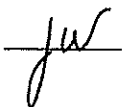


CHAPTER 3

3.000 Storm Drainage

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CHAPTER 3

3.000 Storm Drainage

3.010 Specifications

These Technical Specifications shall be used for all storm drainage construction in the Snoqualmie Ridge Development.

The current "English unit" edition of the *Standard Specifications for Road, Bridge, and Municipal Construction*, prepared by the Washington State Department of Transportation and the American Public Works Association, Washington State Chapter, herein referred to as the Standard Specifications, shall be used to supplement these Standards. The general requirements of the Standard Specifications shall apply unless they are inconsistent with any of the provisions of these Standards. Should inconsistencies occur, these Standards shall have precedence.

References to sections in the Standard Specifications are based on the 1994 edition of the Standard Specifications. If section references in future editions of the Standard Specifications are changed, these Standards will be deemed to be revised accordingly without re-issuance.

3.020 General

Design details, workmanship, and materials shall be in accordance with the King County *1990 Surface Water Design Manual* including updates, the *Snoqualmie Ridge Master Drainage Plan*, and the Standard Specifications, except as they may be modified by this chapter.

Standard Plans need not be repeated on the plans unless required for plan clarification for the Contractor, if being modified to suit a specific design, or as required by the City. However, standard plans shall be clearly referenced on the drawings.

The installation of all storm drainage facilities shall be done in accordance with plans which have been approved by the City Engineer. Plans shall be prepared in accordance with Chapter 1.

3.030 Access

Vehicle access for maintenance vehicles is required to all storm drainage structures and ponds, unless otherwise approved by the City Engineer.

The configuration and construction of the access shall be as approved by the City Engineer.

3.040 Easements

All storm drains not in the public right-of-way shall be in easements granted to the City of Snoqualmie.

In general, minimum drainage easement width shall be 15 feet for publicly maintained open channel or closed system installations. In special circumstances, the easement width may be reduced to 10 feet with the approval of the City Engineer and may be increased because of pipe size and/or depth as required by the City Engineer.

No permanent structures are allowed to be constructed in the easement area. No additional building setback line from the edges of easements is required. Access to easements for maintenance and/or repair of the utility by the City shall not be restricted or prohibited by fences, rockeries, plantings and other improvements.

In general, all easements shall be located within single lots rather than being split by a lot line. In special circumstances, easements may be located on two adjacent lots with the approval of the City Engineer.

3.050 System Design

Publicly maintained underdrains shall be PVC, minimum diameter of 4 inches. Privately maintained underdrains may be ABS, minimum diameter of 3 inches. Removable rodent screens shall be provided whenever the underdrains outfall into a ditch. Pipe bends shall be a minimum of 3 feet radius to allow use of jet rodding or cleaning equipment.

Minimum storm drain pipe size shall be 12-inch diameter. Eight-inch diameter pipe may be permitted on cross street laterals less than 66 feet long to avoid utility conflict or meet shallow gradient.

A catch basin or manhole will be required at all changes in storm drain diameters and changes in grade or alignment.

Debris barriers (trash racks) are required on all culvert pipes and storm drain outfalls larger than 18 inch diameter unless otherwise approved by the City Engineer.

All pipe joints shall be rubber gasketed.

The minimum velocity in any pipe or culvert at the design storm flow shall be 3 feet per second, except for pipe installed as equalizers or as an integral element of a detention system.

Where velocities greater than 15 feet per second are expected, special design features such as energy dissipation structures, thrust blocking, and specific piping materials shall be included to protect against erosion of pipe and structures and displacement by erosion and shock.

In general, minimum cover shall be two feet from top of pipe to finish grade, and shall be increased as required to provide protection from construction traffic. In all cases, a minimum of one foot of cover shall be provided to construction subgrade.

Minimum cover for PVC pipe shall be three feet from top of pipe to finish grade.

In general, the maximum spacing between access structures, whether catch basins or manholes, shall be 300 feet. For pipes 24-inch and larger the spacing may be up to 500 feet upon approval by the City Engineer.

Catch basins shall be spaced no greater than 150 feet for grades less than one percent, 200 feet for grades between one and three percent; and 300 feet for grades three percent and greater.

