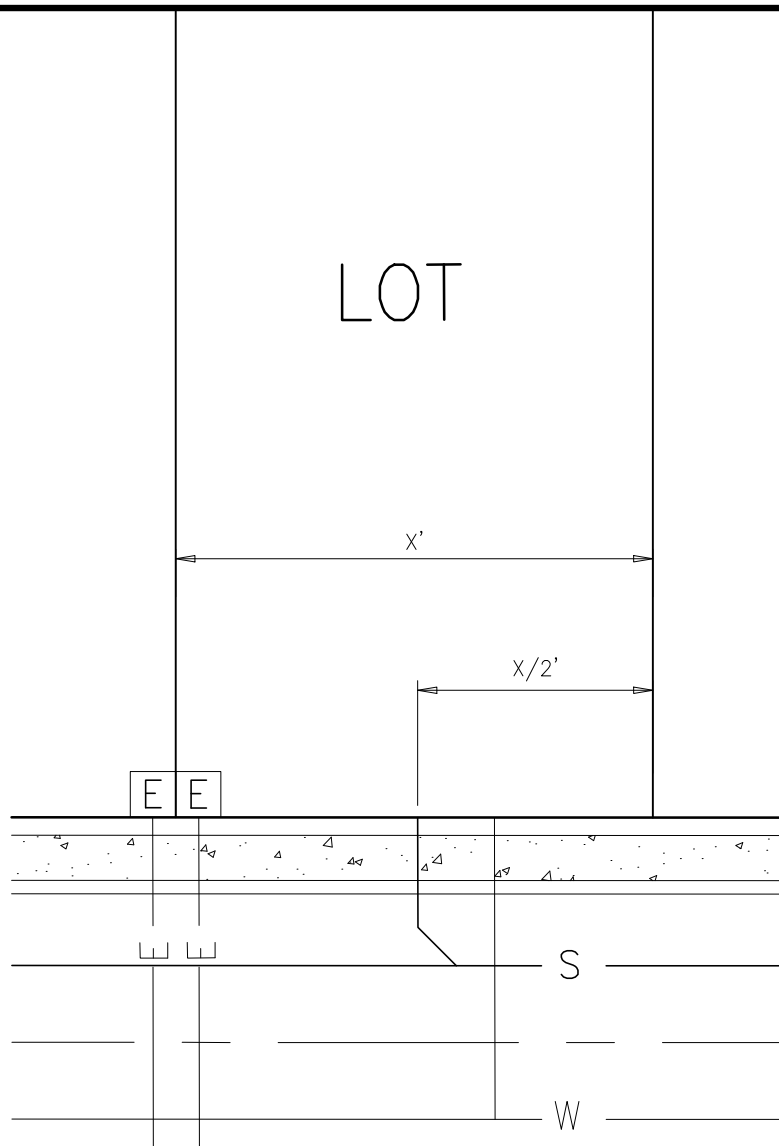
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NOTES:

1. SEWER CLEANOUT SHALL BE LOCATED AT THE MIDDLE OF THE LOT.
2. WATER SERVICES SHALL BE 10' OFF EITHER SIDE OF THE SEWER SERVICE.
3. WATER SERVICES SHALL BE LOCATED ON THE OPPOSITE SIDE OF THE ELECTRICAL SERVICES TO PREVENT METER BOXES IN THE DRIVEWAY.
4. BLOW-OFFS, ARV'S, SAMPLING STATIONS, AND FIRE HYDRANTS SHALL BE LOCATED WITHIN 3' OF A LOT LINE.
5. CATCH BASINS SHALL BE LOCATED ON OR VERY CLOSE TO LOT LINES AND OUT OF DRIVEWAYS.



LOCATION OF UTILITY SERVICES

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NEW PAVEMENT TO BE 1/8" HIGHER THAN ADJACENT PAVEMENT. APPLY FOG SEAL COAT OF SS-1 ASPHALT EMULSION.

IF LESS THAN 30" TO GUTTER OR CONCRETE FLATWORK, REMOVE AC FOR FINAL PATCH

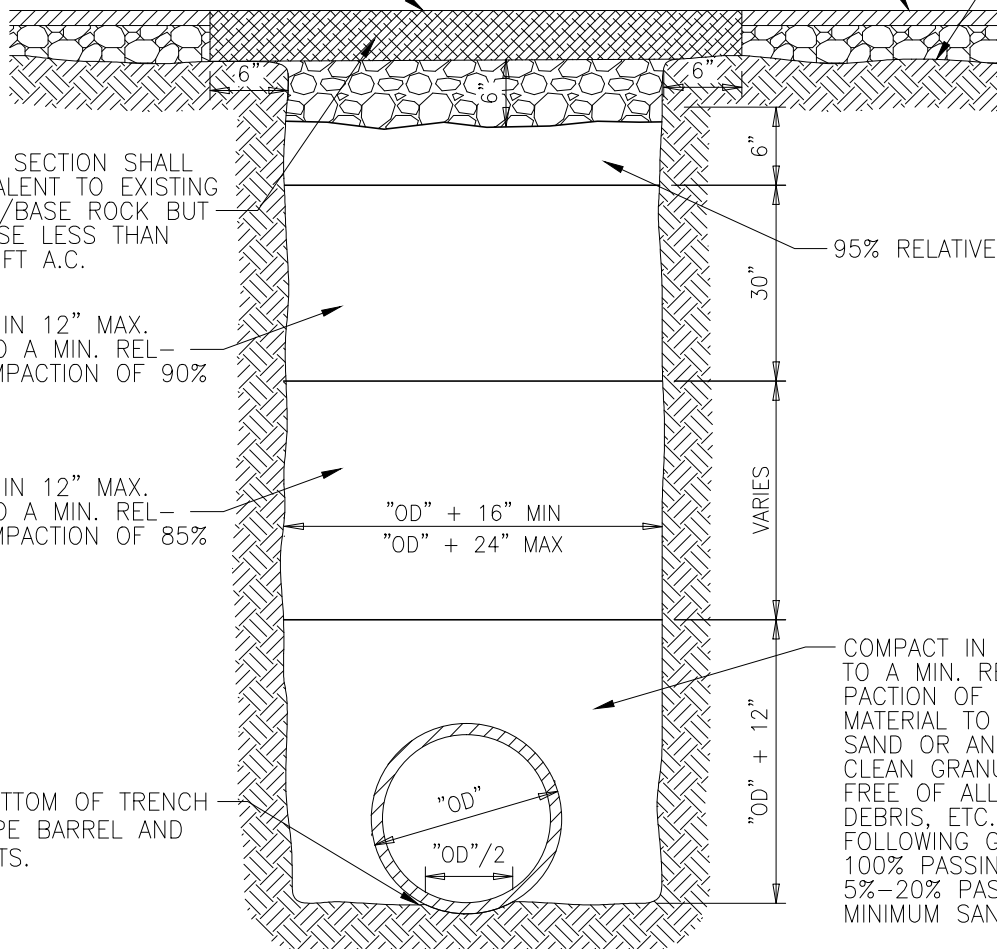
SUBGRADE

PAVEMENT SECTION SHALL BE EQUIVALENT TO EXISTING PAVEMENT/BASE ROCK BUT IN NO CASE LESS THAN 4 1/2" LIFT A.C.

COMPACT IN 12" MAX. LAYERS TO A MIN. RELATIVE COMPACTION OF 90%

COMPACT IN 12" MAX. LAYERS TO A MIN. RELATIVE COMPACTION OF 85%

SHAPE BOTTOM OF TRENCH TO FIT PIPE BARREL AND PIPE JOINTS.



COMPACT IN 6" MAX. LAYERS TO A MIN. RELATIVE COMPACTION OF 85% MATERIAL TO BE IMPORTED SAND OR AN APPROVED CLEAN GRANULAR MATERIAL FREE OF ALL LUMPS AND DEBRIS, ETC. HAVING THE FOLLOWING GRADE:
100% PASSING 3/4";
5%-20% PASSING NO. 200
MINIMUM SAND EQUIVALENT =20

NOTES:

1. TRENCH SECTION SHALL BE BACKFILLED AND MECHANICALLY COMPACTED TO GRADE.
2. CONTRACTOR MAY, AT HIS EXPENSE, EXCAVATE 6" BELOW THE BOTTOM OF THE PIPE AND REPLACE WITH SAND OR AGGREGATE SUBBASE IN LIEU OF SHAPING BOTTOM OF TRENCH TO FIT PIPE BARREL. JOINTS SHALL BE SHAPED IN EITHER CASE.
3. WHEN TRENCH AND EXCAVATION IS IN EXISTING PAVED STREETS, REPLACE PAVEMENT 6" ON EACH SIDE OF THE TRENCH.
4. TRENCHING IN EASEMENTS AND OTHER AREAS NOT IN STREET R/W MAY BE BACKFILLED WITH NATIVE MATERIAL TO RELATIVE COMPACTION OF 85%.
5. DEVIATION FROM ABOVE MAY BE ALLOWED WHEN APPROVED BY THE CITY ENGINEER.
6. IF DEVIATING FROM STANDARD TRENCH SECTION, THE DEVIATION SHALL BE SO NOTED ON THE PLANS AND SPECIFICATIONS.
7. MATURE PAVING THAT HAS BECOME BRITTLE IN THE ENGINEER'S JUDGEMENT, SHALL BE LINE CUT WITH A DIAMOND SAW.
8. CONTROLLED DENSITY FILL (CDF) MAY BE USED IN LIEU OF SPECIFIED BACKFILL METHOD. MINIMUM TRENCH WIDTH MAY BE REDUCED TO 2-1/2" CLEAR OF EACH SIDE OF PIPE.



TRENCH SECTION EXISTING STREETS

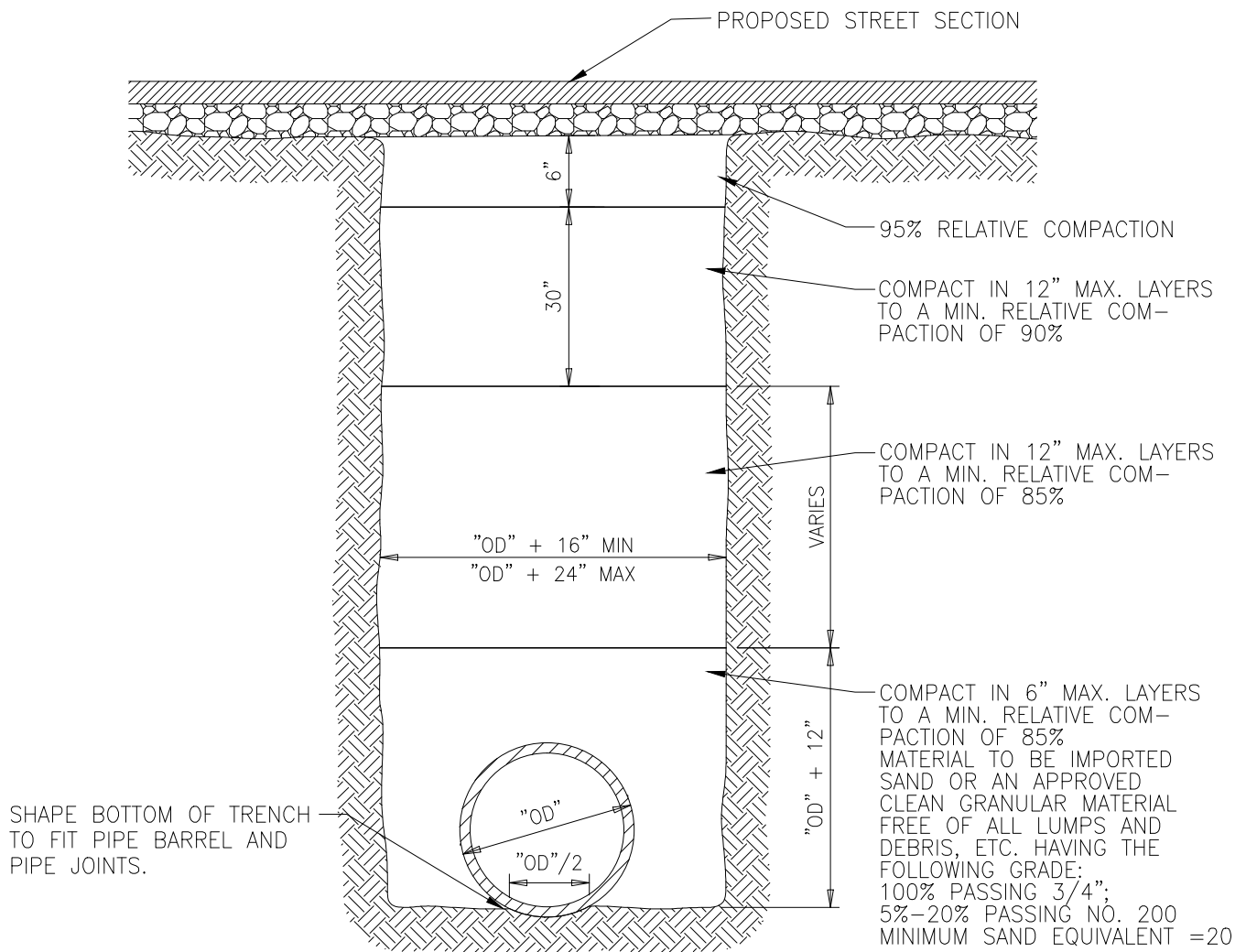
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NOTES:

1. TRENCH SECTION SHALL BE BACKFILLED AND MECHANICALLY COMPACTED TO GRADE.
2. CONTRACTOR MAY, AT HIS EXPENSE, EXCAVATE 6" BELOW THE BOTTOM OF THE PIPE AND REPLACE WITH SAND OR AGGREGATE SUBBASE IN LIEU OF SHAPING BOTTOM OF TRENCH TO FIT PIPE BARREL. JOINTS SHALL BE SHAPED IN EITHER CASE.
3. TRENCHING IN EASEMENTS AND OTHER AREAS NOT IN STREET R/W MAY BE BACKFILLED WITH NATIVE MATERIAL TO RELATIVE COMPACTION OF 85%.
4. DEVIATION FROM ABOVE MAY BE ALLOWED WHEN APPROVED BY THE CITY ENGINEER.
5. IF DEVIATING FROM STANDARD TRENCH SECTION, THE DEVIATION SHALL BE SO NOTED ON THE PLANS AND SPECIFICATIONS.
6. CONTROLLED DENSITY FILL (CDF) MAY BE USED IN LIEU OF SPECIFIED BACKFILL METHOD. MINIMUM TRENCH WIDTH MAY BE REDUCED TO 2-1/2" CLEAR OF EACH SIDE OF PIPE.

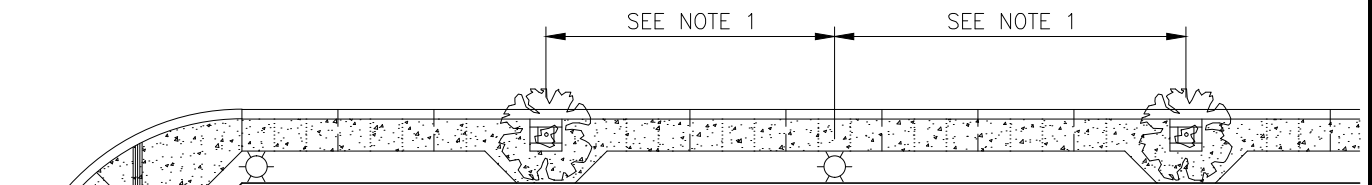
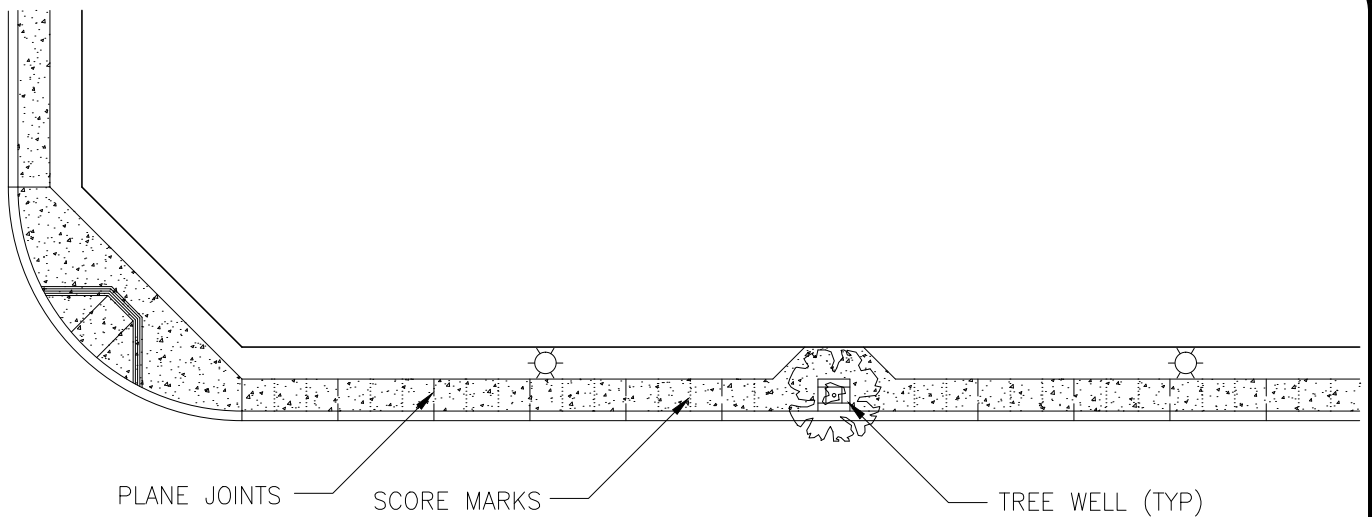


TRENCH SECTION NEW STREETS

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NOTES:

1. SPACING OF TREE WELLS SHALL BE AS APPROVED BY THE CITY ENGINEER (30' MIN-50' MAX) WITH WELLS EQUALLY SPACED. TREE WELLS IN THE DOWNTOWN DISTRICT SHALL BE ALTERNATED WITH STREET LIGHTS.
2. STANDARD SIZE OF TREE WELLS IS 5' X 5'.
3. ALL NEW OR IMPROVED COMMERCIAL FRONTAGE SHALL HAVE TREE WELLS. IF A MONOLITHIC SIDEWALK IS INSTALLED. PLANS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.
4. SEE STANDARD DETAIL 902 FOR TREE BLOCK-OUT DETAIL.
5. AVOID UTILITY TRENCHES, SEWER LATERALS, AND WATER SERVICES, ETC BY 8' MINIMUM.
6. PROVIDE BUBBLER SPRINKLER HEAD TO EACH TREE WELL FROM ADJACENT LANDSCAPE AREA OR WATER SOURCE. FOR BACK-UP FRONTAGES, LOCATION OF METER BOX AND VALVE TO BE AS APPROVED BY CITY ENGINEER.
7. A REDUCED PRESSURE PREVENTION DEVICE SHALL BE REQUIRED AT SERVICE CONNECTION.
8. THE DISTANCE FROM DRIVEWAYS TO TREE WELLS SHALL BE 10' MINIMUM.



