

## **SECTION 101: DRAINAGE**

### **101-1 GENERAL**

Drainage improvements are to include: culverts, drop inlets, lined channels, turf reinforcement matting, manholes, Stormwater quality control measures, outlet and inlet structures and storm drain pipe. These improvements shall be installed in accordance with the approved improvement plans, these Construction Standards, the West Placer Storm Water Quality Design Manual, the City of Roseville Stormwater Quality BMP Guidance Manual for Construction and the latest edition of the State of California Department of Transportation Standard Specifications hereinafter referred to as the Caltrans Standard Specifications. These Standards shall apply to the public right of way and easements and private on-site drainage improvements. Several items within this section shall apply to on-site improvements and in conformance to stormwater quality requirements.

The City of Roseville has adopted Stormwater quality design standards to reduce water pollution generated by urban runoff. These design standards are detailed in the West Placer Storm Water Quality Design Manual. This manual is available on the City of Roseville's webpage:

[https://p1cdn4static.civiclive.com/UserFiles/Servers/Server\\_7964838/File/Government/Departments/Development%20Services/Engineering/Stormwater%20Design%20Inspection/Post%20Development%20Run-off%20Control/W%20Placer%20SWMP%20Manual%20FINAL%202016-04-01.pdf](https://p1cdn4static.civiclive.com/UserFiles/Servers/Server_7964838/File/Government/Departments/Development%20Services/Engineering/Stormwater%20Design%20Inspection/Post%20Development%20Run-off%20Control/W%20Placer%20SWMP%20Manual%20FINAL%202016-04-01.pdf)

Storm Water Pollution Prevention Plans (SWPPP's), as defined by the State, shall not be required for projects smaller than 1 acre in size, provided the project is not part of a larger project. An erosion and sediment plan shall be required as part of the project improvement plan submittal that identifies temporary and permanent Best Management Practices (BMP's).

The Owner of the property or their permit applicant representative may be responsible for Storm Water Inspection services, as required through such time the project is deemed complete.

### **101-2 CONSTRUCTION STAKING**

The Developer for all drainage improvements shall provide Construction staking. Such staking shall provide the station and offset, as well as the cut to the nearest hundredth of a foot, 0.01 foot. Stakes shall be provided at a minimum of every 50 feet in tangent sections and every 25 feet in curved sections. Cut sheets shall be on-site and shall be furnished to the City's Construction Inspector upon request.

### **101-3 DROP INLET INSTALLATION**

Drop inlet installations shall conform to Construction Standard Details DR-1, DR-2 and DR-3 and to provisions in Sections 51 and 52 of the Caltrans Standard Specifications. The interior of the drop inlet shall have a troweled finish; rock pockets shall be grouted and brushed; exposed top surfaces shall have a Class I Surface Finish. Within all City streets and easements and within all commercial sites and private residential subdivisions, a fish stamp conforming to Construction Standard Detail DR-20 shall be placed adjacent to all drop inlets. If the storm drain system is active and open to discharges, then immediately following installation, all storm drain inlets shall

be protected with sediment control protection until construction no longer poses a risk of sediment discharges. Drop Inlets shall conform to ASTM C913. Otherwise, unused knockouts shall be grouted to wall thickness dimension.

#### **101-4 MANHOLE INSTALLATION**

##### **A. Bases**

- 1. Precast:** Precast concrete structures shall be of approved design and sufficient strength to withstand the loads to be imposed upon them. Precast concrete walls for catch basins shall be 6 inch thickness except at knockouts where the minimum thickness shall be 2 inches. Precast bases shall be placed on a foundation of 3/4 inch minus crushed rock, a minimum of 4 inches thick, compacted to 90 percent relative compaction. Elevation differentials of inlets and outlets shall conform to the approved improvement plans. Openings in the base shall align true with all inlet and outlet pipes. Stub out or couplings provided in precast bases shall be of the same material as the pipe to which they connect, unless otherwise approved by the City's Construction Inspector. Precast bases shall be furnished with cutouts or knockouts. Unused knockouts need to be grouted solid to wall thickness dimension if wall is left intact should ASTM C913 certification not be submitted to City Engineer prior to construction. Pipes shall be installed only in factory knockouts unless otherwise approved by the City Engineer. Maximum Knockout or cutout hole-size shall not be greater than the sum of the outer pipe diameter plus the catch basin wall thickness.
- 2. Cast-in-Place Base:** The cast-in-place base portion shall not be placed higher than 6 inches above the outside tops of the main incoming and outgoing pipes.