Generally, grates used at low points should be the thru-curb type. All other grates in roadways shall be vaned grates. See Standard Drawings.

Drainage outlets (stub-outs) shall be provided for each individual lot, unless otherwise approved by the City Engineer. Drainage outlets shall be connected directly into the storm drainage system at a catch basin or inlet. Outfalling of the drainage outlet under the sidewalk and through the curb will be allowed only if specifically approved by the City Engineer.

The following notes shall be included on each plan set:

1. All workmanship and materials shall be in accordance with the latest "English" unit edition of the *Standard Specifications for Road, Bridge and Municipal Construction* (WSDOT/APWA). The Standard Specifications, except as they may be modified or superseded by the Snoqualmie Ridge Development Standards and/or these plans shall govern all phases of work.

2. Temporary erosion/water pollution control measures shall be in accordance with Chapter 6, Erosion and Sedimentation Control of the Snoqualmie Ridge Development Standards.
3. Storm drain pipe shall meet the following requirements:
 - A. Plain concrete pipe shall conform to the requirements of AASHTO M86, Class 2.
 - B. Reinforced concrete pipe shall conform to the requirements of AASHTO M 170.
 - C. PVC pipe conforming to ASTM D 3034 SDR 35 for pipe up to 15-inch diameter and ASTM F 789 Type 1 for pipe sizes 18-inch to 27-inch diameter. PVC pipe joints shall conform to ASTM D 3212 with restrained gaskets conforming to ATM F 477.
 - D. Ductile iron pipe conforming to the requirements of AWWA C 151, thickness class as shown on the plans.
 - E. Corrugated high density polyethylene pipe with smooth interior, conforming to AASHTO designation M-294S.
 - F. High Density Polyethylene Pipe (HDPP):
HDPP shall comply with the requirements of AWWA C906 for pipe materials and pressure rating as follows:

Standard PE Code Designation - PE 3408
Standard Dimension Ratio - maximum 32.5
Pressure Class - minimum 50 psig
 - G. Galvanized corrugated steel pipe as specified in the Standard Specifications, Section 9-05.10. As a minimum, galvanized corrugated steel pipe shall have asphalt coating Treatment 1 as specified in WSDOT/ APWA Section 9-05.4(3).
 - H. All pipe joints shall be rubber gasketed.
4. All storm drain pipe shall be bedded. Bedding material shall conform to "Bedding Material for Rigid Pipe" as specified in Section 9-03.15 of the Standard Specifications. Bedding shall be placed to a minimum depth of 6 inches under the barrel of the pipe and up to the following levels:

- PVC and corrugated polyethylene pipe - one (1) foot above the crown of the pipe.
- Concrete, ductile iron, high density polyethylene and corrugated steel pipe - springline of the pipe.

As an option the contractor may use controlled density fill.

5. Trench backfill shall be excavated native material or Bank Run Gravel for Trench Backfill conforming to Section 9-03.19 of the Standard Specifications, depending on the suitability of the native material to compaction. Suitable native material shall be free from mud, muck, organic matter, broken pavement, rocks greater than 6-inch dimension, and other deleterious material, and must be capable of compaction to meet the required density at the time of placement. If the native material cannot be readily compacted to the specified density, only Bank Run Gravel shall be utilized and any insufficiently compacted native material shall be removed and replaced with Bank Run Gravel. The native material shall only be used and remain in place if insitu compaction testing provides sufficient evidence that the specified compaction is uniformly attained.

Backfill shall be placed in lifts not to exceed 12 inches in loose depth, and each lift shall be mechanically compacted to the following densities:

- Along and over the pipe to a depth of one foot above the crown of the pipe - 90 percent of maximum density.
 - Above one foot above the crown of the pipe in unimproved areas - 90 percent of maximum density.
 - Above one foot above the crown of the pipe in areas to be paved (roadway and/or sidewalk) - 95 percent of maximum density.
6. Open-cut transverse crossings of existing roadways are not to be permitted unless it can be shown that alternatives such as jacking, auguring or tunneling are not feasible or unless the utility can be installed just prior to reconstruction or an overlay of the road. Should an open cut be approved, all transverse trenches shall be backfilled with controlled density fill.