TREE WELL SPACING

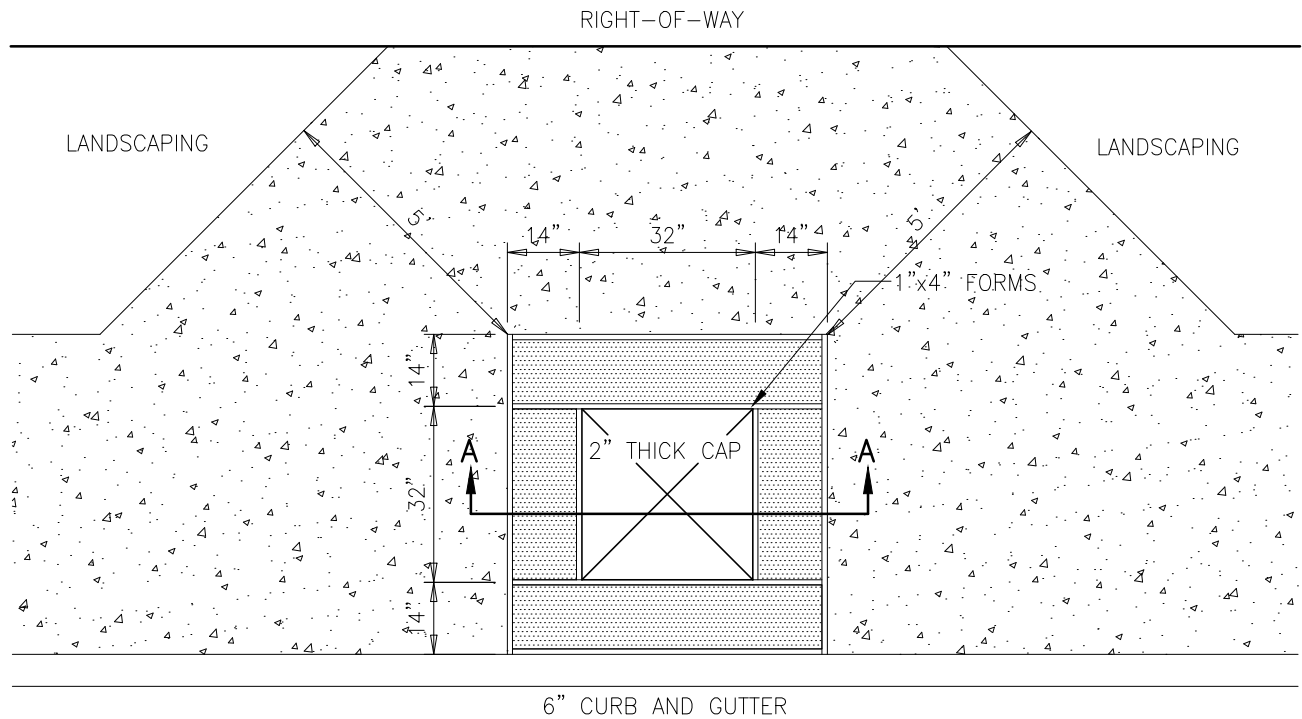
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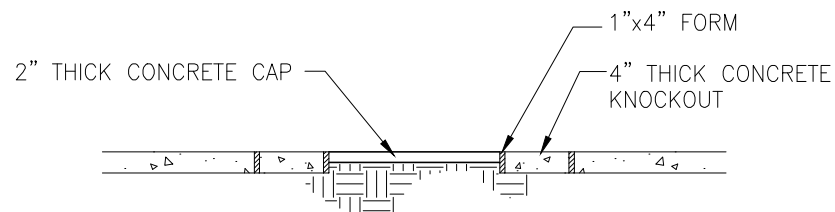
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PLAN VIEW

(NOT TO SCALE)



SECTION A-A

(NOT TO SCALE)

NOTES:

1. THE CITY ENGINEER SHALL DETERMINE THE FINAL PLACEMENT AND SPACING OF TREE BLOCK-OUTS (APPROX 40' O.C.)
2. USE 1"x4" REDWOOD OR CEDAR FORMS.



TREE BLOCK-OUT

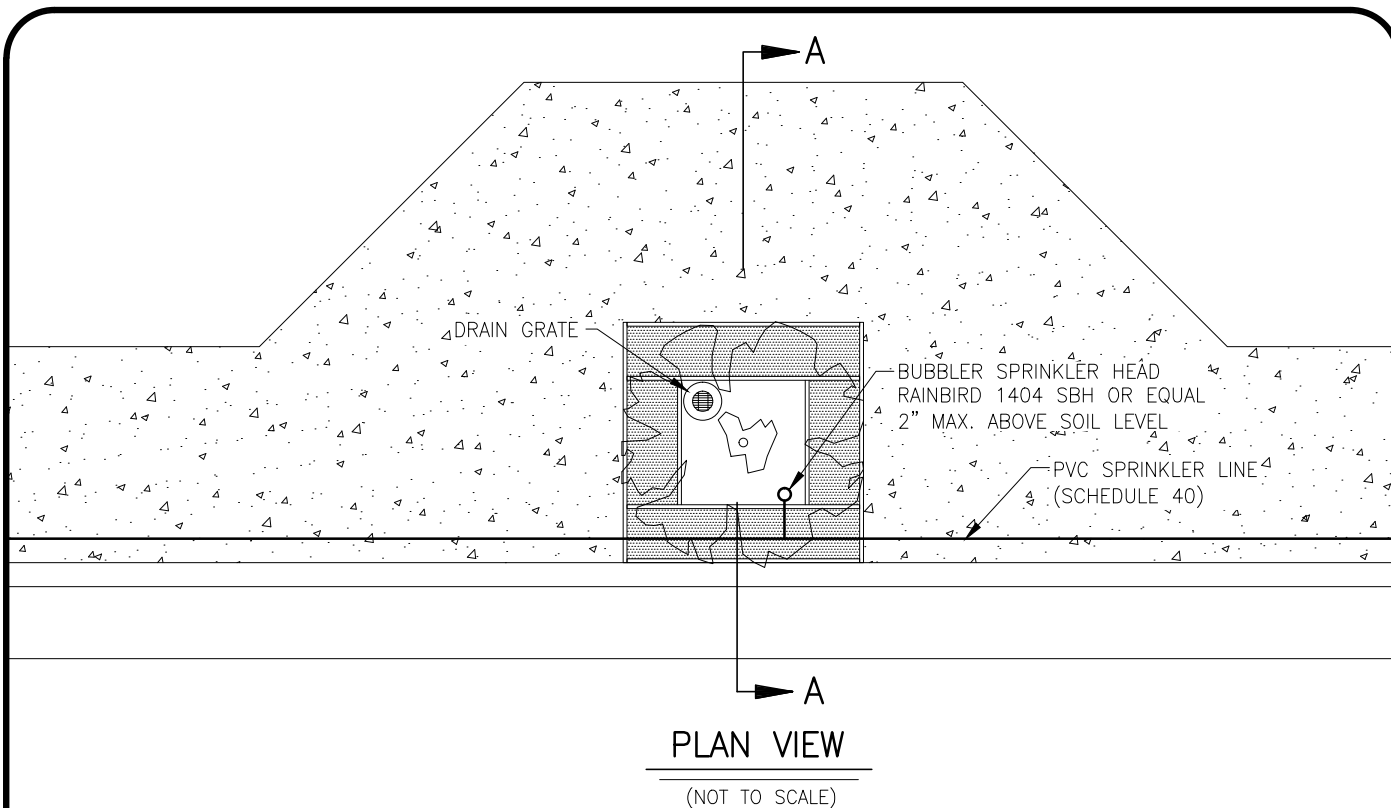
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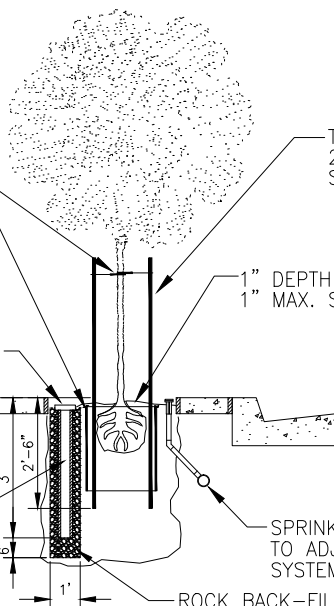


2 STRAND TWISTED 12 GAGE GALV. WIRE
ENCASED IN 1" DIA. RUBBER HOSE OR
2" WIDE ELASTIC WEBBING ATTACHED TO
ANCHOR STAKES WITH GALV. SCREWS OR
NON-RUSTING STAPLES

CENTURY PRODUCTS MODEL ODWS
24" DEEP X 69" CIRCUMFERENCE
ROOT BARRIER/DEEP WATERING
SYSTEM OR EQUAL

DRAIN GRATE 2" BELOW SIDEWALK

4" DIA. P.V.C. PERFORATED PIPE
WITH PLASTIC DRAIN GRATE. GRATE
& PIPE TO BE COMPATIBLE
PLASTIC FOR SOLVENT WELDING.



NOTE:

BACKFILL SHALL BE A FRIABLE LOAM, TYP OF CULTIVATED
TOPSOILS LOCALLY, CONTAINING AT LEAST 2% HUMUS. IT
SHALL BE RESONABLY FREE OF STONES, CLODS, STICKS
OR OTHER OBJECTIONABLE EXTRANEIOUS MATTER OR DEBRIS.
IT SHALL NOT CONTAIN TOXIC MATERIALS.



TREE WELL PLANTING

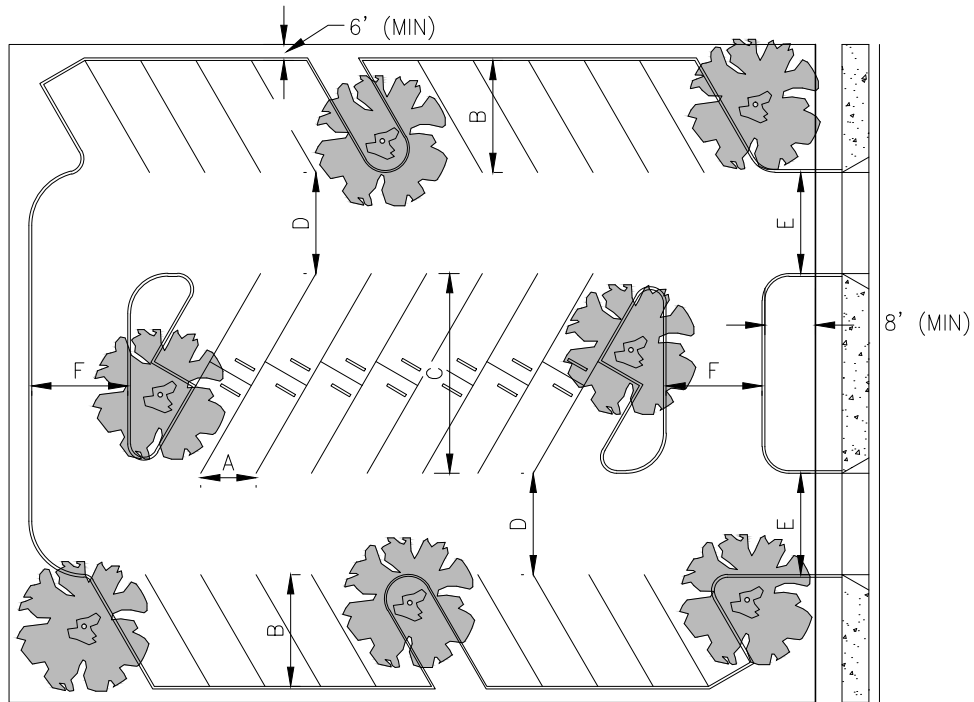
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DATE

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PARKING ANGLE		45°	50°	55°	60°	70°	80°	90°
A. STALL WIDTH	A.	12.7'	11.8'	11.0'	10.4'	9.6'	9.1'	9.0'
B. STALL DEPTH	B.	20.5'	21.1'	21.6'	21.8'	21.9'	21.3'	20.0'
C. DOUBLE STALL DEPTH	C.	34.7'	36.4'	37.9'	39.1'	40.7'	41.0'	40'
D. AISLE WIDTH	D.	13.0'	15.0'	17.0'	19.0'	23.0'	27.0'	31.0'
E. DRIVEWAY WIDTH	E.	SEE NOTE 4						
F. TURNAROUND	F.	SEE NOTE 5						

NOTES:

1. EACH OFF-STREET PARKING STALL SHALL CONTAIN A RECTANGULAR AREA WITH A MINIMUM WIDTH OF 9' AND A MINIMUM LENGTH OF 20'.
2. A MAXIMUM OF 30% OF REQUIRED STALLS MAY BE DESIGNATED FOR COMPACT CARS. COMPACT CAR STALLS SHALL CONTAIN A RECTANGULAR AREA WITH A MINIMUM WIDTH OF 7.5' AND A MINIMUM LENGTH OF 15'.
3. PARKING AREAS SHALL BE PAVED WITH A MINIMUM OF 2" AC AND SHALL BE GRADED AND DESIGNED TO DISPOSE OF ALL SURFACE WATER AS APPROVED BY THE CITY ENGINEER.
4. ANY DRIVEWAY USED FOR BOTH INGRESS AND EGRESS TO AND FROM A PARKING LOT AND NOT DIRECTLY SERVING PARKING STALLS SHALL HAVE A MINIMUM WIDTH OF 20'. ANY DRIVEWAY USED ONLY FOR EITHER INGRESS OR EGRESS TO OR FROM A PARKING LOT AND NOT DIRECTLY SERVING PARKING STALLS SHALL BE A MINIMUM OF 10' IN WIDTH. ALL DRIVEWAYS CONNECTING PUBLIC RIGHTS-OF-WAY TO OFF-STREET PARKING LOTS SHALL COMPLY WITH CITY OF WATERFORD REQUIREMENTS.
5. TURNAROUNDS SHALL BE A MINIMUM OF 18' WIDE.
6. ALL PARKING AREAS OF 5 OR MORE STALLS SHALL BE MARKED BY EITHER STRIPING OR BUTTONS TO DELINEATE SPACES.
7. ALL PARKING AREAS OF 10 OR MORE SPACES SHALL BE LANDSCAPED. THERE SHALL BE ONE DECIDUOUS SHADE TREE PLANTED FOR EACH 10 STALLS. THE TREES SHALL BE DISTRIBUTED THROUGHOUT THE AREA TO SHADE SPACES ON AS UNIFORM A BASIS AS PRACTICAL. FOR PARKING AREAS WITH ONLY ONE AISLE THE TREES MAY BE PLANTED ALONG THE PERIPHERY.
8. FOR ANY GIVEN PARKING ANGLE BETWEEN 45° AND 90° NOT SPECIFICALLY LISTED IN THE ABOVE TABLE, USE THE TABLE ANGLE NEAREST THE GIVEN ANGLE.



PARKING LOT STANDARDS TYPICAL LAYOUT

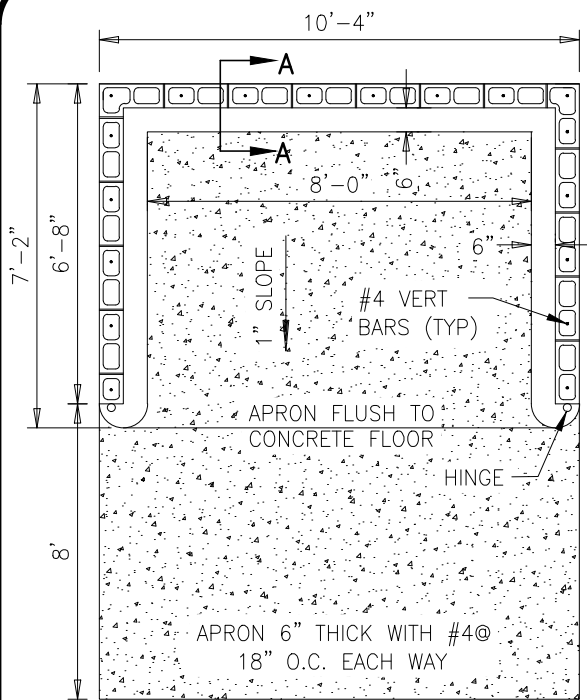
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12/05/2013

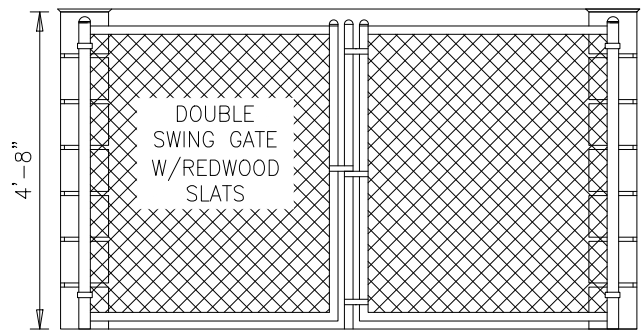
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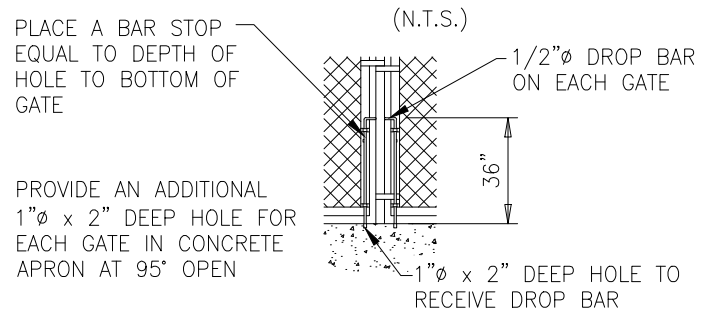


PLAN VIEW

(N.T.S.)



FRONT ELEVATION

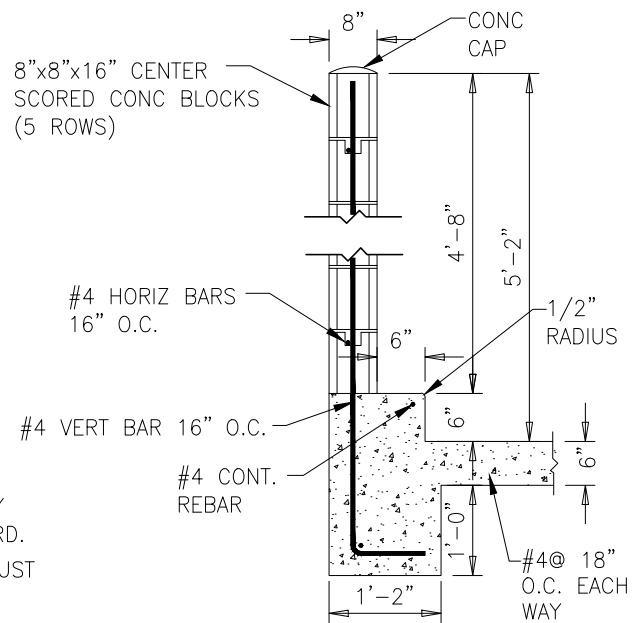


CANE BOLT LATCH

(N.T.S.)

NOTES:

1. ALL CELLS IN CONCRETE BLOCKS SHALL BE FILLED SOLID WITH COARSE GROUT.
2. CORNER BLOCK ENDS AND CENTER WEB SHALL BE CUT TO FORM A CONTINUOUS BOND BEAM.
3. ALL HORIZONTAL AND VERTICAL JOINTS SHALL BE RAKED TO MATCH CENTER SCORED BLOCK.
4. CONCRETE BLOCK, MORTAR, AND COARSE GROUT SHALL CONFORM WITH APPLICABLE SECTION OF THE LATEST UNIFORM BUILDING CODE.
5. SLAB FLOOR AND FOOTING SHALL BE CLASS "B" PORTLAND CEMENT CONCRETE.
6. GROUND SHALL BE SLOPED AWAY FROM WALLS.
7. MULTIPLE BIN ENCLOSURES SHALL BE EVEN MULTIPLES OF 10' IN WIDTH.
8. LOCATION OF CONTAINER ENCLOSURE TO BE APPROVED BY THE SOLID WASTE DEPARTMENT OF THE CITY OF WATERFORD.
9. IF GATES ARE INSTALLED ON ENCLOSURE HINGES, THEY MUST BE ATTACHED IN FRONT RATHER THAN ON THE SIDE OF THE ENCLOSURE WALLS.
10. CHAIN LINK GATES, POSTS, LATCHES, AND APPURTENANCES SHALL CONFORM TO CALTRANS STANDARDS.



SECTION A-A

(N.T.S.)