The wall thicknesses for the top of the cast-in-place base sections shall conform to the following table:

<u>Manhole Diameter</u>	<u>Minimum Wall Thickness</u>
48"	5"
60"	6"
72"	7"
84"	8"
96"	9"

Inside diameters of cast-in-place base portions shall equal the inside diameter of the manhole specified. Standard precast manhole riser sections and/or cones shall be placed above the cast-in-place section to bring the manhole rim to finish grade. Upon pouring the concrete base, the top surface of the cast in place base barrel shall be stamped with a rigid impression ring in order to match it up with the above, precast barrel section. As an alternate, a maximum 1 foot barrel section may be stacked when it is determined that the concrete for the base is adequately stiff.

A 24-hour minimum curing time is required before manhole stacking is allowed.

All inlets and outlets with a 30 inch inside diameter or smaller, connecting to existing manholes, shall be core bored.

Concrete in the cast-in-place portion shall be placed against undisturbed earth or upon a base of crushed rock or sand. All loose material shall be removed from the excavation prior to installation.

**B. Cones:** Cone tops shall be placed within 7 to 18 inches of final street grade. Where depth is insufficient for cones, flat slab tops shall be used. Lifting rings in precast cones shall be plugged with dry packed mortar.

**C. Joints:** Joints in precast manhole sections shall be made with either mortar or plastic sealing compound.

**1. Mortar Application:** All joint surfaces and the face of the manhole base shall be thoroughly cleaned and wetted before applying mortar. Both the inside and outside of mortared joints shall be plastered with mortar, and the inside surfaces brushed to a smooth finish with a wet brush. Special precautions shall be taken to ensure that the entire joint space is filled with mortar and is water tight.

**2. Plastic Sealing Compound Application:** All joint surfaces and the face of the manhole base shall be thoroughly cleaned before applying plastic sealing compound. The sealing compound shall be protected from dirt during application. Ends of the compound shall be joined end-to-end and not joined by overlapping. Sufficient compound shall be used to cause a visual “squeeze-out” of the compound material when adjacent sections are seated.

Squeeze-out material on the inside of the manhole shall be neatly trimmed flush with the inside surface.

**D. Connections:** Pipe connections to drainage manholes shall be made so that the pipe is flush with the inside face of the manhole. These connections shall be finished so that entrances are smooth. Unless the manhole is cast around the pipe, connections shall be made with dry packed cement mortar inside and a 12 inch by 12 inch minor concrete collar outside. Pipe connections shall not be made into the cone section of the manhole unless shown on the approved plans.

**E. Grade Rings:** Grade adjustments shall be made using precast grade rings. Precast rings shall be a minimum of 3 inches in height. The total height of the grade rings, frame, and cover casting shall not exceed 18 inches.

**F. Frames and Covers:** The tops of frames and covers shall be set no more than 1/8th inch below finish grade pavement in the street and 6 inches above finish grade in landscape areas and 12 inches in unimproved, isolated areas unless otherwise shown on the approved plans. Per the Construction Standard Details, a 12 inch deep by 12 inch wide concrete collar shall be

placed around the casting, either covered by 3 inches of asphalt concrete paving in a street area, per Detail DR-4, or be placed flush with the finished surface using minor concrete with a medium broom finish with pattern perpendicular to travel direction. The concrete collar shall be in conformance to Section 90-2, "minor concrete". All joints between the frame, grade rings, dome, barrels and base shall be sealed with non-shrink mortar, or an approved plastic sealing material. Inside the manhole, all joints where the sealing material is not flush with the inside wall shall be grouted with non-shrink mortar and finished/wet-brushed.

**G. Adjusting Existing Manhole Frames:** The frame shall be supported above the grade ring or dome by spacers, or by suspending with timber and wires. After the concrete collar is poured, any space between the frame and grade ring and dome shall be filled with non-shrink mortar, and the inside wall of the riser finished/wet-brushed.

**H. Compaction:** Compaction around storm drain manholes shall conform to Construction Standard Details TB-1 and TB-3.

#### **101-5 JUNCTION BOXES/VAULTS**

Manholes shall not exceed 96 inches in diameter. Where the number of pipes and/or pipe diameters requires a larger structure than a 96 inch diameter manhole, junction boxes or vaults are required. A registered civil engineer shall design vaults. Shops drawings shall be submitted and approved by the City Engineer.