7. Special structures, oil/water separators and outlet controls shall be installed per plans and manufacturer's recommendations.
8. Call underground locate line 1-800-424-5555 a minimum 72 hours prior to any excavations.
9. Before any construction or development activity, a preconstruction meeting must be held between Contractor, the City's Inspector, and other appropriate parties.
10. The City Engineer must be notified at least 24 hours prior to commencing construction. No part of the drainage system shall be put into use until it has been inspected by the City. The City may waive this requirement on a case by case basis if continued evidence of sound construction practice by the Contractor so warrants. In any event, installations which do not meet the requirements of these standards shall be removed and replaced at the Contractor's sole expense.
11. A copy of these approved plans must be on the job site whenever construction is in progress.
12. All drainage structures shall have locking lids. All drainage structures that do not collect surface water runoff shall have solid locking lids.
13. Culvert pipes shall have the ends mitered to conform to the slope. Plastic pipes will not be allowed to project from slopes or into ditches when the slope is flatter than 3:1 to prevent crushing during mowing or maintenance activities.
14. Prior of final inspection and acceptance, pipes and structures shall be cleaned and flushed.
15. Drainage outlets (stub-outs) shall be provided for each individual lot where specifically indicated by the plans. Stub-outs shall conform to the following:
 - A. Each outlet shall be suitably located at the lowest elevation on the lot, so as to service all roof downspouts and footing drains, driveways, yard drains, and any other surface or subsurface drains necessary to render the lots suitable for their intended use. Each outlet shall have free-flowing positive drainage to an approved stormwater conveyance system or to an approved outfall location.

- B. Outlets on each lot shall be located by a 2x4 stake marked "storm" or "drain". The stub-out shall extend above surface level, be visible, and be secured to the stake.
- C. The footing drainage system and the roof downspout system shall not be interconnected unless such connection is at least 1 foot below the footing drainage system and down slope of the building foundation.

3.060 Testing

The storm drain system will be inspected by the City. Any departures from the best construction practices, such as pipeline misalignment, presence of foreign matter in the catch basins or manholes, poor manhole or catch basin construction, etc., shall be corrected.

Continuous poor construction practice shall be cause to require complete testing of the storm drain system in accordance with Section 7-04 of the Standard Specifications.

3.070 Trench Excavation and Backfill

The maximum permissible trench width between the foundation level and up to 12 inches above the pipe shall be 40 inches for pipe 15 inches or smaller inside diameter or 1 1/2 times the inside diameter plus 18 inches for pipe 18 inches or larger. If the maximum trench width is exceeded without written authorization of the City Engineer, the contractor will be required to provide pipe of higher strength classification or to provide a higher class of bedding, as required by the City Engineer.

Trench backfill shall be excavated native material or Bank Run Gravel for Trench Backfill conforming to Section 9-03.19 of the Standard Specifications, depending on the suitability of the native material to compaction. Suitable native material shall be free from mud, muck, organic matter, broken pavement, rocks greater than 6-inch dimension, and other deleterious material, and must be capable of compaction to the required density at the time of placement. If the native material cannot be readily compacted to the specified density, only Bank Run Gravel shall be utilized and any insufficiently compacted native material shall be removed and replaced with Bank Run Gravel. The native material shall only be used and remain in place if insitu compaction testing provides sufficient evidence that the specified compaction is uniformly attained.

Backfill shall be placed in lifts not to exceed 12 inches in loose depth, and each lift shall be mechanically compacted to the following densities:

- Along and over the pipe to a depth of one foot above the crown of the pipe - 90 percent of maximum density.
- Above one foot above the crown of the pipe in unimproved areas - 90 percent of maximum density.
- Above one foot above the crown of the pipe in areas to be paved (roadway and/or sidewalk) - 95 percent of maximum density.

Compaction of trench backfill material shall be accomplished with mechanical tampers, vibratory compactors, or other equipment suitable to the characteristics of the soils. Water settling shall not be employed. The use of compaction equipment directly over the pipe shall be controlled and limited in accordance with installation instructions and recommendations provided by the manufacturer of the pipe.

In-place density testing of compacted backfill material shall be in accordance with ASTM D1556 (sand cone device) or ASTM D2922 (nuclear density gauge). Laboratory maximum density testing of fill material shall be performed in accordance with ASTM D 1557.