**CONCRETE BLOCK
TRASH ENCLOSURE**

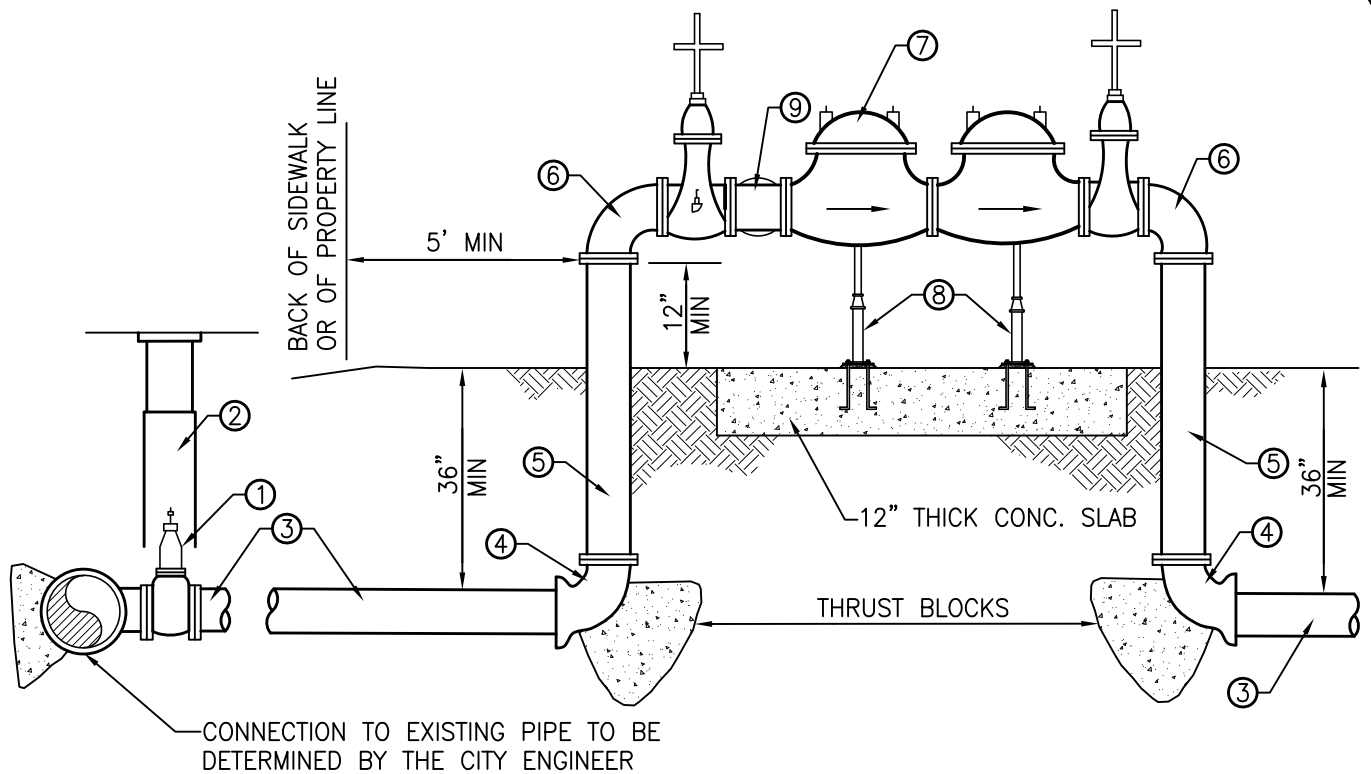
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12/05/2013

DATE

1002



- ① 6" GATE VALVE ON NEW OR REPLACEMENT PIPES OR TAPPING VALVE ON EXISTING PIPE (FLG. x FLG.)
- ② VALVE BOX (STD. DWG. 512)
- ③ STANDARD STEEL PIPE ML&C
- ④ 90° BEND (M.J. x FLG.)
- ⑤ DUCTILE IRON OR SCHEDULE 40 PIPE
- ⑥ 90° BEND (FLG. x FLG.)
- ⑦ CITY APPROVED REDUCED PRESSURE BACKFLOW PREVENTOR
- ⑧ PIPE SUPPORT (STD. DWG. 516)
- ⑨ DETECTOR CHECK METER

NOTE:

1. FDC, CHECK VALVE, AND PIV TO BE LOCATED ON SITE AND APPROVED BY STANISLAUS CONSOLIDATED FIRE PROTECTION DISTRICT.
2. ML&C PIPE SHOULD BE COATED TO 4" ABOVE GROUND LINE.



TYPICAL FIRE SERVICE WITH DETECTOR CHECK INSTALLATION

TONY B. MARSHALL, CITY ENGINEER

12/05/2013

DATE

1003

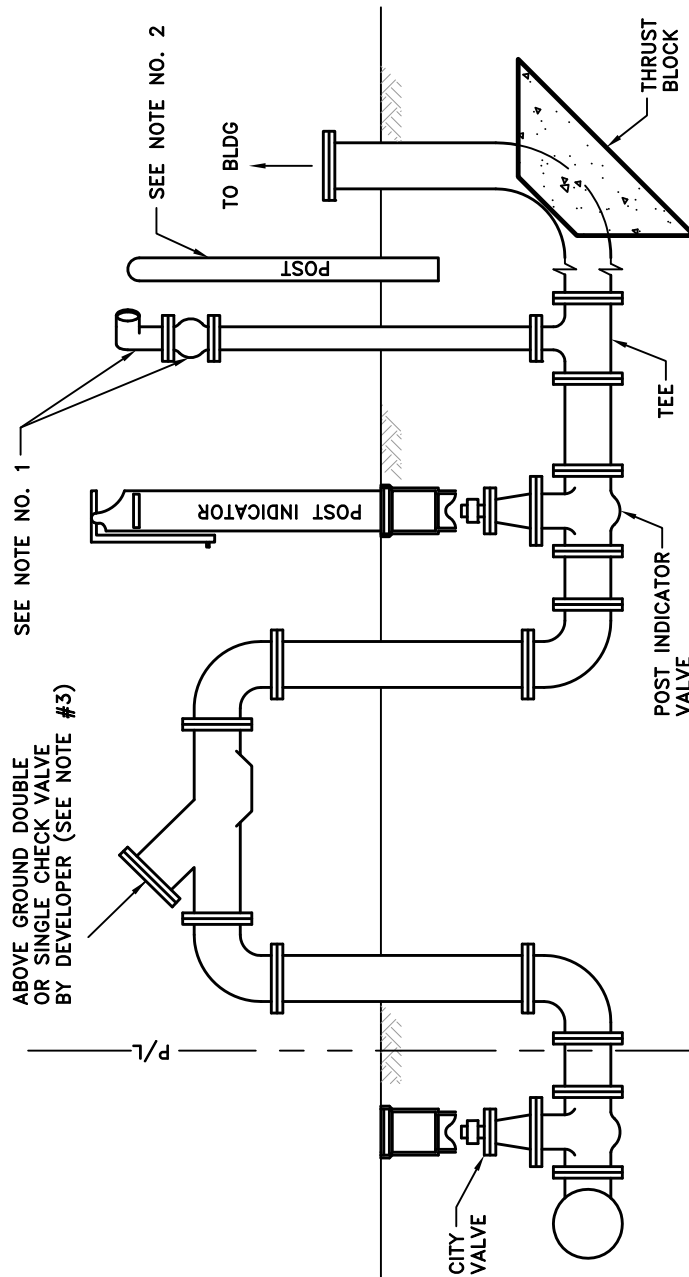


TYPICAL FIRE SPRINKLER WITH POST INDICATOR VALVE

Tom Marshall
TONY B. MARSHALL, CITY ENGINEER

12/05/2013
DATE

1004



NOTES:

1. LISTED AND APPROVED FIRE DEPT. CONNECTION WITH CHECK VALVE PER STANISLAUS CONSOLIDATED FIRE PROTECTION DISTRICT.
2. GUARD POSTS AS REQUIRED.
3. DOUBLE OR SINGLE CHECK VALVE DETERMINED BY FIRE SPRINKLER DESIGNER WITH APPROVAL BY THE CITY CROSS CONNECTION SPECIALIST. A MINIMUM OF A SINGLE CHECK VALVE REQUIRED FOR FIRE HYDRANTS ON PRIVATE PROPERTY.
4. CLASS 3-6 FIRE SPRINKLER SYSTEMS MAY REQUIRE DOUBLE CHECK VALVE ASSEMBLY OR REDUCED PRESSURE DEVICE. PLANS SHALL BE APPROVED BY THE CROSS CONNECTION SPECIALIST.

1. GENERAL

1.1 GENERAL:

These 2013 Improvement Standards of the City of Waterford include the Specifications and Drawings as contained herein. These Improvement Standards have been prepared to aid all persons engaged in the design and construction of public works within the City of Waterford. Portions of these standards also apply to private work within the city limits, such as site improvements in commercial developments.

This document is not intended to be used as Contract Documents between the City or private developer and a contractor. Rather, separate Contract Documents must be prepared for each project with Special Provisions applicable to that particular project.

1.2 DEFINITIONS

The following definitions shall apply to these 2013 Improvement Standards:

City - City of Waterford

CA-MUTCD – The current version of the California Manual on Uniform Traffic Control Devices.

Developer - Subdivider, Developer, Property Owner, Registered Engineer or Contractor proposing to design or construct public improvements (or private improvements that serve the general public) in the City of Waterford.

Engineer - City Engineer of the City of Waterford or his authorized representative.

Improvement Plans – Plans of proposed improvements prepared by the Developer or City and approved by City Engineer.

Public Works Department - Department of Public Works of the City of Waterford.

Special Provisions - Specifications accompanying contract documents.

City Contractor - Persons engaged in construction under contract with the City of Waterford.

Standards - These 2013 Improvement Standards of the City of Waterford. They include both the text (specifications) and drawings contained herein.

State Standards - The current edition of the Improvement Standards and Plans of the State of California, Department of Transportation.

State Traffic Manual – The current edition of the California Department of Transportation Traffic Manual.

Utility - water, sewer, storm drain, gas, electric, telephone, cable, irrigation, railroads, etc.

1.3 PLANS: PLAN SHEET REQUIREMENT

Proposed improvement plans shall be provided to the Engineer for plan checking, review, and comment prior to the commencement of any work. Developer shall pay applicable plan check fees to the Department of

Public Works at the time of plan submittal. Improvement plans and drawings shall conform to the following drafting standard and minimum requirements:

(A) Paper and Scaling Requirements

All improvement plans shall be prepared on 24" x 36" paper. Scales: horizontal 1" = 20', 40' or 50', vertical 1" = 2', 4' or 5', respectively, but only the scale, horizontal and vertical, for which the sheet was intended shall be used.

(B) Drafting Standards

All line work must be sufficiently clear, sharp and heavy to be legible on a half-size or 11" x 17" format. Letters and numbers must be 1/8-inch minimum height, well formed and sharp. Numerals showing profile elevations shall not be bisected by station grid lines. Dimension lines shall be terminated by sharp solid arrowheads. Computer-aided drafting format is required, with a Compact Disk (CD) containing the AutoCAD data files for the development, suitable for incorporation into the City data base.

(C) Title Block

Each sheet within the set of drawings shall have an approved title block showing the sheet title, page number, date, scale the design engineer name, signature stamp and license number, the street address or Assessors Parcel Number (APN) and the name of the subdivision project or assessment district.

(D) General Information Requirements

1. The following information shall be listed on the cover or title sheet of plans, or on the first sheet if there is no title sheet:
 - a. Location Map
 - b. Index of sheets
 - c. Legend of symbols
 - d. Signature blocks in the lower right hand corner of the sheet for approval by the appropriate representative of the City.
2. In addition, the following information shall be shown on the water plan and/or the title sheet:
 - a. The entire subdivision or parcel and proposed project
 - b. City boundary (if on, or adjacent to the project site) and nearby existing facilities
 - c. Street names and widths
 - d. Adjacent subdivisions, including lot lines and lot numbers

(E) Plan Details

In addition to other requirements of these Construction Standards, the following details shall be shown on the plans submitted for approval.

1. Right-of-way lines, the boundaries of lots, easements, section lines and corners, land grant lines and temporary construction easements, both existing and proposed, shall be shown on the plans. All right-of-way and easement lines shall be properly dimensioned and identified.

2. Topography and Existing Utilities - All pertinent topographic features shall be shown, such as street lines, medians, driveways, curbs, sidewalks, location and size of storm and sanitary sewer lines, water lines, gas lines, telephone conduits, other underground utilities, existing structures, houses, trees, (six inches in diameter and larger) and other foliage, traffic signals, street lights and pull-boxes, underground electrical conduits, drainage ditches, utility poles, fire hydrant, retaining walls, masonry structures, and all other features of the area which may affect the design requirements. When a potential utility conflict exists, As Built evaluations of the utilities shall be verified by the design engineer. The best available information shall be used and shown to the best ability of the design engineer after coordination with the utility providers, even if the best available information may have inherent inaccuracies.
3. Profiles - Plans shall include profiles of all proposed utilities (water mains shall show both top and invert of pipe). Sections shall be shown where the following occur:
 - a. Any utilities main crossings
 - b. Special design or construction locations
4. Stationing and Orientation shall be as follows unless modifications to the following have been accepted prior by City:
 - a. Stationing on plan and profile shall read from left to right.
 - b. Stationing shall increase from south to north or from west to east.
 - c. Plans shall be arranged so that North arrow points toward the top or upper right.
5. Bench Marks - The bench marks and datum shall be clearly delineated on the plans as to location, description and elevations. The datum shall be 1929 North American Datum (U.S.G.S. or U.S.D. & G.S.).
6. Special Notes and Details - Special notes shall be included to clarify the design.

(F) APPROVED PLANS

Three (3) sets of complete plans and specifications for all proposed improvements including any necessary dedications shall be submitted to City for approval. Plans must be approved and signed by the Engineer prior to beginning improvement construction.

Approved plans must be resubmitted, if not constructed after twelve (12) months of date of signature approval by City.

Additionally, plans will not be approved until each of the following items has been submitted as required:

1. Two copies of the approved development plans depicting water distribution system; the entire water system shall be detailed on one sheet and submitted in AutoCAD 2013 (or later) on Compact Disk (CD). The water system layout will include all water related facilities, streets, parcels, lot numbers etc.
2. Projects that exceed 200 service connections or 20 acres may be required to submit a computer modeled for the water supply system design.

1.4 INSPECTION:

All work and materials furnished under these Improvement Standards shall be subject to the inspection and approval of the Engineer. The Engineer shall have access to the work at all times and shall be furnished every reasonable opportunity for ascertaining that the methods, materials and workmanship are in accordance with the requirements and intents of these Improvement Standards. Any work constructed without inspection as provided above, except with the specific written consent or approval of the Engineer, or constructed contrary to the instructions or order of the Engineer or his authorized representative, must, if requested by City, be uncovered for examination and properly restored at the Developer's expense. The inspection of the work does not release the Developer of any of his obligation to provide a complete and working system, in full accordance with these Standards, associated codes, and industry standards and practices. Work and materials not meeting such requirements shall be repaired, replaced, or corrected by Developer at his expense, to the satisfaction of the Engineer. Work shall not be accepted and ownership taken by the City until all work is inspected, tested, and found satisfactory by the City.

The Developer shall be responsible for the design and construction of all improvements. Prior to construction of improvements the Developer shall provide to the City a Deposit to cover inspection costs.

1.5 RECORD DRAWINGS:

Prior to the City's acceptance of public improvements, the Developer shall submit a set of Record Drawings depicting any modifications made during construction.

1.6 DEVIATIONS:

These 2013 Improvement Standards are intended to be a minimum standard. However, any deviations intended by the Developer to exceed these 2013 Improvement Standards are to be specifically approved in writing by the Engineer.

Materials proposed for use and not specified herein, shall be submitted for approval by the Engineer prior to ordering such material.

Underground work shall not be backfilled or covered until an inspection by the Engineer has been made and the work approved. Any work that is covered without an inspection shall be uncovered at the Developer's or City Contractor's expense in order for an inspection to be made.

The Engineer shall have access to the work at all times and shall be furnished every reasonable facility for ascertaining that the work done, materials used, and workmanship performed are in accordance with the requirements and intentions of these 2013 Improvement Standards. Failure of the Engineer to not identify faulty material or workmanship during construction or on material submittals shall not relieve the Developer of the responsibility for correcting such deficiencies at his expense.

1.7 GUARANTEE:

The Developer, City Contractor or Utility shall inspect and repair all work done on improvements in the public right-of-way for a period of 1 year from the date the work is accepted as complete by the City Council or the Engineer, whichever is the later date. If during the 1 year period, repairs are required, the repaired areas shall be inspected and repaired for a period of 1 year from the date the repairs are accepted as complete.

END OF SECTION

2. SAFETY

2.1 GENERAL:

The Safety Section is intended to establish general principals of traffic control, worker protection and public safety measures to be taken in the performance of all work covered by these 2013 Improvement Standards.

No specification contained herein shall be deemed to create a legal standard of conduct or duty toward the public nor shall it limit the City in the exercise of powers conferred by law in modifying these specifications under special conditions.

The requirements of the State Traffic Manual and CA-MUTCD shall take precedence over the requirements of this Safety Section.

2.2 TRAFFIC CONTROL:

The safe movement of traffic through construction areas depends upon communicating concise and proper information to the public by signs, barricades, delineators, flagmen and warning lights. All such devices necessary during construction shall be furnished by the Developer. The size, shape, and color of such devices shall be as required by CA-MUTCD.

A Traffic Control Plan may be required at the discretion of the Engineer. Such plan shall be approved by the Engineer prior to construction.

2.3 SIGNS:

Warning signs used for night time conditions shall be reflectorized or illuminated. The use of orange flags in conjunction with signs is permitted if they do not at any time interfere with a clear view of the sign face.

Reflectorized signs fastened to barricades or similar supports shall have the face of the sign vertical and normal to the direction of traffic for effective visibility.

Signs are to be used only as long as necessary and then removed. During periods when the signs are temporarily unnecessary, they shall be removed or have their message covered.

2.4 BARRICADES:

Barricades are intended to impose an obstacle in or close off the normal flow of travel. Approved barricades are shown on DRAWING 201 and 202. For approved portable barricades see CA-MUTCD. Barricades shall not be used unless they are needed to separate the motorist from objects of greater hazard than the barricades themselves. Barricades should never be used primarily for delineation. The use of non-standard types of barricades, such as drums, buckets, sandbag, etc., can be hazardous and their use is prohibited.

2.5 FLASHER SUPPORTS:

Portable flasher supports shall be as required by the State Traffic Manual.

2.6 DELINEATORS:

The function of delineators is to channelize traffic. They shall consist of post and paddle type markers or cylindrical or cone shaped objects 18 to 48 inches in height as shown in CA-MUTCD.

Delineators should be uniformly positioned laterally and longitudinally relative to the line of traffic and they must be maintained in an erect position.

Delineators for night time use shall be reflectorized or illuminated to be visible from 500 feet under normal atmospheric conditions.

When placed in proximity to the edge of a traffic lane, delineators should be made of a material that will withstand impact without damage to them or the striking vehicle. Consideration must also be given to the necessity for stability against knockdown from wind or from the wash of passing traffic.

2.7 FLAGMEN:

Flagmen shall be required as necessary for safe conduct of the traffic through the construction area or as directed by the Engineer. Flagmen shall not be used as a substitute for other warning signs and devices. Standard hand signals shall be used as shown in the CA-MUTCD.

2.8 WARNING LIGHTS:

Warning Lights shall be electric lanterns, electric markers or flashers, provided to indicate an obstruction or restriction during periods of low visibility. Warning Lights shall be placed to mark the location of obstructions. Motion may be imparted to Warning Light.

Flashing Lights for delineating the path traffic is to follow shall be uniformly spaced as approved by the Engineer.

Warning Lights may be fastened to signs, barricades and portable flasher supports in a manner satisfactory to the Engineer.

2.9 STREET CLOSURES:

Partial temporary street closures shall be made as shown in the State Traffic Manual. Prior to any street closure on a collector or major street, a Traffic Control Plan shall be approved by the Engineer. In addition, a copy of the approved Traffic Control Plan shall be on the site at all times. One lane for each direction of through traffic must be maintained except where flagmen are provided to control traffic, then one lane may serve both directions. When trenching is necessary across intersecting streets, the work shall be done in such a manner as to maintain two-way traffic on cross streets at all times.

Where the trench line crosses an entrance to private property, access to the property shall be maintained at all times by means of a suitable bridge, until the trench may be backfilled. Such bridges shall be properly guarded and illuminated at night. Where any crosswalk is cut by the trench, suitable bridging shall be constructed. Such bridging shall be at least 4 feet in width, shall have suitable hand railing, shall be properly guarded and illuminated at night and shall be made immediately in cases where backfill material is suitable for jetting. The Engineer shall determine which backfill material is suitable.

The complete closure of a street is allowed only when authorized in writing by the Engineer as provided by these "2013 City of Waterford Improvement Standards". Such closure shall be accomplished only through the use of Type III Barricades as shown in CA-MUTCD.

Permanent closures and temporary closures in new developments at dead end streets and where pavement narrows at the edge of the development shall be made as shown in DRAWING 201.

2.10 RULES AND REGULATIONS:

All work performed and all materials used by the Developer shall comply with the following: the State Labor Code; the California Administrative Code, Construction Safety Order, Title 8, Subchapter 4; all other applicable Federal, State and Local laws and regulations.