#### **101-6 PIPE INSTALLATION**

All drainage improvements shall conform the following requirements:

**A. Excavation:** Pipeline excavation shall be open-cut trenches, unless otherwise specified on the approved improvement plans. All excavations shall adhere to all applicable Federal and State safety requirements. All work shall be conducted in such a manner as to prevent damage to new and existing facilities or adjoining property.

Wherever the trench bottom is unstable, the area shall be excavated and an adequate amount of 1/2 or 3/4 inch crushed rock shall be compacted in place to provide a stable base for the pipe. Pipe bedding material, per approved plans, will be placed on top of stabilized trench bottom.

**B. Trench Width:** A minimum clearance of 6 inches shall be maintained between the pipe and the trench wall for reinforced concrete pipe and ductile iron pipe. See Detail TB-2 for trench widths for non-rigid pipe.

**C. Pipe Bedding:** Pipes shall be placed on a firm bed of imported granular material conforming to Details TB-1, TB-2 and TB-3. Unless unstable pipe bedding subgrade needs to be removed, pipe bedding shall only be placed on native, undisturbed soil. Prior to placing pipe bedding, the trench bottom shall be free of any loose material.

**D. Laying Pipe:** The pipe shall be laid up-stream with the bell end of the pipe placed up-stream. The interior of the pipe shall be kept clean as the work progresses. There shall not be a change in pipe material between storm drain structures.

**1. Handling, Laying and Backfill of Polyvinyl Chloride (PVC), High Density Polyethylene Pipe (HDPE), Steel Reinforced High Density Polyethylene Pipe (SRHDPE), and Polypropylene Pipe:** The pipe shall be handled in accordance with the manufacturer's published recommendations. Laying and backfill shall conform to Caltrans Standard Specifications, the manufacturer's recommendations, ASTM D-2321 and Construction Standard Detail TB-2, with the following modifications:

- a.** Due to the lightweight characteristic of the pipe, extreme care shall be taken to avoid displacing the pipe during the backfilling operation. Following placement of the pipe on the required bedding and to the required grade, the pipe shall be stabilized in place with ballast. At a minimum, this shall be accomplished by loading the pipe down slowly and carefully with small piles of embedment material to a minimum of 1 foot above the pipe on each joint and midway on each length. The pipe shall be kept centered in the trench during this operation. Every precaution shall be taken to avoid flooding the trench prior to placing backfill. The City's Construction Inspector may require dewatering the trench to confirm pipe grade, and to retest the integrity of the pipe following trench flooding.
- b.** The trench shall be backfilled with embedment material 6 to 12 inches above the pipe, prior to continuing with the trench backfill.
- c.** Pipe material shall not change between manhole structures or between the last structure and the discharge/inlet opening.
- d.** The pipe run between the last structure and the discharge/inlet opening shall be reinforced concrete. Pipe stub runs from storm drain mains into commercial sites shall also be reinforced concrete.
- e.** No pipe, conduit or any other appurtenance shall be located within any existing or newly constructed storm drainpipe or culvert. Each run of storm drainpipe and culvert shall also be 100% clear and unobstructed the total length.

**E. Non Rigid (PVC/HDPE/SRHDPE/Polypropylene) Pipe Testing:** A mandrel test shall be conducted following completion of subgrade processing and compaction for curb gutter and sidewalk and pavement. Placement of curb, gutter and sidewalk and pavement (and related aggregate base) shall not occur until the City's Construction Inspector has confirmed the passing of the mandrel test. The City's Construction Inspector shall be present through the duration of the mandrel testing.

The allowable deflection (reduction in vertical inside diameter) for all non-rigid pipes shall be 7.5% maximum. The deflection shall be tested by pulling a mandrel which is 92.5% of the inside pipe diameter through all installed pipe. The mandrel shall be the "go/no-go:" type and shall be pulled per the manufacturer's recommendations without mechanical assistance. Prior to the mandrel test, the pipe shall be thoroughly flushed and cleaned, (See Subsection "J"

below). Obstacles in the pipe shall be removed. At each location in which the mandrel cannot pass, the cause shall be ascertained. If it is found the deflection exceeds 7.5 % or that a gasket has been improperly installed, or that the pipe has been damaged due to construction activities, then the respective section of pipe shall be repaired and retested. Pipe section repair operations may require rebedding pipe, replacing pipe, or both as needed to properly repair pipe section. Watertight repair couplings shall be used in repair. A passing mandrel retest is required.