A minimum of one compaction test is required for each 200 feet of trench or as may be directed by the City Engineer. Trenches failing the required test shall have the backfill removed, replaced, and re-compacted. Compaction testing shall be done only by an approved testing laboratory at the contractors/developers expense. All test results and analyses shall be promptly given to the City Engineer. The City reserves the right to contract with an independent testing laboratory for testing of trench backfill. This testing shall also be done at the contractors/developers expense.

When, after excavating for pipes to the foundation level, the material remaining in the trench is unsuitable, as determined by the City Engineer, excavation shall be continued to such additional depth as may be required by the City Engineer. Unsuitable foundation material shall be replaced with foundation gravel conforming to Section 9-03.17 of the Standard Specifications.

The developer/contractor shall furnish, install, and operate all necessary equipment to keep excavations above the foundation level free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property or nuisance to the public.

Sufficient pumping equipment in good working condition shall be available at all times for all emergencies, including power outage, and shall have available at all times competent workmen for the operation of the pumping equipment.

3.080 Pipe Bedding

All storm drain pipe shall be bedded. Bedding material shall conform to "Bedding Material for Rigid Pipe" as specified in Section 9-03.15 of the Standard Specifications. Bedding shall be placed to a minimum depth of 6 inches under the barrel of the pipe and up to the following levels:

- PVC and corrugated polyethylene pipe - one (1) foot above the crown of the pipe.
- Concrete, ductile iron, high density polyethylene and corrugated steel pipe - springline of the pipe.

As an option the contractor may use controlled density fill.

3.090 Trenching Transverse to Existing Roadway

Storm Drain trenching that crosses transversely under existing roadway paving will generally not be permitted unless it can be shown that alternatives such as jacking, augering or tunneling are not feasible or unless the pipe can be installed just prior to reconstruction or an overlay of the road. Should an open cut be approved, the trench shall be backfilled with controlled density fill.

3.100 Jacking, Augering, or Tunneling

Tunneling may be ordered by the City Engineer under pavements, buildings, railroad tracks, etc.. The developer/contractor shall install the pipe by jacking, auguring or tunneling, or installing the pipe in a casing pipe by a combination of these methods.

When use of a casing pipe is required, the developer/contractor shall be responsible to select the gauge and size required, unless otherwise indicated on the drawings, and consistent with his jacking or augering operation, and shall be set to line and grade. During jacking or augering operations, particular care shall be exercised to prevent caving ahead of the pipe which will cause voids outside the pipe. When the carrier pipe is installed within a casing pipe, the carrier pipe shall be skidded into position in an acceptable manner and to the line and grade as designated.

The annular space between the casing and the pipe shall be filled with controlled density fill or as otherwise approved.

The faces of the jacking pit shall be constructed by driving steel sheets, or installing timber lagging as the excavation proceeds. The sheets, or lagging, shall extend a minimum of 5 feet below the bottom of the pit except at the entrance of the utility. Prior to jacking or augering activities, shop drawings describing these activities, including dimensioning of pit length and size of underground borings and complete description of shoring, shall be submitted to the City Engineer for approval.

3.110 Shoring

The requirements of the Occupational Safety and Health Act (OSHA) and the Washington Industrial Safety and Health Act of 1973 (WISHA) shall apply to all excavation, trenching, and ditching operations on this project. All trenches over four (4) feet in depth shall be shored, braced, and shielded in compliance with applicable Federal and/or State regulations. Shoring, bracing, or shielding shall be required in all street area excavations, including those areas where all existing pavement is being removed. Sloping to the angle of repose will be permitted only in non-critical, off-street areas.

Shoring and cribbing of excavations and trenches shall be provided in accordance with the provisions of Section 2-09 of the Standard Specifications.

The shoring system shall be a commercially available shoring system designed for the depths anticipated on the project. The shoring system shall meet all requirements of the Washington State Safety and Health Act (WISHA) and United States Federal Occupational Safety and Health Act (OSHA).

3.120 Sawcutting Existing Pavement

The Contractor shall make a vertical sawcut to the full depth of existing asphalt or concrete pavement for all crossings of the existing pavement.