Specifically, the Developer shall furnish; install and maintain all shoring, bracing and sheeting. Any damage resulting from a lack of adequate shoring, bracing or sheeting shall be repaired at the Developers' or City Contractors' expense.

Additional requirements may be imposed by the Engineer in the interest of public safety.

2.11 UNDERGROUND SERVICE ALERT - USA NORTH:

The Developer shall call USA North at 811/800-227-2600 at least 48 hours prior to the start of any excavation, within the City Limits. All participating members, including the City of Waterford, will be informed by USA North of the location, date, time and description of the proposed excavation.

Any existing underground facilities will then be located and marked in the field by the appropriate USA North member organization(s). Requests for field meetings shall be included in the initial call to USA North. For further information, contact the City of Waterford at 1-209-874-2328 (Fax 1-209-874-9656). All excavation shall be in compliance with Section 1540(a) (1) of the Construction Safety Orders (Title 8, California Administrative Code Section 1540), which states:

- 1) " Prior to opening an excavation, effort shall be made to determine whether underground installations; i.e., sewer, water, fuel, electric lines, etc., will be encountered and, if so, where such underground installations are located. When the excavation approaches the approximate location of such an installation, the exact location shall be determined by careful probing or hand digging; and, when it is uncovered, adequate protection shall be provided for the existing installation. All known owners of underground facilities in the area concerned shall be advised of proposed work at least 48 hours prior to the start of actual excavation."

The Developer shall be responsible for the preservation of, and repairing any damage to, both private and public property in accordance with current State Standards.

END OF SECTION

3. STREETS

3.1 GENERAL:

Street improvements in the public right-of-way shall be constructed by the Developer to conform to these 2013 Improvement Standards. Only a contractor with an appropriate license and required insurance may perform the work described herein.

Any existing street improvement damaged by the Developer shall be repaired by the Developer as required by the Engineer.

When an existing City Street Tree(s) is within a proposed improvement project, the Developer must meet the requirements of the City of Waterford Tree Ordinance. Contact the Planning Department for further information before commencement of work.

3.2 GEOMETRIC DESIGN:

The street widths shall conform to applicable street section details in these standards.

The gutter slope shall not be less than 0.0025 unless approved by the Engineer.

The streets shall be designed to collect storm water at intersections whenever possible.

Horizontal curves shall conform to the following criteria:

- 1] Minimum horizontal curve radii for centerline of residential streets shall be 250 feet. For streets other than residential, the curve radii for centerline shall conform to the current edition of the Caltrans Highway Design Manual, Standards for Curve Radii.
- 2] Street intersections shall be as near right angles as practical. In no case shall the angle of intersection be less than 70 degrees.

3.3 STRUCTURAL DESIGN:

The R-value design method used by the California Department of Transportation as detailed in the "Highway Design Manual" and the "Flexible Pavement Structural Section Design Guide for California Cities and Counties," shall be used as the basis to determine the structural section of the streets, except a safety factor shall be required only for a Traffic Index (T.I.) of 8.0 or greater.

The T.I. is based on a 20-year design life.

Where improvements exist adjacent to property, the Engineer may approve alternate proposals for street reconstruction which may include the Developer posting a cash bond for that portion of the property adjacent to the existing improvements.

The minimum T.I. used to determine the structural section shall be as follows:

<u>STREET</u>	<u>T.I.</u>	<u>INTERSECTION</u>	<u>T.I.</u>
Arterial	10	Arterial/Arterial	11
Industrial	9	Industrial/Industrial	10
Collector	8		
Residential	6		
Cul-de-sac	4.5		
Service Road	4.5		

The limits of an intersection T.I. shall be the projection of the lip of gutter lines.

The Developer shall be responsible for obtaining soil R-value tests, specifically supervised by a Licensed Civil Engineer, in sufficient quantity to establish the quality of the soil and to provide a basis for the design of the structural section. R-value tests shall be taken at Developer's expense.

In order to establish the design, the following R-value tests will be required at the street sub-grade elevation and shall be at the Developer's expense:

- 1] A minimum of one R-value test shall be taken for all developments with an additional R-value test required for each 10 lots along a residential street, as directed by the Engineer.
- 2] On major or collector streets where the frontage is less than 500 feet one R-value test shall be made. One major or collector streets where the frontage exceeds 500 feet, a minimum of one R-value test shall be taken at each 500 foot interval.

Exact locations of the R-value tests shall be as approved by the Engineer. The Developer shall stake the field test locations and shall provide an existing ground and finish grade elevation for each test location. The Developer shall determine the depth of the R-value test. The Developer shall provide the results of the R-value tests to the Engineer. The test results shall include a verification signed by a Licensed Registered Civil Engineer that the R-value tests were taken at the depth and location(s) as shown on the approved Plan.

3.4 CLEARING:

Clearing and grubbing shall be done in accordance with Sections 16-1.01, 16-1.02 and 16-1.03 of the State Standards.

3.5 EARTHWORK:

Earthwork shall be performed as set in Sections 19-1.01, 19-2.01 and 19-2.05 of the State Standards except that it shall further include the shaping of ground in the park strip and fill areas.

All embankment or fill materials shall be placed and compacted in accordance with Section 19-5.02, 19-5.03 and 19-5.04 of the State Standards, except that the City Contractor or Developer will only be required to strip the original ground of vegetation and compact the top 12 inches of original ground in place to not less than 95% relative compaction in accordance with Test Methods No., California 216 or 231, a nuclear density-moisture gauge, before the fill is placed.

The Developer shall obtain a disposal site for all of the roadway excavation not used on the jobsite. The Developer shall obtain and file with the City a letter showing permission and conditions for use of the disposal site. The Developer shall control dust at the disposal site and keep any streets free of excess material.

Developer shall comply with Section VIII of the San Joaquin Valley Air Pollution Control District (SJVAPC).

3.6 SUBGRADE:

All clods shall be broken and all rocks, hard ribs, and earth lumps over 2-1/2" inches in greatest dimension and other unsuitable material such as roots shall be removed from the jobsite. On industrial streets or where the T.I. is 10 or above, relative compaction of not less than 95% shall be obtained for a minimum depth of 2.5' feet below the finished grade. For all other streets, the sub-grade material shall be compacted to a firm, stable condition with approved equipment until a relative compaction of not less than 95% has been obtained to a minimum depth of 6 inches below the grading plane for the full width between the faces of the gutters. Location or depth of existing utilities may require alternate construction methods as approved by the Engineer.

The finished subgrade shall not vary more than 0.05' foot above or below the planned grade at any point. Care shall be taken to obtain compaction around existing manholes and water valves.

Relative compaction shall be tested by the Developer, at Developer's expense, as directed by the Engineer. In accordance with Test Methods No., California ASTM D-1557, and the test results shall be provided to the Engineer.

3.7 AGGREGATE BASE:

The aggregate base material shall conform to the requirements of Section 26-1.01, 26-102B, 26-1.03, 26-1.035, 26-1.04 and 26-1.05 of the State Standards for Class 2, 3/4" maximum combined grading.

An exception to Section 26-1.04 shall be that a single layer up to 0.7' foot shall be permitted.

Motor graders shall be permitted to spread and shape the aggregate base materials. The aggregate base shall be maintained in a well mixed optimum moisture condition.

Relative compaction shall be tested by the Developer, at Developer's expense in accordance with Test Methods No., California ASTM D-1557 and test results shall be provided to the Engineer.

3.8 ASPHALT CONCRETE:

The asphalt concrete shall conform to the requirements of Sections 39-2, 39-3 and 39-6 of the State Standards. Asphalt concrete shall be Type B. Aggregate used in all but the final course shall be 1/2" inch maximum, medium grading. Asphalt concrete used in the final course shall be Type B. Aggregate used in the final course shall be as follows:

Major, Collector and Industrial Streets - 1/2" inch maximum, medium grading, Residential Streets - 1/2" inch maximum, medium grading.

Aggregate for 1" inch overlays shall be as specified in the Special Provisions for each project.

The asphalt binder shall be grade PG 64-10 (Typical) or PG 7-10 (Special) as specified by the latest revision of the Section 92: ASPHALTS, State Standards unless otherwise approved by the Engineer.

- a] The final surface course shall be paved in the number of passes approved by the Engineer, starting from the curb and paving toward the centerline.

- b] When paving the final surfacing course, there shall be a minimum of two rakers and one screed man per paving machine.
- c] Rolling equipment shall conform to the requirements of Section 39-6.03 of the State Standards. Vibratory rollers will not be used.
- d] The surface course shall be laid with a paving machine except when permitted otherwise by the Engineer in difficult areas.
- e] Paving machines shall have automatic joint control.
- f] Extensions or wings shall not be permitted except as approved by the Engineer.
- g] Temperature requirements shall conform to the requirements of Section 39-6.01 of the State Standards.
- h] Deep strength or full depth asphalt concrete shall conform to the Special Provisions of the particular project.

3.9 ASPHALT PAINT BINDER:

An asphalt paint binder shall be applied in conformance with Section 39-4.02 of the State Standards.

3.10 HEADER BOARDS:

Header Boards shall be constructed to protect the edges of the asphalt concrete where streets are partially completed.

The boards shall be either Redwood or Douglas Fir with an American Wood Preservers Bureau Stamp indicating its use for ground contact and application of LP22 Waterborne preservative or approved equal.

The boards shall be 2" inch x 4" inch dimensional of appropriate material.

3.11 CURBS AND SIDEWALKS:

Curbs and sidewalks shall be constructed and repaired in accordance with the Drawings of this Section and the requirements of Chapter 30 of the Municipal Code. When matching 6" inch vertical curb sections, the return curb section is optional. The asphalt shall be cut a minimum of 12" inches from the lip of the curb.

Concrete delivery tickets with weighmasters' certificates or certificates of compliance may be required by the Engineer.

The construction shall conform to Section 19-1.01 of the current State Standards, except when grade is machine cut or when curbs and sidewalks are placed on undisturbed native soil. However, the Engineer may require 95% compaction wherever soil stability is questionable. The construction shall also conform to Sections 73-1.02, 73-1.03, 73-1.04, 73-1.05, 73-1.05-A, 73-1.05-B, 73-1.06 and 73-1.07 of the current State Standards, except for reference to payments, or as otherwise specified herein. Curbs shall be measured continuous through approaches. Approaches shall be measured to "back of curb line", when payment is made by the square foot.

Weakened plane joints shall be constructed at a maximum of 10' foot intervals as shown on DRAWINGS 310. Depth of weakened plane joint shall be a minimum of 25% of the thickness of the concrete. Concrete shall be scored at equal intervals between weakened plane joints to approximate squares. Concrete surface shall be finished with a medium broom finish.

Special surface finishes or features such as exposed aggregate, color additives and redwood dividers require the written approval of the Engineer.

Sidewalk shall have a cross slope toward the curb face of 1/8" inch per foot (1%) minimum to 1/4" inch per foot (2%) maximum, unless otherwise approved by Engineer.

Traffic, parking and street name signs on City Streets which require relocation because of the work will be relocated by the City, but two working days advance notice is required. Traffic Signs on State Highways and stop signs on streets entering State Highways must be relocated by Caltrans. Utility poles which require relocation because of the work shall be relocated by the utility company owning the poles. The Developer shall be responsible for protecting the work against damage and insuring the safety of the public.

Transitions between different types of curb shall be constructed within a minimum distance of 4'. Transitions between different widths of sidewalk shall be approved by the Engineer.

3.12 APPROACHES:

Approaches shall be constructed and repaired in accordance with the DRAWING 309 and Chapter 30 of the Municipal Code. The Engineer may approve additional requirements where these 2013 Improvement Standards cannot be met.

The construction shall conform to Sections 73-1.02, 73-1.03, 73-1.04, 73-1.05, and 73-1.06, of the current State Standards, except for references to payments, or as otherwise specified herein. Curbs shall be measured continuous through approaches. Approaches shall be measured to the "back of curb line" when payment is made by the square foot.

Weakened plane joints shall be constructed as shown on DRAWING 310. Depth of weakened plane joint shall be a minimum of 25% of the thickness of the concrete. Concrete shall be surfaced with a light broom finish.

The total width of approaches serving a parcel of land shall conform to the following:

For frontages having a vertical curb, the limit shall be 40% of the street frontage of the property or 36 feet, whichever is greater, in the case of corner lots, the limitation shall apply to each street frontage.

The minimum distance between approaches serving the same parcel of land shall be 20 feet. The distance between approaches on adjacent parcels may be less than 20 feet.

Approaches shall be located so they will not interfere with intersecting sidewalks, traffic signals, light poles, fire hydrants, or other public improvements unless specified approval is given by the Engineer and the necessary adjustments to the improvements are accomplished without cost to the City of Waterford.

3.13 ALLEYS:

Alleys shall be constructed in accordance with these 2013 Improvement Standards.

The concrete gutter for alley approach driveway shall be constructed as shown on DRAWING 310 and the concrete shall be as required in Section 1.7 of these 2013 Improvement Standards.

The aggregate base for the alley approach driveway shall be constructed as required in Section 3.7 of these 2013 Improvement Standards.

The subgrade shall be constructed as required in Section 3.6 of these 2013 Improvement Standards.

3.14 VALLEY GUTTERS:

Valley gutters designed to permit drainage across a street shall be constructed as shown on DRAWING 314.

3.15 ADA CURB RAMPS:

ADA (Americans with Disabilities Act) Curb Ramps shall be constructed at all intersections as shown on DRAWINGS 317 thru 319, and per current State Standards.

The ramps must comply with current ADA and State of California Title 24 requirements.

3.16 FINAL ADJUSTMENT TO UTILITY COVERS:

In accordance with these 2013 Improvement Standards, the covers for all sanitary and storm manholes, lamp holes, water valves and survey monuments existing at the time paving takes place shall be adjusted to final grade by the Developer within 10 working days after the pavement has been placed.

Where existing utility boxes are in the work area, their frames and covers shall be removed before subgrade compaction is made and a cover shall be placed to prevent dirt and loose material from entering the facility.

Base and surface material shall be placed over the covers, after which the frames and covers shall be set to finish grade.

3.17 TESTING:

Material testing required by the Engineer for work done under the provisions of this section shall be provided by the Developer and submitted to the Engineer for approval.

Where approved by the Engineer, materials certificates of compliance may be submitted in lieu of actual tests.

3.18 INSPECTION:

The Developer shall request inspections as follow:

- (1) Completion of concrete subgrade preparation
- (2) Completion of forms installation
- (3) During placement of concrete
- (4) Completion of road subgrade
- (5) During placement of aggregate base
- (6) Completion of aggregate base grade
- (7) During placement of asphalt concrete
- (8) Prior to commencement of dry well drilling
- (9) Completion of final clean up

Other inspections to cover special items shall be as determined by the Engineer as needed.

3.19 STREET MONUMENTS:

Street Monuments and Monument boxes shall be placed as shown on DRAWING 320, on the centerline of each street at the following locations:

- (1) Section corners
- (2) Quarter section corners
- (3) Major-Major intersections
- (4) Other points of survey significance, as directed by the Engineer

The monuments shall consist of durable new material. They shall be 3/4" inch O.D. x 24" inch long galvanized iron pipe or approved equal. The center of the top shall be the exact point monumented. The monument shall be tagged as required by the State of California Land Surveyor's Act.

3.20 BOUNDARY MONUMENTS:

Boundary Monuments shall be placed on the exterior boundary of the subdivision at the following locations:

- (1) Changes of direction
- (2) Beginnings and ends of curves
- (3) Other points deemed necessary by the Engineer

Boundary Monuments shall be placed in the same manner and of the same material as Street Monuments, except that in unpaved areas the top shall be at least 1' foot below the finished grade.

3.21 BLOCK CORNER MONUMENTS:

Corner Monuments shall be placed at all Block Corners and Alley Corners.

Block Corner Monuments shall be placed in the same manner and of the same material as Street Monuments, except the top shall be set at least 1' foot below the ground surface.

3.22 LOT CORNER MONUMENTS:

Lot Corner Monuments shall be placed in the same manner and of the same material as Street Monuments, except that in unpaved areas the top shall be at least 1' foot below the finished grade.

Lot Corner Monuments shall be located where required by the Engineer. The basic criteria for the location shall be as follows:

- (1) Lots shall have a monument at each corner except as otherwise provided by this section.
- (2) Lots that are created with zero back or side yards may have lot corners under building foundations, except those corners that are Block or Alley Corners.
- (3) Lots that are created as a part of a townhouse condominium development where realty is to be owned in fee by the individual lot owner shall be monumented using a minimum of 4 monuments for each contiguous group of lots. Contiguous groups of lots containing more than 10 lots shall have

additional monuments as required by the Engineer. Monuments shall not be located under footings or structures.

- (4) Condominium airspace developments where realty is not to be owned in fee by the individual lot owner shall have the exterior boundary monumented as required by Section 3.24 of these 2013 Improvement Standards.

3.23 CONCRETE:

Portland cement concrete, unless otherwise specified in the Special Provisions, shall be Class B as defined in the current State Standards with a 28-day compressive strength of 2,500 pounds per square inch, a maximum slump of 3 inches, and contain 470 lbs of cement per cubic yard. Concrete shall consist of Portland Cement, water and aggregate. Portland cement shall be Type II. Aggregates shall be washed before use and be free from any foreign matter. The aggregate shall be graded to provide a plastic, workable mixture of maximum density with a maximum size aggregate of 3/4" inches. The water shall be potable and no admixtures shall be used without approval of the Engineer.

The cement, water and aggregates shall be combined at the batch plant and be thoroughly mixed. No water shall be added to the mixture after leaving the batch plant without approval of the Engineer. All concrete shall be placed within 90 minutes after the introduction of water to the cement. The temperature of the concrete shall be not less than 50° degrees F and not more than 90° degrees F.

The concrete shall be consolidated by tamping or vibrating. Concrete which has rock pockets or honey combing after curing shall be removed and replaced.

All concrete shall be cured in accordance with Section 90 of the current State Standards.

3.24 DUST CONTROL:

Dust control shall be the responsibility of the Developer. However, the Engineer may perform emergency dust control and the cost shall be borne by the Developer.

On existing paved streets, the dust shall be controlled by the sweeping and removal of the dirt before it enters drywells or storm drains. On existing streets where paving has been removed, a temporary pavement or a dust palliative shall be used. Dust palliative shall be "Lignosulfonate" manufactured by I.T.T. Rayonier, Inc. Seattle, applied per manufacturers specifications or SC70 Road Oil applied at approximately 0.15 gallons per square yard, or approved equal. Contractor shall comply with Regulation VIII of SJVAPCD.

In the work area, the dust may be controlled by use of water, but the drywells must be protected. Contract shall comply with current NPDES permit.

Water from City Fire Hydrants must be metered through a meter installed by the City Water Department. Meter and Permit fees shall be paid for by the Developer or City Contractor on capital improvement projects.

3.25 SURFACE RESTORATION:

The surface of the work area shall be restored to its original condition with material as described in each trench section drawing.

Work in easement areas must be confined to the easement and the surface must be reseeded, leveled, and all undesirable material removed.

Written agreements must be made with the property owners if work or equipment is to go outside the easement. The surface of the area outside the easement must be restored to the satisfaction of the property owner.

In the case of paved areas, excavations that leave 3' feet or less of existing surfacing shall have the remaining surfacing removed and repaved with the same material as the trench section.

Excavation in the shoulder area located within 3' feet beyond the edge of pavement shall be restored with a minimum of 8" inches of aggregate base material. The Engineer may require a full structural section of the existing surfacing at approximate ultimate grade.

The Developer is responsible for determining from the Engineer the resurfacing requirements for each project when the plans are drawn or an encroachment permit is obtained.

Prior to any paving, all uneven or loose edges shall be trimmed in true and even lines parallel to the center line of the work.

The aggregate base shall conform to the requirements of Section 3.7 of these 2013 Improvement Standards.

A paint binder as specified in Section 3.10 of these 2013 Improvement Standards shall be applied to all existing vertical services and construction joints prior to placing asphalt concrete.

The asphalt concrete shall conform to the requirements of Section 3.9 of these 2013 Improvement Standards. The asphalt concrete shall be Type B-AR4000, medium grading of 1/2" inch or 3/4" inch maximum, whichever is required by the Engineer.