At the contractor's discretion, any sections of non-rigid pipe not passing the mandrel test may be televised to evaluate the problem.

**F. Pipe Laying Tolerances:** The pipes shall be laid true to line and grade with allowed tolerances of 0.03 foot above or below the design grade and 0.10 foot left or right of the design alignment.

**G. Trench Backfill:** Initial backfill material shall be place immediately after pipe joints have been completed inspected and passed by the City's Construction Inspector.

The material shall be carefully placed so as not to disturb or damage the pipe, and shall be brought up evenly on both sides. Trench backfill shall be placed in accordance with Section 111 of these Construction Standards.

**H. Cast-in-Place Concrete Pipe:** Cast-in-place concrete pipe shall conform to provisions in Section 63 of the May, 2006 Edition of the Caltrans Standard Specifications. Where excavations for other utilities undermine installed cast-in-place pipe, that excavation shall be backfilled to the spring line of the cast-in-place pipe with 2 sack slurry per these Standards.

**I. Pavement Cutting and Repaving:** When the trench line is in an existing pavement area, the pavement shall be sawed or scored and broken ahead of trenching operations.

The proper tools and equipment shall be used in marking and removal of the pavement such that it is cut accurately to a neat and parallel line on either side of the trench width required, in conformance with the Trench Cut Ordinance. All cuts in Portland cement concrete pavements shall be sawcut with equipment approved by the City's Construction Inspector. See Section 31, Trench Backfill, of these Standards.

**J. Cleaning of Storm Drain System:** The storm drain system shall be cleaned to the satisfaction of the City's Construction Inspector upon completion. If flushing is utilized, then the discharge shall not be routed into the existing City system. The downstream manhole shall be plugged and the discharge fluid shall be disposed of in a manner satisfactory to the City's Construction Inspector. Flushing shall comply with requirements of Section 21-2 U of these Standards

#### **101-7 CHANNEL LINING INSTALLATIONS**

Channel lining installations shall conform to Construction Standards DR-16 and DR-17 and to the following specifications:

**A. Surface Preparation:** The surfaces of the areas to be lined shall be evenly graded to the lines and grade and sections as indicated on the approved plans. The surfaces shall be moistened thoroughly to prevent moisture from being drawn from the freshly placed lining.

All surfaces on which lining is to be placed shall be free from water, mud and debris and shall be firm enough to prevent contamination of the fresh lining by earth or other foreign material. Prior to placing any lining, the Contractor shall verify line and grade of the excavated channel.

**B. Reinforcement:** Welded wire fabric shall be embedded in the concrete so that it will be a minimum of 1 inch clear from either face of the concrete, unless otherwise noted.

**C. Joints:**

**1. Construction Joints:** Shall be square and edged with a ¼ inch radius-edging tool. The edge shall be thoroughly wetted before the next section of lining is placed. Construction joints shall be constructed whenever the operation is halted for a period exceeding 30 minutes. Welded wire fabric reinforcing shall extend through the construction joint.

**2. Deep Tool Joints:** Transverse deep tool joints shall be constructed at 10 foot intervals. The aggregate shall be separated with the joint tool a minimum of 2 inches deep. Immediately following application of the deep tool joint, a ¼ inch grooving tool shall be applied to the surface to seal the joint.

**D. Weep Holes:** On channels with side lining extending more than 18 inches vertically above the channel toe, weep holes shall be constructed at intervals of 10 feet, midway between contraction joints on each side of the channel. The weep hole elevation shall be 12 inches above the adjacent toe of slope.

The holes shall be backed by a minimum of 1 cubic foot of aggregate material tied in a burlap bag.

The aggregate shall extend at least 6 inches above and below and to each side of the weep hole, and at least 10 inches into the side slope. The side and back of the burlap sack shall be protected from being coated by mortar or concrete during the lining placing operation.

On the day following the lining placement, each weep hole shall be rodded to assure it has not been blocked. The weep hole shall then be cut to fit the channel slope.

**E. Cutoff Walls:** Cutoff walls shall be constructed around the perimeter at each end of the channel lining and at all locations where the new lining meets structures or existing lining, and at all other locations shown on the approved plans. The cutoff walls shall be a minimum of 6 inches thick and 18 inches in depth, as measured from the surface of the lining. The welded wire fabric shall be bent down into the cutoff walls.

**F. Geotextile Linings:** Geotextile linings shall follow the manufacture's recommendations for preparation of soil, seed bedding, blanket orientation, anchoring details, and appropriate seed blend and application rates.