Where necessary to remove existing curbs, gutter, driveways and sidewalk, full panels shall be removed. Care shall be taken during removal to protect adjacent sidewalk panels, concrete curbs and existing utilities from damage.

3.130 Pavement Patching

This work shall consist of the reconstruction and patching of existing pavement that is scheduled to remain. The following provisions shall apply regardless of the condition or type of roadway base and pavement types encountered. Asphalt pavements shall be patched with asphalt, and concrete pavements shall be patched with concrete.

Pavement patching shall be scheduled to accommodate the demands of traffic and shall be performed as rapidly as possible to provide maximum safety and convenience to public travel.

Before the patch is constructed, all pavement cuts shall be trued so that the marginal lines of the patch will form a rectangle with straight edges and vertical faces. The patch shall be flush with the surrounding surface and shall provide a smooth riding surface for passing traffic.

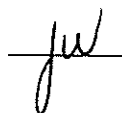
Asphalt shall be Asphalt Concrete Pavement, Class B. The depth of asphalt shall be a minimum of four inches in all areas, and shall be increased as necessary to match the existing thickness. Asphalt Concrete Pavement shall be laid over four inches of crushed surfacing.

Cement Concrete Pavement shall be a 3-day mix conforming to the requirements of Section 5-05 of the Standard Specifications. The thickness of concrete shall be a minimum of 6 inches, and shall be increased as necessary to match the existing thickness.

Until such time as the permanent patch placed, the Contractor shall install a temporary patch over unfinished portions of work that will affect traffic in any way. Temporary pavement patch shall be accomplished by using 3 inches of cold mix (MC 250), or 3 inches of ATB.

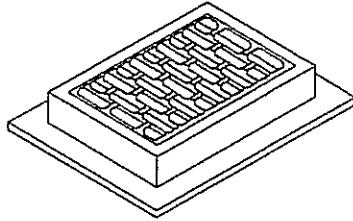
3.140 Approval of Alternate Materials

The City Engineer shall be the sole judge of whether other types and materials of pipe, drainage structures, drainage hardware, etc. qualify as suitable for use on City of Snoqualmie storm drainage systems. As a minimum, submit information proving that specifications are available to control quality, and that acceptable user experience with the product can be shown in uses similar to those proposed. The Developer / Contractor shall have the full burden of proof in proving adequacy. Incomplete submittals will be rejected. Allow 20 working days after receipt of all required information for the approval process. See Chapter 1 for submittal requirements.

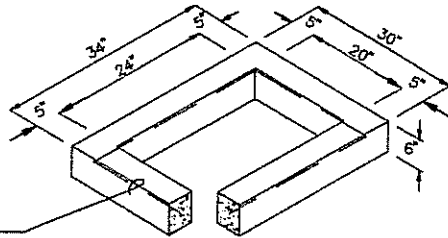


LIST OF STANDARD DRAWINGS**CHAPTER 3 - STORM DRAINAGE**

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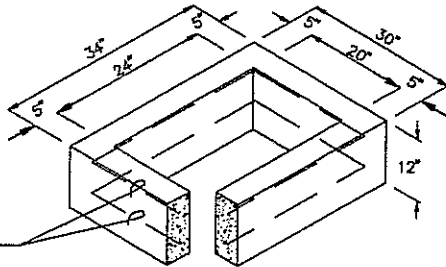


FRAME AND VANED GRATE



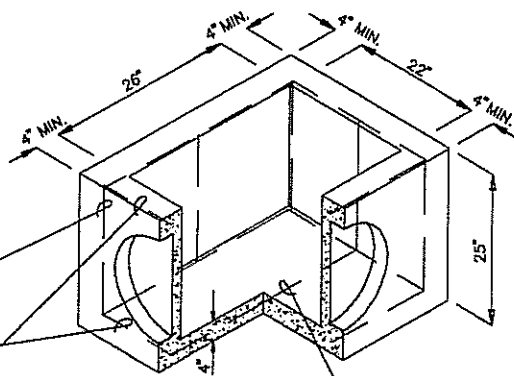
1 #3 BAR HOOP

6" RISER SECTION



2 #3 BAR HOOPS

12" RISER SECTION



#3 BAR EACH CORNER

#3 BAR EACH SIDE
TOP & BOTTOM

1-#3 BAR ACROSS BOTTOM

PRECAST BASE SECTION
(MEASUREMENT AT THE TOP
OF THE BASE)