3.26 CLEANUP:

The Developer shall clean up the dirt and debris in all of the adjacent streets caused by the construction at least once each week or as requested by the Engineer. All sidewalks, curbs, approaches, crosswalks, existing and new drain inlets, lawns, etc. shall be kept free of excess dirt and rubbish and kept in a clean and neat condition.

Before a final inspection of a project is requested, the following shall be completed:

- 1) All of the right-of-way, adjacent property, adjacent streets and alleys and all areas used by the Developer in connection with this project shall be cleared of all debris and excess material, and left in a neat and presentable condition.
- 2) All paved areas shall be free of dirt and dust.
- 3) All concrete surfaces shall be left free of excess concrete, paving materials, liquid asphalt, dirt and dust.
- 4) All old and new drain inlet bottoms and outlet pipes shall be left free of all dirt and debris. Water shall not be used to clean streets. Care shall be taken to keep sand and silt out of storm drains, catch

basins, sanitary sewer manholes or drywells. Any storm drains, catch basins, sanitary sewer manholes or drywells affected by the work shall be cleaned by the Developer.

- 5) All sewer manhole bottoms shall be cleaned of all foreign matter and construction debris, and covers shall have all paving asphalt removed.

The Developer shall not remove temporary warning, regulatory, and guide signs prior to formal acceptance by the City Council. Such signs shall be removed when directed by the Engineer.

END OF SECTION

4. LIGHTING

4.1 GENERAL:

Street lighting shall be installed to conform to these 2013 Improvement Standards by a Developer holding an appropriate license for such work under the provisions of the State of California Business and Professions Code. In the development of the plans, the Engineer shall be consulted to insure coordination with Pacific Gas and Electric and the 2013 Improvement Standards.

Electrical equipment shall conform to the requirements of the National Electrical Manufacturers Association and material and work shall conform to the requirements of the National Electrical Code, the Electrical Safety Orders of the Division of Industrial Safety, Department of Industrial Relations of the State of California; rules for Overhead Line Construction G.O. 95, State of California, Public Utilities Commission, the Standards of the American Society for Testing Materials and the American National Standards Institute.

4.2 DESIGN:

The lighting system shall be designed to best serve the area and to minimize the length of service runs from the points of connection to the street lights.

All street lights to be installed shall be shown on the improvement plans. The location of the power source and of all conduit runs shall be shown on the improvement plans.

The circuit lengths and conductors shall be sized such that the maximum voltage drop between the source and any street light does not exceed 5 percent of the nominal circuit voltage.

The spacing and location for 25 foot poles shall be as shown on DRAWING 405 and the spacing and location for 28 foot poles shall be shown on DRAWING 406.

4.3 CONDUIT:

Conductors shall be run in P.V.C. conduit except when run inside poles. Conduit and fittings shall be rigid metal or intermediate metal in locations, where approved by National Electrical Code, 1 inch minimum diameter, as shown on DRAWINGS 403 and 404. All fittings installed in concrete shall be of the concrete tight type.

Conduit shall be Sch. 40 P.V.C. between pull boxes, zinc-coated at the sherardizing, hot-dip or electro-plating process, from pull box to pole. Each length shall bear the label of the Underwriters Laboratory, Inc.

Conduits shall be bonded together in pull boxes and pole bases as shown in DRAWINGS 403 and 404 with not less than No. 8 AWG copper wire

Where factory bends are not used, conduit shall be bent without crimping or flattening, using the longest radius practicable. In no case shall the bend radius be less than six times the inside diameter of the conduit.

Conduits crossing a paved right-of-way, shall be installed by the jacking or open trench method and shall be installed 30 inches below top of grade.

4.4 CONDUCTORS:

Conductors shall be No. 10 copper or larger, THW single conductor, Underwriter Laboratory approved.

No conductors shall be drawn into the conduit until the conduit run is complete and the conduit is free of debris. If the conduit is installed in a pole foundation, the conductors shall not be drawn into the conduit for at least 3 days after placement of the foundation concrete.

Conductors shall not be spliced except in pole bases (or in pull boxes when approved by the Engineer). The splices shall be made as follows:

- 1) In pole bases, all splices shall be made with wire connections, ITT No. 10-604, 10-606 or 10-6010 or approved equal.
- 2) Where specifically approved by the Engineer, spliced in pull boxes shall be made using Ilson IK8 10 STP-8STP split box bolt or approved equal to connect wire ends. Split bolt shall be wrapped first with Plymouth Bishop 122 Rubber Tape (splicing compound) #2002 or approved equal and then with 3M "33+" electrical tape or approved equal. The entire splice shall be coated with 3M "Scotchkote" electrical coating or approved equal.

4.5 PULL BOXES:

Pull boxes shall be size Christy N-30 concrete, Brooks Series 38 or approved equal, and shall be furnished by the Developer. The pull box shall be installed as shown in DRAWING 404. A pull box shall be installed at the base of the street light standard.

Where a utility company transformer is designated as the service point, a pull box shall be installed adjacent to the transformer and at street light standard.

Additional pull boxes shall be installed in conduit runs as necessary so that no conduit run shall exceed 200 feet between pull boxes.

Traffic lids shall be used when pull boxes are placed in areas travelled by vehicles. The traffic lids shall be 1/4" inch galvanized steel plate with 1/2" inch diameter lift hole and bolt holes to match standard stud bolts. All pull box lids shall identify the circuit as Street lights, Traffic Signals, etc.

4.6 FOUNDATIONS:

Foundations for poles shall be constructed of concrete and shall be located as shown on DRAWING 403.

Foundations shall be placed monolithically to within 4" inches of sidewalk grade. After pole is installed, a 36" inch square cap shall be placed to bring the foundation to sidewalk grade.

In areas of reconstruction, all work on foundations must conform to Section 15-2.05, 86-2.01, 86-2.02 and 86-2.03 of the current State Standards. Sidewalk grade may be lowered a maximum of 2" inches. In no Case shall the base of the standard, be permitted to be more than 2" inches above grade. Where the new grade will be higher than the original established grade, the standards may be raised as permitted by unused threads on the anchor bolts. In all cases, a full nut of threads must be maintained. Welding shall not be performed on the body of high strength anchor bolts. Base of standards may never be left below grade. Where these standards cannot be met, a new pole foundation must be installed.

Where steel poles are to be served by an aerial drop from overhead source, the foundations shall include a concrete-encased grounding electrode complying with Article 250-81(c) of the National Electrical Code.

4.7 ANCHOR BOLTS:

Anchor bolts shall be 1" inch in diameter, 40 inches long with a 4" inch "L" bend at the bottom end. Anchor bolts shall conform to ASTM Designation A 307.

4.8 POLES:

Poles shall be hot-dipped galvanized steel. 28' foot poles with 15' foot arms shall be Ameron Catalog No. N-2815-2 or approved equal. 25' foot poles with 15' foot arms shall be Ameron No. N-2515-2 or an approved equal. Pole tops and base covers shall be furnished and installed with each pole.

Poles shall not be installed until the foundation has set at least 5 days. Poles shall be plumbed by adjusting the leveling nuts; leveling shims shall not be used. The poles shall be grounded to conform to the provisions of the National Electrical Code.

Poles shall have hand-holes near their bases.

When mounted in locations shown on DRAWING 403, luminaire arms shall be 15' feet in length. Where the pole is not located at the back of the sidewalk, the length of the luminaire arm shall be as directed by the Engineer.

4.9 ELECTROLIERS:

The electroliers shall be located according to size as shown on DRAWINGS 405 and 406. The luminaires shall be as follows or an approved equal:

- 1) 200 Watt, I.E.S., Type III, I.T.T. 113-62J3, G.E. M2RR20S1A2GMS2, Hubbell - RM GT 20 S31 071 0 3 4 0
- 2) 150 Watt, I.E.S., Type II or Type III, I.T.T. 113-56262, G.E. M2RR15S1M2GMS2, Hubbell - RM GT 15 S31 061 0 3 4 0
- 3) 100 Watt, I.E.S., Type II or Type III, I.T.T. 113-56262, G.E. M2RR10SM2GMS2, Hubbell - RM GT 10 S31 061 0 3 4 0

Luminaires shall have high pressure sodium lamps, glass refractors, built-in receptacles for photoelectric cells, and regulator or auto-regulator type ballasts with a power factor of not less than 92%.

4.10 PHOTOELECTRIC CELLS:

Photoelectric cells shall be adjustable, compatible with related equipment and adequate for the load. They shall be General Electric No. C402G660, Fisher Pierce No. 6690B or approved equal.

4.11 EXCAVATION:

The trench excavation shall be made by the Developer. Trenches shall be straight and of even depth. Special locations or depths must be approved by the Engineer prior to excavation.

4.12 LAYING CONDUIT:

Wherever possible, the conduit shall be placed adjacent to sidewalk for protection from future excavation. Conduit shall be jacked or open-trenched at existing street crossings.

4.13 BACKFILL:

The backfill shall be compacted to 90% relative compaction.

4.14 WOODEN UTILITY POLE MOUNTING:

Existing wooden utility poles shall not be used for mounting lights unless specifically directed by the Engineer and permitted by the Owner of the pole. Where approved, brackets for street lights mounted on wooden utility poles shall be Ameron Catalog No. 961-15N2 or approved equal.

When mounted in locations shown on DRAWINGS 405 and 406, brackets shall be 15 feet in length.

4.15 CONNECTION TO ELECTRICAL DISTRIBUTION SYSTEM:

Where lighting circuit and energy source meet, the circuit shall terminate in a service box or pull box, (See Section 4.5 of these 2013 Improvement Standards), as shown on DRAWING 404. The circuit shall terminate with a Bussman TRON fuse-holder, with 30 Amp cartridge fuse, type HEB-AB or approved equal. The fuse shall be taped to the cable and there shall be 4' of slack conductor coiled in service box.

Developer shall furnish and install conduit and conductors from pull box into transformer. Entrance transformer shall be coordinated with, and supervised by owner of utility.

The connection to either an overhead or underground energy source will be made by the utility company upon receipt of request for service by City. All necessary wiring, conduit, etc. to an existing and available power source shall be installed prior to acceptance by the City. Request for service is made upon completion of work by Developer or upon development of adjacent property.

When a light is to be mounted on a wooden utility pole, Developer shall furnish all materials as specified herein, including all conduit, conductors, thru bolts, lag bolts, etc. for installation by City or utility company. The cost for installation shall be included in the cost for inspection of improvements.

4.16 TESTING:

The street lights on City Contract Projects shall be tested in normal service for 4 nights before acceptance by the City.

4.17 CONFLICT WITH UTILITIES:

Developer shall be responsible for contacting other utilities to determine that locations for foundations and conduit runs are clear.

Where conflicts exist, the locations may be altered with approval of the Engineer.

END OF SECTION

5. WATER

5.1 GENERAL:

Water mains and service shall be installed by a Developer holding the appropriate license for such work under the provisions of the State of California Business and Professions Code. The following Construction Standards for design and installation of Water Supply Pipe include pipe and appurtenance for residential and commercial developments. These Construction Standards are not applicable to the design and construction of major infrastructure improvements, including transmission mains, wells, pumping stations, tanks, and water treatment facilities. Pipelines with diameters greater than 12" shall be designed on a project-by-project basis as directed by the Engineer. The design and construction of other major facilities shall be approved by the Engineer.

5.2 CURRENT STANDARDS

Pertinent and current requirements of the following standards shall be applicable and incorporated as part of the Construction Standards. In case of conflict, City of Waterford design criteria shall govern. However, City of Waterford Construction Standards shall not be interpreted to reduce, lessen, or eliminate the following codes and requirements.

- (a) Environmental Protection Agency Drinking Water Regulations.
- (b) Laws and Standards of the State of California, Department of Public Health, relating to Domestic Water Supply, and particularly therein the Standards of Minimum Requirements for Safe Practice in the Production and Delivery of Water for domestic use.
- (c) California Water Code
- (e) Title 17, Chapter V, Section 7583-7622, California Administrative Code, regarding cross-connections.
- (g) Stanislaus Consolidated Fire Marshall and Uniform Fire Code (UFC)
- (i) AWWA, current standards.
- (j) City of Waterford Drinking Water Permit as approved and ammended by CDPH.

5.3 DESIGN:

(a) WATER SUPPLY PRESSURE

Normal operating pressures of not less than 45 psi or more than 80 psi shall be maintained at service connections to the distribution system. A minimum pressure of 20 psi shall be maintained during fire demands.

(b) UNIT WATER DEMANDS

Average unit demands to be used for calculating water demands in residential developments shall be as follows:

Average Day Demand	0.5 gallons per minute (gpm)
Maximum Day Demand	1.0 gpm (2.0 x Average Day Demand)
Peak Hour Demand	2.0 gpm (4 x Average Day Demand)

For developments other than single family units, the developer shall submit estimated unit demands for each type of proposed use.

Total project demands shall be based on maximum day demands with fire flow, or peak hour demands, whichever is highest. Pipes shall be sized to provide for highest demand conditions while maintaining minimum pressures. Minimum pipe diameter shall be 8" in residential developments, and 10" in commercial developments.

Large projects may be required to replace/add water infrastructure in developed areas or outside of the project area to provide adequate flow, pressure, and reliability for the proposed development. No development shall have a single pipe supply; all developments shall be looped to ensure reliable delivery in the event of a single supply pipe failure.

(C) REQUIRED FIRE FLOWS

Required fire flows are to be established which meet the requirements of the Stanislaus Consolidated Fire Marshall, State Fire Marshall, and the Uniform Fire Code (UFC).

The minimum required fire flow for single family residential water systems shall be 1,500 gallons per minute. Lesser fire flow requirements in conformance with UFC may be allowed with prior approval of the City Engineer and Fire Marshal. The minimum required fire flow for multi-family residential, and commercial/industrial developments shall be 2,000 gpm. The City of Waterford shall provide a *maximum* of 3,000 gpm for any development. Required fire flow greater than 3,000 gpm must be provided by the project.

All water services shall be minimum 1 inch nominal diameter. Larger sizes shall be installed, as required, to provide adequate service to larger lots and/or higher water uses.

Where a water line crosses a sewer line, the water line shall be designed according to "Criteria for the Separation of Water Mains and Sanitary Sewers", Department of Health Services, State of California or as directed by the Engineer.

5.4 STANDARD LOCATIONS AND SPACING:

Location of Water Main: All water mains shall be installed within public utility easements or rights-of-way. Installation of pipe in dedicated easements shall be allowed for temporary connections as approved by the Engineer.

1. Water main location shall be 10 feet from centerline (see DRAWING 801).
2. Designs shall place water mains above gravity and non-potable systems. Water supply pipes shall be maintained at the highest elevation possible, without excessive elevation changes. When necessary and unavoidable, water supply pipes shall drop below other utilities using 45

degree fittings to maintain valves at or near minimum cover and plumb. Install air release valves at high points in pipelines.

3. Minimum cover under minor roadways (60 foot R/W or less) shall be thirty (30) inches. Minimum cover for pipe in unimproved areas shall be thirty six (36) inches. The maximum normal cover for water pipes shall be fifty-four (54) inches.
4. When it is necessary to install a water main within a privately owned parcel, an easement with minimum width of fifteen (15) feet and five (5) feet minimum clearance on either side.
5. If it is necessary to install a water main within a landscape corridor, no trees shall be planted within seven (7) feet of the water main center line.
6. Maintain ten (10) feet minimum horizontal distance between parallel water distribution and non potable utilities (gravity or force sanitary sewer mains, storm drains, and non potable water supply). In all instances the water main shall be one (1) foot above the sewer main. Less vertical separation may be approved by the Engineer with use of special materials (i.e. ductile iron pipe, concrete encasement, etc).
7. No water pipe shall be less than 5 feet in length. Any pipe less than 10' in length shall be mechanically restrained.
8. The developer shall may be required to move, remove or abandon existing water mains or service lines in conflict with improvements and re-establish service to existing customers with minimal disruption to service.
9. Where a water main is installed in a major thoroughfare (84 foot right-of-way or greater), or in an area zoned for industrial use, dual mains (one pipeline on each side of the street) may be required to eliminate the need for extended services.

Main Valves: The distribution system shall be furnished with a sufficient number of valves so that isolating any single section of pipe will not result in removing from service: (a) a transmission main, (b) a length of pipe greater than five-hundred (500) feet in school, commercial, industrial, or multiple-family dwelling areas, (c) more than 15 residential service connections, or (d) more than two fire hydrants.

The valves shall be so located that any section of main can be shut down without going to more than two (2) locations to close valves. Valves shall typically be located at street intersections, within curb returns. Valves located between street intersections shall be located on property lines between lots. Install no fewer than two (2) valves per tee, and three (3) valves per cross. Install valves on main line at cul-de-sacs (not on branch).

Fire Hydrants: Fire hydrants assemblies shall be located as follows:

1. Fire hydrants shall be connected to distribution mains only. Fire hydrants shall not be connected to transmission mains.
2. Fire hydrants shall be located to minimize the hazard of damage by traffic. They shall have a maximum normal spacing of five-hundred (500) feet measured along the street frontage in residential developments and three-hundred (300) feet in commercial developments. Within residential areas, all other hydrants shall be located on property lines between lots at a minimum distance of three (3) feet from back of walk to allow maintenance personnel access to a hydrant that has been damaged without

being sprayed with water. Hydrants located at intersections shall be installed at the curb return or within five (5) feet if a drop inlet is present.

3. A fire hydrant shall be installed on all permanent dead end runs including cul-de-sacs (Two (2) inch blow-off assemblies shall be used on all temporary dead end runs).
4. No more than three hydrants shall be placed on an eight (8) inch main between intersection lines. The minimum size main serving a fire hydrant shall be eight (8) inch diameter pipe. The pipeline connecting the hydrant to the main shall be a minimum of (6) inch diameter with an isolation valve installed at the main (on branch).

In addition, hydrants shall be placed on both sides of a major street and shall be spaced on each side according to the maximum distance allowed. On major streets where buildings and street are separated by a restrictive wall, hydrants shall be placed with a maximum distance of 500 feet between hydrants.

Fire hydrants shall also be spaced so that primary property improvements can be reached with a 250 feet maximum fire hose lay.

Hydrant Assembly and Valves: All tees, valves, and hydrant assemblies shall have restrained joints. Thrust blocks are not allowed.

5.5 PIPE MATERIALS:

Pipe shall be capable of withstanding all internal and external loads that may be reasonably expected to occur. In no case shall water supply pipe have an internal pressure rating of less than 150 psi. Higher pressure ratings may be required for special circumstances (i.e. less than 10' horizontal separation from non potable utilities, special crossings, etc.).

Material options for pipe include the following:

- (a) Ductile Iron Pipe (D.I.P.) - Ductile Iron Pipe shall conform to the American National Standard A21-51-1976 (AWWA C151-1976).

Ductile Iron Pipe shall have "Tyton Joints", "Ty-Seal Joints", or approved equal and shall be cement lined in conformance with latest AWWA Specification C-104.

- (b) Polyvinyl Chloride Pipe (P.V.C.) - Polyvinyl Chloride Pressure Pipe shall be Class 150 DR 18, and shall conform to AWWA C-900. Polyvinyl Chloride Pipe shall be Pacific Western, Johns Mansville, CertainTeed or approved equal. All Polyvinyl Chloride Pipe shall be twenty (20) foot laying lengths and shall have Cast Iron outside diameters (C.I.O.D.'s). No pipe length shall be less than 5'. Lengths less than 10' shall be mechanically restrained.

Joints of Polyvinyl Chloride Pipe shall have elastomeric-gasket bell ends or couplings. The bell ends shall be integral thickened bell end or integral sleeve-reinforced bell end. The bell end joints shall have a minimum wall thickness of the bell or sleeve-reinforced bell, equal to all points to the Standard Dimension Ratio (S.D.R.) requirements for the pipe. The minimum wall thickness in the ring groove and bell-entry sections shall be equal to or shall exceed the minimum wall thickness of the pipe barrel.

If belled pipe is not used, one Polyvinyl Chloride coupling, manufactured of the same material and by the same manufacturer as the pipe, shall be furnished with each length of pipe together with 2 rubber rings.

5.6 FITTINGS:

Bends, tees, crosses, reducers, and other fittings shall be Cast Iron or Ductile Iron Pipe. All fittings shall be mechanical joints by flange.