**101-8 MATERIAL**

**A. Backfill Material:** All Drainpipe backfill material shall conform to Construction Standard Details TB-1, TB-2, TB-3, TB-4 and TB-5.

**B. Drop Inlets:** All drop inlets shall conform to Construction Standard Details DR-1, DR-2 and DR-3. Concrete shall conform to these standards.

**C. Manholes:** All precast manhole barrels, risers, cones, flat tops and grade rings shall conform to ASTM Designation C478 and shall conform to dimensions shown on Construction Standard Details DR-4 through DR-8 inclusive.

- 1. Bases -** Bases shall be either precast or cast-in-place. Precast bases shall conform to ASTM Designation. Cast-in-place bases shall be of minor concrete with cementitious content of not less than 505 pounds per cubic yard, with a maximum size aggregate not greater than 1 inch or smaller than 3/8 inch, per Section 90 of the Caltrans Standard. Slump shall not exceed 4 inches as determined by the slump cone method of ASTM Designation C143 or an equivalent slump as determined by CTM533.
- 2. Barrels:** Manhole barrels shall conform to dimensions of Jensen Precast Products or approved equal, and shall conform to ASTM Designation C478.
- 3. Cones:** All cones shall be concentric (unless otherwise shown on the approved improvement plans), Jensen Precast Products and conform to ASTM Designation C478.
- 4. Joints/Mortar:** Joints shall be made with either non-shrinking mortar or with a plastic sealing compound conforming to Federal Specification SS-S-002-10. Mortar shall consist of 1 cubic foot of Portland cement to 2 cubic feet of concrete sand.
- 5. Manhole Frames and Covers:** All manhole frames and covers shall be of cast iron or ductile iron and conform to ASTM Designation A48, C478 or ASTM A536 for Ductile Iron or Class 30 and shall be the following or approved equal for the indicated size and application: 24 inch frame and slotted cover: D&L Supply #A-1021 (standard 6 5/8 inch high) or South Bay Foundry #D1920; "D" shall be embossed in center.
  - a.** 36 inch frame and cover: D&L Supply #A-1462 or South Bay Foundry #D1907; "D" shall be embossed in center.
  - b.** 24 inch frame and slotted cover: D&L Supply #C-2660 (#A-1021 with slotted cover), or South Bay Foundry #1920 (specify slotted cover).



- c. Short 24 inch frames and covers: D&L Supply #A-1022 (5 inch) and #A1023 (3 inch); South bay Foundry #1922 (5 inch) and #1923 (3 inch).
- d. Rexus Manhole Cover: Saint-Gobain Pam, CDRU6oEHDRA, 24 inch round lightweight hinged, ductile iron manhole cover.

Note: Covers for all 24 inch frames are interchangeable.

**D. Storm Drain Pipe:** Storm drainpipe; shall conform to the following:

1. **Cast-in-Place Concrete Pipe:** Concrete shall be Type II Modified Portland Cement content of the minor concrete shall not be less than 550 pounds per cubic yard with a maximum size aggregate not greater than 1 inch or smaller than 3/8 inch and shall conform to the requirements of Sections 63 (2006 Edition) and 90 of the Caltrans State Specifications.
2. **High Density Polyethylene Pipe (HDPE):** HDPE shall be type “S”, conforming to Section 64 of the Caltrans Standard Specifications. Joint connections shall be water tight, rubber ring gasketed. HDPE shall be Hancor (Sure-Lok F477), ADS, Inc. (N-12 Pro Link Ultra) or approved equal.
3. **Polyvinyl Chloride Pipe (PVC):** PVC shall conform to the following standards based on pipe diameter:

<u>Pipe Diameter</u>	<u>ASTM Designation</u>
12” through 15”	D3034, SDR 35
18” through 27”	F794, F2241, SDR 51
30” through 48”	F794

All PVC pipe joints shall be integral wall bell and spigot configuration, factory formed. All rubber rings shall conform to ASTM Designation F477.

4. **Precast Reinforced Concrete Pipe (RCP):** RCP shall conform to ASTM Designation C76 for Class I, II, III, IV or V. The class of pipe shall be based on the designation conforming to the approved plans.

Joints for RCP shall be bell and spigot with rubber gasket. The gasket shall conform to Section 65 of the Caltrans Standard Specifications.