NOTES:

1. CURB INLET TO BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 & C890 UNLESS OTHERWISE SHOWN ON PLANS
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497. WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS.
5. THE BOTTOM OF THE PRECAST BASE SECTION MAY BE ROUNDED.
6. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CURB INLET WALL THICKNESS.
7. ROUND KNOCKOUTS MAY BE ON ALL 4 SIDES WITH MAX. DIAM. OF 17".
8. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'-0".
9. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2" / FT.
10. CONCRETE INLET FRAME AND GRATES SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-621D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY OTHER COVER POSITION.
11. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.

SNOQUALMIE RIDGE

CONCRETE INLET

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02/21/96

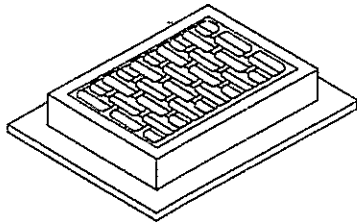
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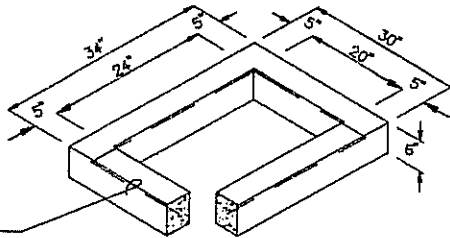
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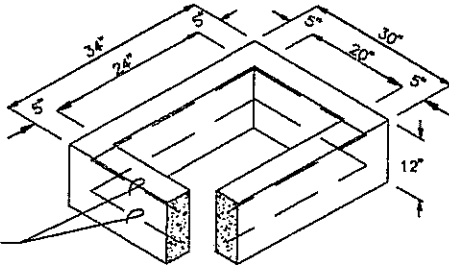


FRAME AND VANED GRATE



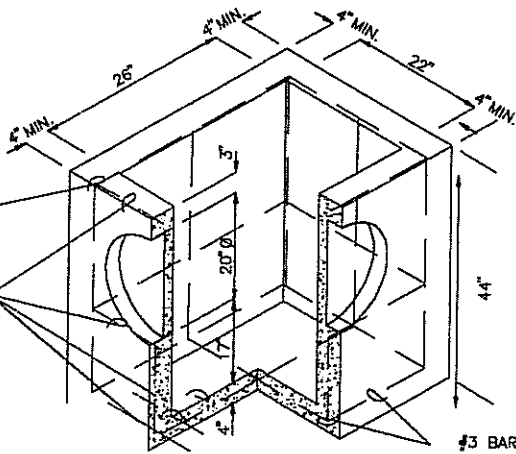
1 #3 BAR HOOP

6" RISER SECTION



2 #3 BAR HOOPS

12" RISER SECTION



#3 BAR EACH CORNER

#3 BAR EACH SIDE

#3 BAR EACH WAY

PRECAST BASE SECTION
(MEASUREMENT AT THE TOP
OF THE BASE)

NOTES:

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS.
6. ROUND KNOCKOUTS MAY BE ON ALL 4 SIDES, WITH MAX. DIAM. OF 20". KNOCKOUTS MAY BE EITHER ROUND OR "D" SHAPE.
7. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'-0".
8. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2" / FT.
9. CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-62ID. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
10. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.
11. EDGE OF RISER OR BRICK SHALL NOT BE MORE THAN 2" FROM VERTICAL EDGE OF CATCH BASIN WALL.