Fittings shall be handled and jointed as specified for pipe installation herein before. Reaction or thrust blocking shall be constructed at bends, tees, dead ends and where changes in pipe diameter occur. Thrust blocking shall be made of Class B Concrete, and shall be placed between undisturbed ground and the fitting to be anchored. The area of bearing on the pipe and on the ground shall be that required by DRAWING 514. The blocking shall be placed so that the joints of the pipe and fittings will be accessible for repair by placing 6 mil Visqueen around fitting, covering all nuts and bolts.

All fittings shall be flanged fittings with valves bolted on all bends, tees and fittings, in conjunction with the installation.

5.7 VALVES AND VALVE BOXES:

Valves and valve boxes shall be installed at the locations shown on the plans.

All valves shall be Mueller resilient seat gate valve, American Flow Control compression resilient seat valve, M&H 3067 AWWA resilient seat gate valve, Kennedy resilient seat gate valve, AVK resilient seat gate valve or approved equal, and shall be the rubber-seated, tight-closing type conforming to the current AWWA Specifications C-509. Valves shall open left and be equipped with a 2 inch AWWA operating nut. Dresser "450" butterfly valve conforming to the current AWWA Specifications C-504, or approved equal, may be installed, as approved by the Engineer.

Valve boxes shall be Christy G5 with Christy Cast Iron cover or approved equal. The following materials may be used for extensions; concrete; 8 inch Poly Vinyl Chloride Pipe, with a minimum 50 foot head or approved equal. All valve boxes shall be installed to finished grade as per DRAWING 512.

5.8 WATER SERVICE MATERIALS:

- (a) General - Each individual residential building unit shall have a separate water service complete from the City water main to the property. Commercial, multi-family residential, and industrial services may be located on internal mains, as approved by the Engineer. Water services are not permitted in easements without prior written approval of the Engineer. This approval will be given only when it is physically impossible to serve the property directly from a water main in the right-of-way.

The minimum size water service is 1 inch. Normally, single family residential properties can be adequately served by a 1 inch water service. For properties other than single family residential, and for non-typical single family residential, the Engineer shall determine the water service size. For making such determination, the Engineer shall take into account the anticipated water use, water pressure requirements, and property size.

Pipe material shall be as follows:

1" to 2" Diameter	Polyethylene (P.E.)
Larger than 2", smaller than 4"	Polyvinyl Chloride (PVC), Schedule 40
4" and Larger	Polyvinyl Chloride (PVC), C-900

If abnormal or unusual conditions occur, the Engineer may vary the pipe materials.

(b) 1 inch Water Service with Meter Box: All 1 inch water services, including meter boxes, shall be installed in accordance with DRAWINGS 501 thru 504. The following materials shall be used:

- 1) Plastic Pipe - All Plastic Pipe shall be ultra-high molecular weight polyethylene flexible pipe; Class 150 psi; PE 3406 for potable water; 1 inch Iron Pipe size (I.P.S.); outside diameter from 1.310 inches to 1.370 inches per latest AWWA Specification C901, and 2 inch copper tube pipe size (C.T.S.).

Manufacturer shall be: Yardley-02223; Driscopipe-5100 or Wesflex-PE 3406

- 2) Curb Stop, Meter Box, and related materials for 1 inch Water Service.

The curb stop shall be a 1 inch ball valve Ford BA13-444W-LA86-44 or Jones J-1971W.

Meter adaptor: 1 inch meter coupling, Ford SP3 or approved equal.

Meter Idler: Schedule 80 PVC 10-3/4" inch x 1-1/4" inch threaded.

Shut-Off Valve: Ford SG13-444 or equal.

Meter Box: Christy Concrete Box B-30 with B-30D lid.

- 2a) Curb Stop, Meter Box and related materials for 2 inch water service.

The Curb Stop shall be a 2 inch angle ball valve, Ford BFA43-777W or BFA23-777W with a LA04-77.

Meter Box: Christy Concrete Box B-36 with B-36D Lid.

- 3) Water Main Taps - All water mains shall be tapped with a standard hot tap machine, APAC, Mueller or Ford. (Use of a hole saw and drill is unacceptable). The following tapping saddles may be used: Romac, Ford, APAC or Ford - F.A.S.T. tapping sleeves for sizes 4 inch and up shall be Romac - S.S.T. or Ford F.A.S.T.

P.V.C. water mains are to use full support type saddles. All other water mains will use a double strap.

Each water service shall have bronze corporation and curb stops.

5.9 MATERIALS TO BE FURNISHED AND INSTALLED BY DEVELOPER:

The Developer shall furnish all labor, material, equipment and appliances required to complete the water mains and services specified. Service taps on lines not yet accepted by the City shall be made by the Developer, after approval by the Engineer.

5.10 STAKING OF WATER MAINS AND SERVICES:

The water lines and services shall be staked by the Developer on projects installed by Developer, Engineer on projects installed by the City.

5.11 EXCAVATION:

The Developer shall perform all excavations necessary or required to construct all pipelines and structures. Excavation shall include the removal and disposal of all materials of whatever nature encountered. Trenches shall be excavated in open cut, following neat parallel lines equidistant from the centerline, which line shall be staked as set forth in Section 5.9 of these 2013 Improvement Standards. No tunneling or jacking will be permitted without written permission from the Engineer. Trenches shall be of sufficient width to provide clearance beside the pipe for bracing and support and working space.

Care shall be taken to preserve all surface and subsurface facilities in the work area.

The trench shall be excavated to a minimum of 2 inches below the grade of the bottom of the pipe and 2 inches below the couplings of bells. If any of the trench bottom is in material too hard to permit proper bedding of the pipe, excavation must be carried to a depth at least 4 inches below the grade of the bottom of the pipe, and this over-excavation shall then be brought to grade with approved material compacted in place. Should the trench bottom at any location be of material which will not afford sufficient sound foundation, it shall be excavated as directed by the Engineer and refilled to grade with approved materials compacted in place. Excess and / or rejected material shall be disposed of by the Developer.

5.12 SHORING, BRACING AND SHEETING:

The Developer shall furnish, install and maintain such shoring, bracing and sheeting as required in Section 2.10 of these 2013 Improvement Standards.

After the pipeline has been installed and sufficiently backfilled to protect the pipe, all shoring, bracing and sheeting shall be removed. All voids left by the removal of such bracing shall be carefully filled with suitable material compacted in place.

5.13 DISPOSAL OF SEEPAGE, STORM WATER, OR SURFACE WATER:

The Developer shall remove any seepage, storm water, or surface water that may be found or may accumulate in the excavation during the progress of the work. He shall furnish all pumps and other equipment necessary therefore and shall keep all the excavation entirely free from water at all times during the construction of the work. When pipe laying is in progress, the open ends of the pipe shall be closed by approved means to prevent entrance of water or dirt into the line. Whenever water is excluded from the pipe, adequate backfill shall be deposited on the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and re-laid as directed by the Engineer.

5.14 PREPARATION OF TRENCH AND LAYING OF PIPE:

All pipe for water mains and laterals shall be laid to line and grade as shown on the approved plans and at such depths as to provide 30 inches minimum cover from top of the pipe to ultimate finish street grade. The Developer shall be responsible for verifying ultimate finish grade by requesting this information from the Engineer.

When waterlines are being installed in a new subdivision, mainline pipe and the fire hydrant runs shall be installed prior to the installation of curb, gutter, and sidewalk.

The Developer shall field verify the depth and alignment of any existing water line prior to construction. If the existing water line is not exactly as shown on the improvement plans, the Developer shall obtain approval of the Engineer before proceeding.

All water pipe runs shall have a No. 10 gauge solid, insulated with one-sixteenth (1/16) inch insulation, soft-drawn copper wire laid along the pipe to facilitate location of the pipe at a later date. The wire shall be stubbed up inside each valve box and be placed as shown on Standard Detail Drawings. All wire connections shall be stripped to bare wire connected with brass connectors shall be wrapped twice with 10mil PVC tape. Wire extending into the valve boxes shall have a one-sixteenth (1/16) inch polyvinyl chloride insulation. The contractor shall conduct a continuity test on all locating wire splices.

5.15 HANDLING OF PIPE AND ACCESSORIES:

Proper implements, tools and facilities satisfactory to the Engineer shall be provided and used by the Developer for the safe and efficient execution of the work. All pipe, fittings, valves, hydrants and accessories shall be lowered into the trench in such a manner as to prevent damage to pipe fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. All foreign matter or dirt shall be removed from the interior of pipe before lowering into position in the trench. Pipe shall be kept clean by means approved by the Engineer during and after laying. All pipe and accessories shall be inspected for defects prior to lowering into trench. Any defective, damaged or unsound pipe or accessory shall be repaired or replaced at the Developer's or City Contractor's expense.

5.16 SERVICE INSTALLATION:

The services shall be installed as per DRAWINGS 501 thru 504.

Installation of the services shall consist of the following basic steps:

- (a) Excavation on the entire trench.
- (b) Thoroughly clean the water main.
- (c) Place and make tap as shown on the Standard Drawing.
- (d) Open tap valve immediately after making tap to flush material from the main line.
- (e) Insert stainless sleeves in the plastic pipe and tighten service line connections as per manufacturer's recommendation.
- (f) Place the service line at right angles to the water main.
- (g) Use boring or pushing methods, but not washing methods, to place pipe under curb and sidewalk.
- (h) Backfill and compact the dirt above the service line.
- (i) Service location to be marked by cutting or stamping a "W" on curb face.

- (j) Curb stop, stainless steel insert, meter idler, Globe Valve and P.V.C. stub unit and meter box to be placed at correct depth and distance from sidewalk.

Plastic service pipe shall not be heat-flared. Because of the variation in the outside diameter of the pipe, a saddle tap in lieu of the Quicktap may be required.

Special care shall be exercised to insure proper compaction is made under curb stop, so it is vertical and the meter idler is level. Compaction shall be made under and around the meter box so it remains level and at the finished sidewalk grade.

5.17 FIRE HYDRANTS:

Fire hydrants shall be installed at the location shown on the plans in conformance with DRAWINGS 509 thru 511.

Fire hydrants shall be Jones J-4040, Long Beach Model 425, Clow Model 859, Mueller A-481 or approved equal and shall conform to the latest AWWA Specifications, C-503, for wet-barrel fire hydrants. All hydrants shall be painted with "Caterpillar Yellow" Polyurethane High Duty Industrial Enamel.

5.18 TEMPORARY AND PERMANENT BLOW-OFFS:

Temporary and permanent blow-offs shall be installed at the locations shown on the plans in conformance with DRAWING 526. Location of permanent blow-offs to be marked by chiseling an "X" on curb face. The final length of pipe, prior to the blow-off, shall be 18 to 39 inches.

All salvaged temporary blow-offs shall become the property of the Developer and shall be removed from the job site before completion.

5.19 CONNECTIONS TO EXISTING WATER MAINS:

In order to protect public health and in accordance with State permit requirements, operation of the existing water system and its components shall be performed solely by representative of City of Waterford. Contractor shall never operate valves owned by City for any reason. When a new pipe or service is to be connected to a City owned water supply main, a work plan shall be submitted to the City for approval. The work plan shall define: (a) type of connection, (b) materials to be used, (c) water management, (d) sections of main to be isolated, (e) disinfection of materials, (f) flushing and testing upon completion, (g) schedule and duration of work, etc. Once the work plan is approved, Contact City operations at least five (5) working days in advance of start of work to allow City representatives to contact existing customers of service interruptions.

Shutdowns shall be made only at times when there will be the least interference with consumer service. Connections shall be made only after complete and satisfactory preparations for such work has been made, in order that the duration of the shutdown is as short as possible. The Contractor shall have on site all piping, fittings, equipment and appurtenances as may be required to complete the connection.

Once work is started, it shall be under the supervision of the licensed City distribution operator. Contractor shall only proceed with the work if authorized by the City operator, and shall stop work if directed.

When work is done by the Developer, the Developer shall make all excavations and furnish, install and maintain such shoring, bracing and sheeting necessary for these connections as set forth in Section 5.11 of these 2013 Improvement Standards. The Developer shall connect to the existing system.

5.20 INSPECTION:

All water lines shall be inspected for proper installation by the Engineer, prior to backfilling of trenches. See Section 1.6 of these 2013 Improvement Standards. If work is to be completed after normal business hours. Contractor shall call Tel: (209) 874-2328 to arrange for an inspection to be made after normal business hours. Work shall not be covered without inspection, see Section 1.6 of these 2013 Improvement Standards.

5.21 TESTING:

After establishing road subgrade and aggregate base has been placed, the entire length of each line shall be subjected to a hydrostatic pressure of not less than one hundred fifty pounds per square inch (150 psi) for a period of not less than two (2) hours. No pipe installation will be accepted if leakage for the section tested exceeds a rate in gallons per hour per thousand feet (gph/1000') of 0.25 multiplied by the pipe diameter in inches (0.25 x diameter in inches).

The Developer shall perform the test prior to connecting to the existing system. The Developer shall furnish and install temporary caps, plugs for SP3 units, thrust blocks and other necessary materials needed to hold pressure on sections of line being tested.

Water for testing may be taken from the nearest blow-off, fire hydrant or other approved source. All pipe, fittings, valves, couplings, and other materials needed to fill the test lines with water shall be supplied and installed by the Developer. Care shall be taken not to contaminate the existing system.

The pump, gauge, pipe connection, and all necessary apparatus and equipment needed for the test shall be supplied by the Developer of City Contractor.

The Developer shall permanently stop all leaks. All pipe or joints which prove defective shall be replaced and the lines on which such defect or defects occur shall be tested again to determine final acceptability of the installation

5.22 DISINFECTION:

GENERAL: Disinfection of pipelines shall not proceed until all appurtenances and any necessary sample ports have been installed. Every effort shall be made to keep the water main and its appurtenances clean and dry during the installation process. Any piping, valves, fittings, and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5% sodium hypochlorite disinfecting solution prior to installation. Water mains under construction that become flooded by storm water, runoff, or ground water shall be cleaned by draining and flushing with metered potable water until clear water is evident. Upon completion, the entire main shall be disinfected using a method approved by the City Engineer of licensed Water Distribution Operator.

METHODS:

A. Sodium Hypochlorite Solution (Liquid)

1. Sodium hypochlorite solution shall be used for cleaning and swabbing piping and appurtenances immediately prior to installation and for disinfecting all components of connections to the City's existing system.

2. Sodium hypochlorite solution may be used for the initial disinfection of newly installed water mains. The solution shall be applied at a terminus of the system to be chlorinated using an injector which can adjust the amount of solution being injected into the piping system. The solution shall be injected at the appropriate concentration to achieve the specified concentration range of chlorine throughout the entire piping system. Where pumping equipment is used in conjunction with an injector, an integral backflow prevention device shall be installed and connected to the potable water supply.
3. Pumping equipment, piping, appurtenances and all other equipment in contact with potable water shall be disinfected prior to use. Water trucks shall not be used for disinfection of pipelines.
4. Sodium hypochlorite solution may also be used to increase the total chlorine residual if the concentration from the initial chlorination of the system is found to be low. The solution shall be added to the system in sufficient amounts at appropriate locations to ensure that the disinfecting solution is present at a concentration within the specified range throughout the piping system.

PROCEDURE FOR DISINFECTING WATER MAINS AND APPURTENANCES:

A. The pipeline shall be filled at a rate not to exceed 300 GPM or a velocity of 1 foot per second, whichever is less.

B. Disinfection shall result in an initial total chlorine concentration of 50 ppm to 150 ppm. This concentration shall be evenly distributed throughout the system to be disinfected.

C. All valves shall be operated with the disinfection solution present in the pipeline. All appurtenances such as air-vacuum relief valves, blowoffs, hydrants, backflow prevention devices, and water service laterals shall be flushed with the treated water for a sufficient length of time to ensure a chlorine concentration within the specified range in all components of each appurtenance. (Note the limitations for discharge of chlorinated water outlined below.)

D. The Contractor will verify the presence of the disinfection solution throughout the system by sampling and testing for acceptable chlorine concentrations at the various appurtenances and/or at the test ports provided by the Contractor. Areas of the system found to be below the specified chlorine concentration level shall receive additional flushing as noted above and/or additional disinfection solution as necessary. (Note the limitations for discharge of chlorinated water outlined below). All testing will be done in the presence of the City representative.

E. The chlorinated water shall be retained in the system for a minimum of 24 hours. The City will test the total chlorine residual. The system shall contain a total chlorine residual of not less than 80% of the initial total chlorine residual before the 24-hour soaking period began. If the total chlorine residual has decreased more than 20%, the system shall be soaked for an additional 24-hour period. If the total chlorine residual has not decreased after this additional 24-hour period, the system shall be flushed in accordance with the procedure detailed herein. If the total chlorine residual has decreased, the system shall be flushed in accordance with the procedure detailed herein, and shall be re-disinfected.

5.23 FLUSHING:

Following a successful retention period as determined by the District Engineer, the chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source

designated by the City. The minimum water velocity during flushing shall be 3 feet per second. Flushing shall continue until the replacement water in the new system is equal in chlorine residual to the potable source of supply, and as follows:

1. All (Valves, Curb Stops, Blow-off, Hydrants or any other piping fixture) must be flushed until proper chlorine concentrations are achieved. No air can be in the system at any time after being flushed.
2. Water free from air and at proper chlorine concentrations must remain in the system at least 24 hours before a bacteriological sample can be taken.
3. If chlorine or air is found in the system at any point or time, the flushing process must be repeated.
4. Once the flushing process is achieved and approved, the bacteriological testing can begin.

The City will collect water samples and a California State certified drinking water laboratory will perform bacteriological testing.

5.24 DISCHARGE OF CHLORINATED WATER:

A. Indiscriminate onsite disposal or discharge to sewer systems, storm drains, drainage courses or surface waters of chlorinated water is prohibited. The environment to which the chlorinated water is to be discharged shall be examined by the Developer, licensed operator, and the City Engineer. Where necessary, federal, state and local regulatory agencies shall be contacted to determine special provisions for the disposal of chlorinated water. Any discharge of chlorinated water to the environment shall require the neutralizing of the chlorine residual by means of a reducing agent in accordance with AWWA C651 and California Regional Water Quality Control Board.

B. A chlorine reducing agent shall be applied to the water prior to exiting the piping system. A licensed distribution operator shall monitor the chlorine residual during the discharge operations. Total residual chlorine limits for the discharge of chlorinated water from the testing of pipelines to surface waters are as follows:

Total Residual Chlorine Effluent Limitations Instantaneous Maximum - 0.02 ppm

The various methods of dechlorination available can remove residual chlorine to concentrations below standard analytical methods of detection, 0.02 ppm, which will assure compliance with the effluent limit. The Contractor will perform all necessary tests to ensure that the total residual chlorine effluent limitations listed above are met.

5.25 BACTERIOLOGICAL SAMPLING:

1. All sample sites must be free from Chlorine, or air. If one or all sample sites have Chlorine or Air in the system, the flushing process will start over.
2. Samples are to be collected from all predetermined sites.
3. All samples must be negative from bacteria.
4. If one or all samples fail, then all samples must be retaken

5. If all samples pass, a second set of samples must be taken, and pass before further action can be taken.
6. If one or all samples from the second test fails, the disinfection process and flushing process must be repeated. (Two (2) separate series of samples, 24 hours apart, must pass.)

Passing of Bacteriological Sampling:

1. All samples must be reported as negative.
2. Written results of testing have been received and accepted by the City of Waterford and California Department of Health Services.
3. After all the procedures have been logged and reported to the City of Waterford. The City of Waterford may consider the water main acceptable.
4. On approval by the Engineer or the City of Waterford Water Department, the new water main system may be connected at this time.

5.26 CITY OF WATERFORD RIGHT OF RESPONSIBILITY:

1. The Engineer or City of Waterford Public Works Department reserves the right to test the water after refilling the water main, and if not found to be safe, the bacteriological quality may require the Developer to rechlorinate the water main, until the water quality is proven to be safe and satisfactory.
2. The Engineer or City of Waterford Public Works Department reserves the right to require the Developer to provide all necessary items to protect City of Waterford Potable Water System.
3. The City of Waterford reserves the right to impose, all costs associated with the Disinfection of City of Waterford Water Main System to the Developer.

5.27 BACKFILLING AT EXISTING IRRIGATION LINES (M.I.D.):

Whenever it is necessary to cross an existing irrigation pipe, the backfill shall be made by use of a pneumatic tamper. The entire area under the irrigation pipe, 2 feet on either side and 6 inches on top of the pipe shall be tamped to 95% compaction.