5. **Steel Reinforced High Density Polyethylene Pipe (SRHDPE):** SRHDPE shall be manufactured in accordance with ASTM F2562 “Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage”. SRHDPE shall be manufactured from high density polyethylene stress rated resins conforming to the minimum requirements of cell classification 345464 C per ASTM D3350 “Standard Specification for Polyethylene Plastic Pipes and Fittings Material”.

Joints shall be watertight to an internal water pressure of 15 psi when tested in accordance with ASTM D3212 “Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals”. SRHDPE shall be CONTECH (DuroMaxx) or approved equal.

**6. Polypropylene Pipe:** Pipe 12 inch – 60 inch Diameter shall conform to ASTM F2736 (12-30 inch diameters) and ASTM F2881 (36-60 inch diameters). Joints must be watertight in accordance to ASTM D3212 with gaskets meeting the requirements ASTM F477. Minimum cover shall be 36 inches cover from top of pipe bell to bottom of roadway structural section. Maximum cover exceeding 20 feet and unpaved surfaces will be approved on a case-by-case basis at the discretion of the City Engineer. Polypropylene Pipe shall be ADS N-12 HP Pipe, or Prinsco GOLDPRO Storm Dual Wall HP Pipe, or approved equal.

**E. Stormwater Treatment Devices:** The use of on-site storm water treatment devices are strictly limited to smaller development projects with limited space where bio-retention facilities are not functional, at the discretion of the City Engineer.

**F. Inlet and Outlet Structures:** All inlet and outlet structures shall conform to Construction Standard Details DR-1 through DR-14 inclusively.

**G. Slurry Cement Backfill:** Slurry cement backfill shall conform to the requirements of Section 19 of the Caltrans Standard Specifications containing 188 pounds of cement.

**H. Lined Channels:** All lined channels shall conform to Construction Standard Details DR-16 and DR-17 and the following materials:

- 1. Air Blown Mortar:** Air blown mortar shall conform to provisions in Section 53 “Shotcrete” of the Caltrans Standard Specifications.
- 2. Concrete:** Concrete shall be either “Minor Concrete” with Type II cement, sacked concrete, or doweled and sacked concrete. The minimum weight of sacked concrete shall be 94 pounds per sack.
- 3. Curing Compound:** Curing Compound shall conform to provisions in Section 90-1.03B(3) of the CalTrans Standard Specifications and Section 71-5,I of these Design and Construction Standards.
- 4. Grouted Cobbles:** Ground cobbles shall be set in 6 inches of “Minor Concrete” with pea gravel concrete. The top surface of the concrete shall be flush with adjacent finish grade. Cobbles shall be 4 to 10 inches in size, with 1/3 exposed above the concrete surface, per Caltrans Specifications. Base for concrete shall be undisturbed native soil. If the soil is disturbed or undercut, it shall be processed to 90% relative compaction.

**5. Weep Holes:** All weep holes shall be 2 inches in diameter and made of: galvanized steel pipe, schedule 40 or greater; PVC pipe, schedule 40 or greater; or ABS pipe, schedule 40 or greater.

**6. Welded Wire Reinforcement:** Welded wire reinforcement to conform to ASTM Designation A185.

**I. Metal Storm Drain Marker:** “No Dumping” public notices are required at all storm drain inlets within the City limits, public and private storm drain improvements. Where conditions do not warrant as defined in Detail DR-20 “Detail A” of these Design and Construction Standards, metal storm drain markers as shown on Detail DR-20 “Detail B” may be substituted as approved by the City’s Construction Inspector. “Detail B” shall be Almetek Industries Marker, stainless steel storm drain marker model SDM-SS, “No Dumping Drains to Creek” with “fish” symbol and blue background. Installation methods shall be installed per manufactures’ recommendations and approved by the City’s Construction Inspector.

#### **101-8A ABANDONING STORM DRAINS**

In newer construction, storm drain stubs and services to be abandoned shall be either removed to the main or manhole of origin or filled solid with concrete slurry, at the discretion of the City Engineer. Abandonment of existing storm drain stubs shall be removed or left in place as directed by the Director and/or as shown on the approved plans.

Temporary storm drain plugs may be used when short term blockage is necessary at either the stub or lateral run to prevent storm water from entering/exiting the stub or lateral run. Material for plugs may be a combination of 6 mil plastic and rigid plywood. For longer term plugs, and at the discretion of the City’s Construction Inspector, 6 mil plastic and 1 foot thick of 2 sack concrete is required. In both cases, the plug shall be marked with a 4x4 temporary post.