5.28 BACKFILLING OF TRENCH:

Prior to the pressure test on the pipe, the trench shall be backfilled. On completion of the pressure test, taking particular care to properly bed the entire length of pipe, the remaining portion of the trench shall be backfilled and compacted as shown on DRAWING 804. Tests for compaction shall be made in accordance with N-Cal-Test Method 216 or 231 and ASTM D-1557. Backfill material in undeveloped streets shall be free of objectionable matter, such as vegetation, large clods and asphaltic paving material.

In undeveloped streets, ponding or jetting may be permitted when specifically approved by the Engineer, if this method does not hinder subsequent operations. Ponding or jetting will not be allowed in existing paved streets.

The Developer shall take proper precautions to prevent floating of the pipe when flooding is used for compacting the trench and the Developer shall be responsible for damage resulting there from.

5.29 RESTORING SURFACE:

The surface of all trenches shall be filled and compacted so that the surfaces will conform to the condition of the surrounding ground. The paving requirements of the plans shall be met regardless of type of existing surface.

Existing pavement shall be cut in neat parallel lines as shown on DRAWING 803.

Aggregate base shall be Class II, compacted to 95% relative compaction. Aggregate base shall have 3/4" inch maximum combined grading.

Asphalt concrete shall be Type B, AR 4000 with 1/2" inch maximum aggregate, medium grading.

A paint binder of asphaltic emulsion shall be applied to all surfaces in conformance with Section 39-4 of the current State Standards.

5.30 FINAL ADJUSTMENT TO UTILITY COVERS:

In accordance with these 2013 Improvement Standards, the covers for all sanitary and storm manholes, lampholes, water valves and survey monuments existing at the time paving takes place, shall be adjusted to final grade by the Developer within 10 working days after the pavement has been placed.

5.31 SAMPLE STATIONS:

In accordance with the Coliform Rule as mandated by the State of California, sampling stations shall be installed by the Developer at Developer's expense, where located by the Engineer, approximately 1 sampling station for every 1/4 square mile.

Sampling stations shall be served by a 1" inch service installed per Section 5.7 of these 2013 Improvement Standards, except that a meter idler assembly is not required. The testing nozzle shall be threadless and shall be between 36 - 48 inches in height.

The piping from the curb stop to the nozzle shall be of brass, copper or Schedule 40 Polyvinyl Chloride Pipe. All piping that is above grade shall be insulated with foam pipe insulation. All station housings shall be "Kupferle Foundry-Mainguard 91", "Koraleen Enterprise-Station Guard", "Max Fusion", or approved equal.

END OF SECTION

6. SEWER

6.1 GENERAL:

Sewers shall be installed by a Developer holding the appropriate license for such work under the provisions of the State of California Business and Professions Code.

6.2 DESIGN:

All sewers shall be sized to carry the quantity of sewage which will be discharges from their service area. Minimum sewer pipe slopes are as follows: 6" S=0.0040, 8" S=0.0030, 10" S=0.0020, 12" S=0.0015.

The minimum sewer grades set forth above may be modified with the approval of the Engineer.

All lateral sewers shall have a minimum cover of 3 feet, 6 inches from the top of the pipe to finished grade at the center line of road. Sewers with less than minimum cover shall be cast iron or ductile iron or shall be constructed with special beddings, and approved by the Engineer.

Sewers within 100 feet of domestic wells shall be cast iron or ductile iron, and approved by the Engineer.

Sewer mains shall be located on centerline, unless otherwise directed by the Engineer. Where a sewer line crosses a water line, the sewer line shall be designed according to "Criteria for the Separation of Water Mains and Sanitary Sewers". Department of Health Services, State of California or as directed by the Engineer.

As a minimum, sewer mains shall be extended across property frontage, unless otherwise approved by the Engineer.

6.3 MANHOLES:

Manholes as shown in DRAWINGS 601 thru 604 shall be constructed at all changes in vertical or horizontal alignment, and at all pipe intersections. The maximum distance between manholes shall be 400 feet. Manhole bases may be cast-in-place, Class B concrete or pre-cast reinforced concrete and shall extend beyond the outer wall of the manhole. Precast bases shall conform to ASTM Specification C-478 and shall be placed on a minimum of 4 inches of crushed rock, of 3/4" inch maximum size. The rock shall be placed on undisturbed native soil.

Elevation differentials of inlets and outlets must conform to the improvement plans. The channel through the manhole shall be formed by laying the pipe through the manhole and removing the upper half of the pipe after the concrete has set. Special care shall be taken in the finishing of the interior of all manholes to obtain the best hydraulic characteristics. All rough edges shall be chipped away and plastered to leave smooth surface. Where called for on the plans, stubs shall be installed and plugged at the upstream end in a manner approved by the Engineer.

Manholes shall be constructed of precast reinforced concrete sections which conform to A.S.T.M. Specifications C478.

The frame and cover shall conform to the elevation of the adjacent ground or pavement as shown in DRAWING 602.

6.4 PIPE FOR NEW SEWER MAINS & LATERALS:

Sewer pipe shall be Polyvinylchloride, Cast Iron or Ductile Iron. Compression joints shall be used for all pipe and shall conform to the current Improvement Standards of the A.S.T.M. C425-77.

Polyvinylchloride Pipe shall conform to the current Improvement Standards of A.S.T.M. D2241 SDR-26.

Cast Iron Pipe shall conform to the current Improvement Standards of the American National Standards Institute (ANSI) A21.6, and shall be Class 150, with bell and spigot joints. Cast Iron fittings shall conform to ANSI/AWWA C110-77. In areas of minimum cover, (typically 2 to 3 feet), No-Hub Cast Iron Pipe and fittings conforming to CISPI 301 and 310 may be used. However, all No-Hub Cast Iron Pipe and fittings, including services, shall be hydrostatically tested in accordance with Section 6.14 of these 2013 Improvement Standards. The hydrostatic test shall be performed after the pipe and fittings have passed the television inspection.

Ductile Iron Pipe shall be Class 50 and shall conform to the current Improvement Standards of the ANSI/AWWA C151/A21.51. All fittings shall conform to ANSI/AWWA C110/A21.10.

6.5 STAKING OF SEWER MAINS AND SERVICES:

The sewer mains and services shall be staked by the Developer on projects installed by Developer and by the Engineer on projects installed by the City.

6.6 EXCAVATION:

Excavation shall include the removal of all materials encountered. All trenches shall be excavated in open cut following neat parallel lines equidistant from the pipe centerline as shown in DRAWING 804.

Maximum width of the trench at the level of the top of pipe shall not exceed the outside diameter of the pipe barrel plus 24 inches.

At no time shall there be more than 300 feet of trench open per trenching machine, including the section ahead for pipe laying and the section behind which is not completely backfilled, unless otherwise specified by the Engineer.

Excavation shall be made at least 4 inches below the grade of the bottom of the pipe in areas where the material is too hard to permit proper bedding. This over-excavation shall be brought to grade with approved material compacted in place.

Any areas which do not provide a firm foundation shall be over excavated as directed by the Engineer and refilled to grade with approved materials compacted in place.

Excess and/or rejected material shall be disposed of by the Developer.

No tunneling or jacking will be permitted without written permission from the Engineer.

6.7 SHORING, BRACING AND SHEETING:

The Contractor shall furnish, install and maintain such shoring, bracing and sheeting as required in these 2013 Improvement Standards under Section 2.10 Safety.

After the pipeline has been installed and sufficiently backfilled to protect the pipe, all shoring, bracing and sheeting shall be removed. All voids left by the removal of such bracing shall be carefully filled with suitable material compacted in place.

6.8 SEEPAGE, STORM WATER, OR SEWAGE:

The Developer shall remove from the trench any seepage, storm water, or sewage that may be found or accumulate during the progress of the work, and shall furnish all pumps and other equipment necessary therefor. The Developer shall also keep his completed work reasonably free from accumulation of water and sewage and shall free it entirely at such times as may be required by the Engineer for the purpose of inspection. The removed material shall not be discharged into the sewer.

6.9 LAYING PIPE:

The pipe shall be laid to conform with the prescribed lines and grades. The line and grade shall be obtained by means of a laser beam or by measuring a tightly stretched string or wire set from the survey stakes. The Developer shall field verify the depth and alignment of any existing sewer main prior to construction. If the existing sewer main is not exactly as shown on the improvement plans, the Developer shall obtain the approval of the Engineer before proceeding. All adjustments of pipe to line and grade shall be made by scraping away or filling in and tamping under the body of the pipe, not by blocking or wedging.

Manufacturers' recommendations on proper procedure for laying pipe shall be followed.

6.10 SEWER SERVICE MATERIALS:

General: Each individual property shall have a separate sewer service (s) complete from the sewer main to the property line. The minimum size sewer service lateral is a 4 inch. Sewer services are not permitted in easements without prior written approval of the Engineer. This approval will be given only when insufficient grade makes it impossible to serve the property directly from a sewer main in the right-of-way.

Normally, single family residential properties can be adequately served by a 4 inch sewer service lateral. For properties other than single family residential, and, for other non-typical family residential, the Engineer shall take into account the anticipated sewer use, and property size.

Vitrified Clay Pipe, P.V.C., Cast Iron Pipe or No-Hub Cast Iron Pipe shall be used for all 4 inch or larger sewer services.

If abnormal or unusual conditions occur, the Engineer may vary the pipe materials.

All sewer services, including risers, wyes, tees, tee saddles and wye saddles, shall be installed in accordance with DRAWING 606.

Cast Iron Pipe (C.I.P.): All Cast Iron Pipe shall conform to the current Improvement Standards of the American National Standards Institute (ANSI) - A21.6 and shall be Class 150, with bell and spigot joints. In areas of minimum cover, (typically 2 to 3 feet), No-Hub Cast Iron Pipe conforming to CISPI 301 and 310 may be used. However, all No-Hub Cast Iron Pipe services shall be hydrostatically tested in accordance with Section 6.14 of these 2013 Improvement Standards.

(1) Connections:

Only Cast Iron wyes and tees shall be used for connections to Cast Iron sewer mains, and shall conform to the current Improvement Standards of the American National Standards Institute (ANSI) - C110-77. No-Hub Cast Iron wyes and tees shall be used for connections to No-Hub Cast Iron sewer mains.

Only Class 50 Cast Iron straight pipe, elbows and fittings shall be used from the sewer main to the right-of-way line. Cast Iron Pipe shall be furnished with "Tyton Joints", "Ty-Seal Joints", or approved equal. Cast Iron transition couplings shall be installed in accordance with the manufacturer's specifications for pipe size.

When connecting a sewer lateral directly from the manhole to the right-of-way line, Cast Iron Pipe shall be inserted onto the manhole and brought to the right-of-way.

Ductile Iron Pipe (D.I.P.): All Ductile Iron Pipe shall be Class 50 and shall conform to the current Improvement Standards of the American National Standards Institute (ANSI) - A21.51 – 1976

All ductile Iron Pipe shall have a polyethylene encasement which shall conform to the current Improvement Standards of the ANSI - A21.5 (AWWA C105-72).

(1) Connections:

Connections to Ductile Iron Pipe sewer mains shall be at manholes only.

Only Cast Iron straight pipe, elbows and fittings shall be used from the sewer main to the right-of-way line. Cast Iron Pipe shall be furnished with "Tyton Joints", "Ty-Seal Joints", or approved equal. Cast Iron transition couplings shall be installed in accordance with the manufacturer's specification for each pipe size.

When connecting a sewer lateral directly from the manhole to the right-of-way line. Cast Iron Pipe shall be inserted onto the manhole and brought to the right-of-way line.

6.11 MATERIALS TO BE FURNISHED AND INSTALLED BY DEVELOPER:

The Developer shall furnish all the labor, materials, equipment and appliances required to complete the sewer mains and sewer services specified.

6.12 SERVICE INSTALLATION:

The services shall be installed as per DRAWINGS 606 and 607.

Wye or Tee: (For 6 inch VCP main and all Cast Iron or Ductile mains):

- (1) Excavate sewer main to a point 6 inches below required depth.
- (2) Make three (3) initial cuts in the main, 2 to 6 inches apart, and remove the rings. Cut the main to the required length to insert wye or tee.
- (3) Place 6 inches of crushed stone or crushed gravel as per Section 6.10 of these 2013 Improvement Standards at bottom of sewer main trench.

- (4) Install wye or tee as per DRAWING 607. Tee shall be used if main is 5 feet or deeper.

Wye Saddles or Tee Saddles: (For 8 inch or 10 inch VCP mains):

- (1) The Engineer shall be present during the installation procedure.
- (2) Excavate service trench and expose minimum section of the main.
- (3) Cut a hole of a shape and diameter compatible with the fitting to be installed. Sewer main shall be drilled or saw cut. No chiseling will be permitted. A tee saddle with a collar shall be installed if main is 5 feet or deeper.
- (4) The under surface of the wye or tee collar and the receiving edge around the hole in the main shall be ground slightly to remove the glaze on the pipe surface, immediately prior to the application of the epoxy.
- (5) Service location to be marked by chiseling an "S" on curb face.

12 inch or larger sewer mains: No direct connections are permitted on 12 inch or larger sewer mains, except in areas specifically designated and approved by the City Engineer. A service lateral may be connected to these mains, upon approval of the Engineer, using one of the following methods:

- (1) A lateral, (Minimum 6 inch), may be extended from an existing manhole to the property, parallel to the main line.

The lateral extension shall end in a terminal manhole or lamphole.

The building lateral shall be connected from the lateral extension to the right-of-way line.

Construction plans of the lateral shall be prepared by a Private Civil Engineer and shall be submitted to the City Engineer for approval.

- (2) If no manhole exists immediately adjacent to the property, a manhole may be placed over the main.
- (3) If a manhole exists immediately adjacent to the property, the building lateral may be connected directly from the existing manhole to the right-of-way line.

6.13 BACKFILL:

In undeveloped streets, after the sewers and appurtenances have been properly constructed and inspected. (See Section 6.14 of these 2013 Improvement Standards), the trench shall be backfilled and compacted as shown on DRAWING 804 and shall conform to Section 19-3.06 of the current State Standards. The pipe shall be shaded by hand shovel method, 1 foot over the pipe, where clods exist in the spoil pile which may damage the pipe in the opinion of the Engineer. Above this hand shading, all clods of any kind shall be removed which are larger than 4 inches in diameter.

Ponding or jetting may be permitted when specifically approved by the Engineer, if this method does not hinder subsequent operations.

In existing paved streets, Class 1 aggregate sub-base conforming to Section 25-1.02A of the current State Standards, shall be used as the backfill material where a sewer wye is installed on an existing main. Ponding or jetting will not be allowed in existing paved streets.

Compaction tests on City Contracts will be performed by the Engineer. Compaction tests on other contracts shall be performed by a Registered Engineer retained at the Developer's expense.

6.14 INSPECTION:

All sewer lines shall be inspected for proper installation by the Engineer prior to backfilling of trenches. Inspection of sewer lines shall include an air test, mandrel test, and television inspection.

Air Test: Manhole to Manhole, 3.5 psi. for 3 minutes.

Mandrel: 95% mandrel

TV: Allowable Deflection:

6"	¾"
8"	1"
10"	1 ¼"
12"	1 ½"

If work is to be completed after normal business hours. Contractor shall call (209) 874-2328 to arrange for an inspection to be made after normal business hours. Work shall not be covered without inspection.

When pavement is cut to install a sewer lateral perpendicular to the main and the work cannot be completed within 1 day, a steel plate shall be placed over the open trench and safety precautions shall be followed as required in Section 2 Safety. The trench shall not be backfilled until the work has been inspected by the Engineer, see Section 1.6 of these 2013 Improvement Standards.

Prior to backfilling of trenches, the Engineer may test for fractures and / or cracks in the pipe using a dye recommended by the pipe manufacturer and supplied by the City. All fractures and / or cracks in the pipe, shall be repaired by the Developer and re-inspected by the Engineer, at Developer's or City Contractor's expense.

The Engineer will inspect all new lines with closed circuit television. The Developer shall give the Engineer at least 2 working days notice prior to performing the work, at the Contractor's expense.

The Developer shall clean all lines of dirt and other debris, clean manholes, remove broken pipe, compact trench, raise manhole rims to grade, and correct all visible infiltration, leaks, and deficiencies prior to inspection. Areas adjacent to manholes shall be leveled and made accessible to the television trailer. All inspections, including repeat work because the lines have not been cleaned, will be charged to the Developer on subdivision projects based on the time of the crew and equipment.

The Developer will have access to the television log sheets and to any pictures taken of the work. The Developer shall repair all substandard work discovered by the TV camera. Developer shall give the Engineer at least 2 working days notice prior to performing the work.

6.15 GREASE TRAPS:

Grease Traps and Interceptors shall be constructed by the Developer on private property, on the sewer service lateral for any facility whose operation will result in oil, grease, sand or other solids being discharged into the City's sanitary sewer or storm drainage system.

The Traps or Interceptor shall conform to Section 708 and 711 of the current Plumbing Code adopted by the City and it shall be constructed where it can be easily inspected for proper operation by the Engineer.

END OF SECTION

7. STORM DRAIN

7.1 GENERAL:

These 2013 Improvement Standards cover storm drainage facilities to be constructed in the public right-of-way. The drainage system shall be by drywell or by positive collection system discharged into a natural waterway (positive drainage). These 2013 Improvement Standards also specify how and when private property may discharge into the public storm system.

Where storm drain trunks are available, the Developer or Engineer shall design a drain collection system to discharge into the storm drain trunks or, if approved by the Engineer, the Developer may also design the trunk line for discharge into a natural waterway.

Where no storm drain trunks are available, the Developer shall construct drywells. All on-site drainage shall be stored and disposed of on-site.

In these 2013 Improvement Standards, storm drain trunks are 42" inches and larger. Other storm drains are referred to as laterals.

7.2 DESIGN OF POSITIVE DRAINAGE:

Positive storm drainage shall be designed using the "Rational Method", with the following values of the parameters applied in the equation $Q = CIA$:

$C = 0.40(*)$ for residential (R-1, R-2)

$C = 0.80(*)$ for all other areas

I = Intensity in inches, per hour taken from the 5 year frequency curve on DRAWING 701.

(*) The C-values listed are considered to be average runoff coefficients. Allowances for different C-values may be made upon approval of the Engineer and shall be determined by the design of the improved areas.

The area "A" in the above equation is the contributing area in gross acres, and the flow "Q" is in cubic feet per second.

The minimum pipe flow velocity shall be 2 feet per second, with an "N" value of 0.013 for concrete pipe and an "N" value of 0.011 for PVC pipe when using "Manning's Formula".

The minimum pipe size shall be 12" inches inside diameter for lines providing drainage of public right-of-way. Private service lines may be smaller, but they are to be maintained by the property owner.

The time of concentration on a lot shall be 20 minutes, unless otherwise approved by the Engineer.

7.3 DISCHARGE STRUCTURES:

Discharge structures designed by the Developer shall be submitted for approval by the Engineer.

It shall be the responsibility of the Developer to obtain written approval and encroachment permits from any agency controlling the discharge of drainage into the natural waterway or receiving waters.

7.4 DRYWELLS:

Drywells shall be constructed as shown on DRAWING 704. Drywells shall be located at least 150 feet from domestic water wells.

Drywells as depicted on DRAWING 704 are required for drainage in all areas not served by other approved drainage systems.

The depth of the drywell shall extend to a level where it penetrates at least 10' feet of continuous sand stratum that is 25' feet or more below the surface of the street. The drywell shall extend to 50' feet deep, if a coarse sand stratum is not reached between 25' and 50'.

The maximum street right-of-way area drained into one drywell shall be 12,000 square feet. Double drywells shall drain a maximum right-of-way of 16,000 square feet, and they shall be separated by a minimum horizontal distance of 20' feet.

Provision shall be made by means of street geometric design to minimize the overflow of one drywell service area into adjacent areas. Where possible, the Street geometric design shall be such that overflow from a drywell service area into adjacent areas shall only occur for storms with a return frequency of greater than 5 years.

Where a drywell service area is designed to overflow into adjacent areas, the Developer shall provide drainage facilities in the adjacent areas to dispose of the additional runoff. The drainage facilities in the adjacent areas shall be as approved by the Engineer.

Drywells shall be tested for adequacy after completion of all work in their designed service area. Testing shall consist of flooding with water until a static head is obtained at the well inlet. Drywells shall absorb this static water within 24 hours. If the maximum practical input flow has been applied continuously for 1 hour without obtaining a static head, the drywell will be approved by the Engineer.

It is the Developer's responsibility to adjust the drywell or add more drywells until the test is approved by the Engineer. Testing shall be done under the direction of the Engineer and at Developer's expense.

The Driller or Developer shall submit to the Engineer a well drilling log as soon as possible after drilling is completed and prior to acceptance of the improvements by the Engineer. Rock shall conform to the gradation of current State Standards, Section 90: Portland Cement Concrete, is amended and included in the project Special Provisions.

The corrugated metal pipe may be either corrugated aluminum pipe or corrugated galvanized steel pipe. The pipe shall conform to the requirements of Section 66-1.02 of the current State Standards.

The catch basin pipe shall be Reinforced Concrete Pipe (RCP) or Polyvinyl Chloride (PVC) SDR-35.

The drywell frame and cover shall be as shown on DRAWING 704. The drywell frame shall weigh between 30 and 35 pounds. The drywell cover shall weigh between 40 and 45 pounds.

7.5 DRAINAGE BASINS:

Drainage basins must be approved by the City Council and designed to meet the requirements of the Engineer.

The basic requirements are as follows:

- (1) The volume of the basin shall be large enough to entrap a total of 2 inches of water over the commercial area developed and 1 inch over the residential area developed. For residential areas, the capacity may be reduced, upon approval of the Engineer.
- (2) The high water elevation of the basin shall be 6 inches below the lowest gutter elevation.
- (3) The maximum water depth shall be 10 feet and the bottom shall be shaped to concentrate the water at the inlet.
- (4) Each basin shall have a minimum of 3 drywells, unless otherwise approved by the Engineer.

Other requirements for safety, aesthetic and special conditions may be imposed by the Engineer.

7.6 PIPE MATERIAL:

Storm drain pipe may be Reinforced Concrete Pipe (RCP) or Polyvinyl Chloride (PVC) SDR-35.

The type of pipe used must conform to accepted engineering practice and must be approved by the Engineer. The class of pipe to be used shall be shown on the plans or specified in the special provisions.

Reinforced concrete pipe shall conform to Sections 65-1.02, 65-1.02A, 65-1.03, 65-1.06, 65-1.07 and 65-1.08 of the current State Standards.

7.7 CATCH BASINS:

Catch Basins shall be constructed as shown on DRAWING 703. Catch basin inlet frame and cover shall be as shown on DRAWING 703. The structural channel iron shall be galvanized to conform to the requirements of Section 75-1.05 of the current State Standards. Damaged galvanizing shall conform to Section 66-3.05 of the current State Standards.

7.8 MANHOLES:

Storm drain manholes shall be constructed on storm drain trunk lines and lateral lines as shown on DRAWING 702. Manholes on cast-in-place pipe shall be constructed as shown on DRAWING 702 and shall conform to Section 6.3 of these 2013 Improvement Standards.

The manhole castings shall be raised to finish street grade by the Developer. In easement areas, the casting grade shall conform to the surrounding surface unless special elevations are required because of irrigation or future street grades.

Manholes shall be constructed at changes in horizontal alignment or slope, at intersections of trunks or laterals, at drain inlet connections except as specified in Section 7.13 of these 2013 Improvement Standards, at 500 foot maximum spacing, unless greater spacing is approved by the Engineer, and at all storm drain ends.

7.9 EXCAVATION:

Excavation shall include the removal of all materials encountered. All trenches shall be excavated in open cut following neat parallel lines equidistant from the centerline as staked. No tunneling or jacking will be permitted without written permission from the Engineer.

Maximum width of the trench at the level, of the top of pipe shall not exceed the outside diameter of the pipe barrel plus 24 inches.

Excavation shall be carried at least 4 inches below the grade of the bottom of the pipe in areas where the material is too hard to permit proper bedding. This over-excavation shall be brought to grade with approved material compacted in place. Any areas which do not provide a sound foundation shall be over-excavated as directed by the Engineer and refilled to grade with approved materials compacted in place. Excess and / or rejected material shall be disposed of by the Contractor.

7.10 LAYING PIPE:

The pipe shall be laid in conformity with the prescribed lines and grades, which shall be obtained by means of a laser beam or by measuring from a tightly stretched line parallel with the grade and supported on at least 3 points over the centerline of the pipe. The Developer shall field verify the depth and alignment of any existing storm drain line prior to construction. If the existing storm drain line is not exactly as shown on the improvement plans, the Developer shall obtain the approval of the Engineer before proceeding. All adjustments of pipe to line and grade shall be made by scraping away or filling in and tamping under the body of the pipe and not by blocking or wedging. All pipe shall be laid with bell end upstream and shall be laid upstream from structure.

7.11 BACKFILL:

After the drain pipe and appurtenances have been properly constructed and inspected, see Section 7.11 of these 2013 Improvement Standards, and the joints have set, the trench shall be backfilled and compacted until the relative compaction is not less than 90% to within 24" inches to finish grade or to finish grade in an easement. All material in the remaining 24" inches shall be compacted to 95% relative compaction as shown on DRAWING 804 and shall conform to Section 19-3.06 of the current State Standards.

Ponding or jetting will be permitted when specifically approved by the Engineer, if this method does not hinder subsequent operations. Ponding or jetting will not be allowed in paved streets.

7.12 SERVICE CONNECTIONS:

Service connections include lines from drain inlets in the public right-of-way, private lines from drain inlets on private property, and private lines from roof drains of private buildings.

No service connections shall be made without prior written approval from the Engineer.

7.13 TESTING:

Testing for proper compaction and for control of the concrete shall be as directed and observed by the Engineer and performed by the Developer unless otherwise specified on the Plans.

Certificates of compliance, weighmaster tags or other standard design data may be required by the Engineer, in lieu of testing for proper concrete design.

On subdivision projects, the cost of the above testing shall be at the Developer's expense.

7.14 INSPECTION:

The Engineer will inspect all new lines with closed circuit television or by visual inspection made when crawling through the lines. If the closed circuit television is used, the Developer shall give the Engineer at least 2 working days notice prior to performing the work. Allowable deflection shall be 10% of pipe diameter.

The Developer shall clean all lines of dirt and other debris, clean manholes, remove pipe crowns, compact trench, raise manhole rims to grade, and correct all visible infiltration, leaks, and deficiencies prior to inspection. Areas adjacent to manholes shall be leveled and made accessible to the television trailer. All inspection and equipment time will be charged to the Developer on subdivision projects.

The Developer may have access to the Television Log Sheets and to any pictures taken of the work. The Contractor shall repair all substandard work.

If work is to be completed after normal business hours, Contractor shall call (209) 874-2328 to arrange for an inspection to be made after normal business hours. Work shall not be covered without inspection, see Section 1.6 of these 2013 Improvement Standards.

END OF SECTION

8. UTILITIES

8.1 GENERAL:

These 2013 Improvement Standards are intended to establish uniform locations and construction procedures for all underground utilities.

8.2 ENCROACHMENT PERMITS:

All utilities shall obtain an encroachment permit prior to commencement of work. The request shall be accompanied by a plan showing location and sizes of all underground work in existing right-of-way and easements including new subdivisions and parcel splits. The encroachment permit must be obtained from the Engineer prior to commencement of work.

Emergency or repair work may be done prior to obtaining a permit by calling Public Works Department at (209) 874-2328 and giving then the location, contractor and circumstances of work required within the City of Waterford right-of-way. Any work within the State right-of-way, will require a "State Encroachment Permit".

8.3 BACKFILLING OF TRENCH:

The trench shall be backfilled and compacted as shown on DRAWINGS 803 and 804, and shall conform to "Section 19-3.06 of the current State Standards". Alternate cementitious backfill material may be used with prior approval of the Engineer.

In undeveloped streets, ponding or jetting will be permitted when specifically approved by the Engineer, if this method does not hinder subsequent operations. Ponding or jetting will not be allowed in existing paved streets.

Except where otherwise specified, initial backfill material shall be sand, gravel, crushed aggregate or native free-draining material. If, in the opinion of the Engineer, the native material is unsuitable for initial backfill, the Engineer may require the Developer to test the native material, at the Developer's expense. In order to be considered suitable, the native material shall have a sand equivalent of not less than 30 or having a coefficient of permeability greater than 1.4 inches per hour. The initial backfill shall be free of rocks or clods greater than 3 inches in diameter and shall be free of organic or other unsuitable material.

All native backfill material shall be free of rocks and clods greater than 3 inches in diameter and free of organic or other unsuitable material.

In the event that select native or native backfill material as defined by this section is not available in the trench spoils, material shall be imported to meet the requirements of this section.

8.4 TRENCH PAVEMENT:

All trenches shall be paved as per DRAWINGS 803 and 804.

8.5 TEMPORARY TRENCH PAVEMENT:

When paving replacement of trench is to be done by the City of Waterford, Contractor shall backfill the trench with aggregate base as shown on DRAWING 803. Temporary pavement, 3 inches thick, shall be installed on top of the aggregate base.

8.6 INSPECTION:

Inspection of the utility work shall conform to the requirements of the encroachment permit and these 2013 Improvement Standards.

Additional inspections shall be requested by the utilities, Developers and City Contractors whenever damage to another utility occurs.

8.7 IRRIGATION LINES:

Existing cast-in-place irrigation lines in street right-of-way shall be replaced with reinforced concrete pipe conforming to "Sections 65-1.02A and 65-1.-6B of the current State Standards".

The pipe shall be Class III except where the cover to finish grade is less than 3 feet, the pipe shall be Class IV.

Irrigation lines to be abandoned shall be removed, and not crushed and left in place.

Irrigation lines within a subdivision shall be removed, protected or relocated as required by the "Modesto Irrigation District" and the Engineer. Appropriate easements for irrigation lines to remain shall be dedicated as necessary. If required, a release of irrigation rights shall be executed by the "Modesto Irrigation District".

8.8 TRENCH MAINTENANCE - MAJOR PROJECT:

The Developer, City Contractor or Utility shall inspect and repair work done on the trench for a period of 1 year from the date the work is accepted as complete by the Engineer or, if subsequent repairs as required, 1 year from the date the repairs are complete.

8.9 UNDERGROUND SERVICE ALERT - ALL PROJECTS:

The Developer, City Contractor shall call "Underground Service Alert North", two working days before you dig. By calling CA/NV 1-811/800-227-2600, for all projects by the City of Waterford. The Developer shall outline the proposed excavation with white paint. Call 6:00 AM - 7:00 PM, Monday thru Friday except holidays.

END OF SECTION

9. LANDSCAPING

9.1 GENERAL:

Landscaping shall be installed to conform to these 2013 Improvement Standards, by a contractor holding an appropriate license for such work under the provisions of the "State of California Business and Professional Code".

Plant materials shall conform to the requirements of the "Nursery Standards and to Section 20-2.13 of the current State Standards.

9.2 DESIGN:

The landscape planting shall be designed to "soften" the hard surfaces and reduce the heat absorption of the sidewalks and masonry walls. This planting will be aesthetically pleasing, low maintenance, and require a minimal use of irrigation water, once established.

The automatic irrigation system shall be designed to efficiently distribute water to planting areas. System shall be underground, automatic and shall not overspray irrigation water onto pavement or walls. The system shall conform to the requirements of the "Current Edition of the Uniform Plumbing Code".

9.3 IRRIGATION PIPE:

If the main line from the backflow prevention device to the remote control valve is 2-1/2 to 4 inches in diameter, the pipe shall be Poly-Vinyl Chloride 1120 - 160 pounds per square inch with "Ring-Tite" connections, or approved equal. If the pipe diameter is 1/2 to 2 inches, the pipe shall be Poly-Vinyl Chloride 1120, Schedule 40. If the main line from the City water main to the backflow prevention device is 2 to 4 inches in diameter, the pipe shall be Poly-Vinyl Chloride 1120 - 160 pounds per square inch with "Ring-Tite" connections, or approved equal. If the pipe diameter is 1 to 1-1/2 inches, the pipe shall be Poly-Vinyl Chloride 1120, Schedule 40.

The main line pipe shall have a minimum cover from top of pipe to finish grade as follows:

- (a) 24 inches over main lines to control valves
- (b) 24 inches over control wires from controller to valves
- (c) 18 inches over Remote Control Valve (RCV) controlled lines, (Lateral), to emitters

Lateral lines (non-pressure) shall be Poly-Vinyl Chloride 1120-200 pounds per square inch with Schedule 40, Type 1, Grade 1, Poly-Vinyl Chloride solvent weld fittings or approved equal and shall conform to "Section 20-5.03 of the current State Standards".

9.4 BACKFLOW PREVENTION DEVICE:

Backflow Prevention Device shall conform to DRAWING 508 and shall consist of 2 check valves, an automatic operated differential relief valve located between the 2 check valves, a tightly closing shut-off valve on each side of the check valve assembly, and equipped with necessary test cocks for testing. Components of the device shall be factory matched. Remote control valves shall be sized as required by flow of irrigation circuit.

They shall be brass and have a flow range of 5 to 50 gallons per minute, and pressure regulation from 15 to 70 pounds per square inch.

9.5 CONTROLLER:

Controller shall not be mounted on access control wall. Electrical service and meter shall be mounted in a pedestal-type cabinet. With the approval of the Engineer, the controller and the meter may be mounted in a single pedestal type cabinet. Controller must be 120 volt automatic and have a moisture sensing capability. The controller must have the potential of 8-hour continuous irrigation and be installed in a vandal-resistant case.

9.6 GATE VALVES:

Gate valves sized 1/2 to 2 inches shall be brass with screwed connections, 200 pounds per square inch for water, oil or gas, and have a non-rising stem. Valves sized 2-1/2 to 4 inches shall be Cast Iron with "O-ring" connections and a 200 pound working water pressure with non-rising stem. The valve shall have a 2 inch square operating nut.

9.7 INSTALLATION MATERIALS:

Solvent cement and primer for solvent weld joints shall be of a make and type recommended by the manufacturer(s) of pipe. Lubricant for assembling rubber ring and seal joints shall be of make and type recommended by manufacturer(s) of pipe. Pipe joint compound shall be non-hardening, non-toxic materials designed specifically for use on threaded connections in water carrying pipe. Performance shall be as Teflon, or approved equal.

9.8 PIPE DETECTION TAPE:

Tape shall be 2 inch wide continuous flexible metal or direct burial irrigation wiring. Detection tape or wiring shall be used on all main lines that do not have control wire sharing a common trench.

9.9 TRENCHING AND BACKFILLING:

Trenching and backfilling shall conform to DRAWINGS 803 and 804, and Section 20-5.03D of the current State Standards. The irrigation pipe shall be inspected by the Engineer in accordance with Section 13.12 of these 2013 Improvement Standards prior to backfilling.

9.10 CONFLICT WITH UTILITIES:

Developer shall be responsible for contacting other Utilities to determine the locations of any underground utilities as required by these 2013 Improvement Standards. Where conflict exist, the locations may be altered with approval of the Engineer.

9.11 PLANT MATERIALS:

The type and size of materials to be used in these landscape situations shall be approved by the Public Works Department.

9.12 PREPARING PLANTING AREAS:

Preparing planting areas shall consist of digging holes and trenches, cultivating soil, constructing plant basins and doing any other work necessary to ready areas for planting. Soil adjacent to curbs or paved areas shall be graded so that, after settlement, the soil will be 1 inch below the top of the curb or paving. Soil in planters shall be compacted so as to prevent any migration of irrigation water under the sidewalk or the access control wall. Plants shall be planted in holes large enough to receive the root ball, backfill, amendments and fertilizer.

9.13 PLANTING:

Planting shall be shown on approved improvement plans. Place backfill in bottom of plant hole after making sure base of hole is loose enough for good drainage. Place approximately 1 cup or 1/2 beverage can of bone meal in bottom of planting hole and mix to a depth of 6 inches prior to placing of plant.

Proper drainage of plant pit is necessary, and any subsoil conditions causing the retention of water in plant holes for more than 24 hours must be corrected by the Developer.

All planters shall be top dressed with a 1.5 inch layer of "Vita Bark" or "Tillo" mulch, 3/4 inch maximum sieve size, or approved equal. See "Section 20-4.05 of the current State Standards", for additional information.

9.14 PRESSURE TESTING:

Testing shall conform to "Section 20-5.03G of the current State Standards".

9.15 INSPECTION:

The Developer shall request inspection upon completion of each of the following:

- (1) Subgrade
- (2) Irrigation main line
- (3) Forms installation
- (4) Irrigation system
- (5) Planting installation

9.16 MAINTENANCE:

Developer shall provide maintenance of all planted areas (shrubs, trees, groundcover, and vines), by watering, weeding, replanting, and fertilizing and by performing any other necessary operations of maintenance, including treatment for fungus diseases, insect pests, or rodents until project is accepted by the City as complete. Any plant indicating weakness or probability of dying shall be replaced immediately by the Developer at the Developer's or City Contractor's expense. Following planting and initial watering, water shall be applied to all plants as necessary to keep the ground moist from the surface to well below the root systems. Any plants blown over shall be replanted and restaked as required in Section 20-4.07 of the current State Standards.

9.17 GUARANTEE:

The Developer shall fill and repair all depressions and replace all necessary lawn and planting lost, due to the settlement of irrigation trenches for one year following completion and acceptance of the job. The Developer

shall guarantee all materials, and shall agree to replace at Developer's expense any and all defective parts that may be found by the Engineer within one year after installation is accepted by the City as complete.

9.18 AS-BUILT DRAWINGS:

"AS-BUILT DRAWING'S": shall be prepared and submitted to the City of Waterford and shall be drawn on "Clearprint 1000H, or reproduced on Mylar, and stored on a CD-RW, using AutoCAD 2011 Software, compatible with the City of Waterford Engineering Department AutoCAD 2011 Software".

9.19 DEVELOPER RESPONSIBILITY:

Developer shall obtain a permit from the City for the water tap and meter to supply water for irrigation system. Tap and meter shall be paid by the Developer at the time the permit is issued by the City. The Developer shall furnish all labor, material, equipment and appliances required to complete the back-up lot irrigation specified, including the electrical meter and source to supply electricity for the irrigation system.

END OF SECTION

10. SITE IMPROVEMENTS

10.1 PURPOSE:

The purpose of this section is to address issues relating to on-site improvements of private development projects, such as commercial and industrial developments, schools, churches and other uses that include site improvements that are used by the general public (parking lots etc.).

10.2 PARKING:

Parking stalls and aisle widths shall comply with Standard Drawing No. 1001.

10.3 TRASH ENCLOSURES:

Trash enclosures shall comply with Standard Drawing No. 1002.

10.4 FIRE PROTECTION:

General:

- (1) All private fire systems cross-connected to unapproved water sources and connected to domestic water mains shall have backflow prevention as required by AWWA M-14 for Classes III, IV, V and VI fire systems. Plans shall be submitted to and approved by the fire department and City of Waterford Water Division cross-connection specialists prior to construction. "AS-BUILT" drawings shall be provided prior to connection to the public water system.
- (2) All fire protection systems shall be disinfected prior to connection to public water system in accordance with these 2013 Improvement Standards.
- (3) Within the city water service area, all on-site fire hydrant systems shall have a detector check with check valve located at the property line immediately down-stream of the main shut off valve. Plans and specifications shall be submitted for approval by the Building Department.
- (4) All system installations shall be subject to approved of the Stanislaus Consolidated Fire Protection District.

Other Requirements:

- (1) Fire hydrants, on-street and / or on-site, shall be installed in accordance with these 2013 Improvement Standards. Inspection approval by the Fire Marshal is required prior to any backfill. Witnessed pressure test, 150 psi for 2 hours, is required for all on-site systems. Plan location approval is required by the fire department prior to construction. Combined systems (sprinkler and hydrant) shall be tested at 200 pounds for 2 hours.
- (2) Automatic sprinkler systems shall be installed in accordance with NFPA #13 Standards. Prior to construction, detailed plans shall be submitted to Fire Department for approval. Pressure and flow testing of both above ground and underground systems shall be at 200 pounds for 2 hours and observed by the fire department. A final inspection of the completed system shall be conducted by the fire department to insure that equipment and installation conforms to the approved plans.

- (3) All standpipe systems (wet or dry) shall be installed according to NFPA #14 Standards. Prior to construction, detailed plans shall be submitted to Fire Department for approval. Testing and inspection shall conform to sprinkler system installations.

END OF SECTION