SNOQUALMIE RIDGE

TYPE 1 CATCH BASIN

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NOT TO SCALE

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2-22-96

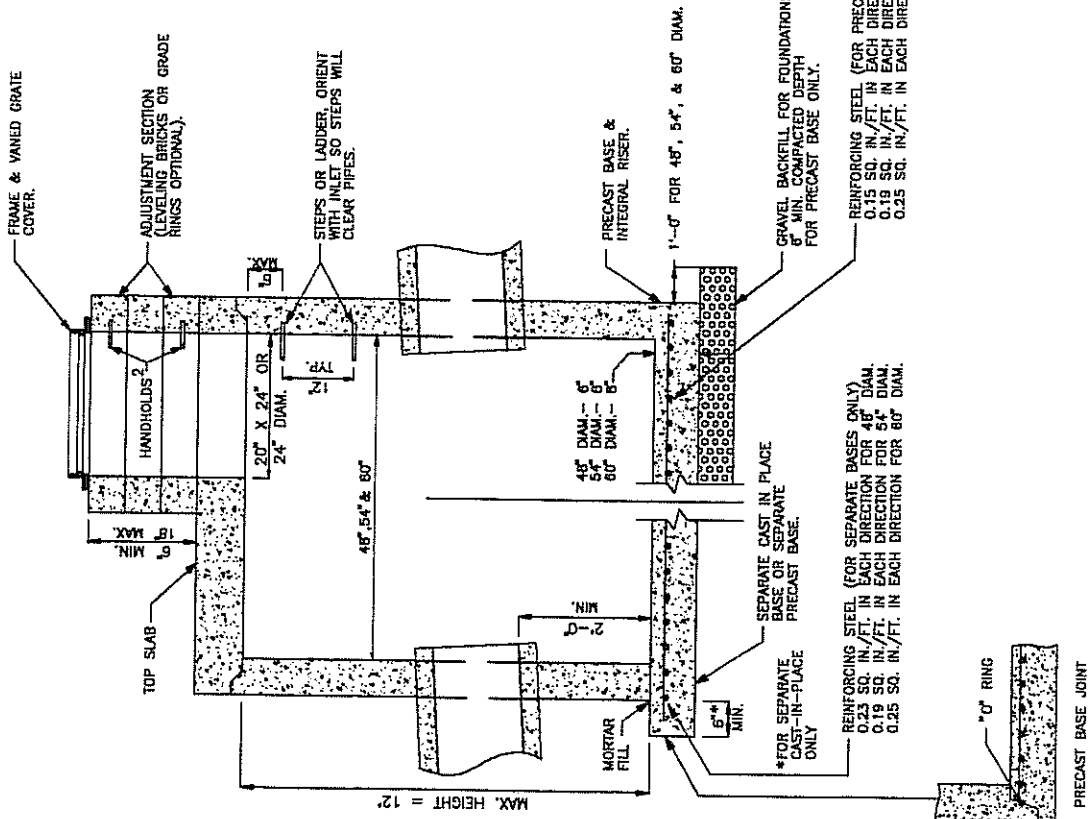
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REV. NO:

NOTES:

- CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (MASHITO M199) AND ASTM C890 UNLESS OTHERWISE SHOWN ON PLANS.
- HANDHOLDS IN ADJUSTMENT SECTION SHALL HAVE 3" MIN. CLEARANCE. STEPS IN CATCH BASIN SHALL HAVE 6" MIN. CLEARANCE. HANDHOLDS SHALL BE PLACED IN ALTERNATING GRADE RINGS OR LEVELING BRICK COURSE WITH A MIN. OF ONE HANDHOLD BETWEEN THE LAST STEP AND TOP OF THE MANHOLE.
- ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000. ALL PRECAST CONCRETE SHALL BE CLASS 4000.
- PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE WALL THICKNESS OF 2" MIN. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT. PIPES SHALL BE INSTALLED ONLY IN FACTORY KNOCKOUTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- KNOCKOUT OR CUTOUT HOLE SIZE SHALL EQUAL PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS. MAX. HOLE SIZE SHALL BE 36" FOR 48" C.B., 42" FOR 54" C.B. AND 48" FOR 60" C.B. DISTANCE BETWEEN HOLES SHALL BE 8" FOR 48", 54" AND 60" C.B.
- CATCH BASIN FRAMES AND GRATES OR COVERS SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-621D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
- ALL BASE REINFORCING STEEL SHALL HAVE A MIN. YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MIN. CLEARANCE.
- MIN. SOIL BEARING VALUE SHALL EQUAL 3,300 POUNDS PER SQUARE FOOT.
- FOR DETAILS SHOWING LADDER, STEPS, HANDRAILS AND TOP SLABS, SEE DWG. NO. 2-006.
- SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SEC. 7-05.3 FOR JOINT REQUIREMENTS.



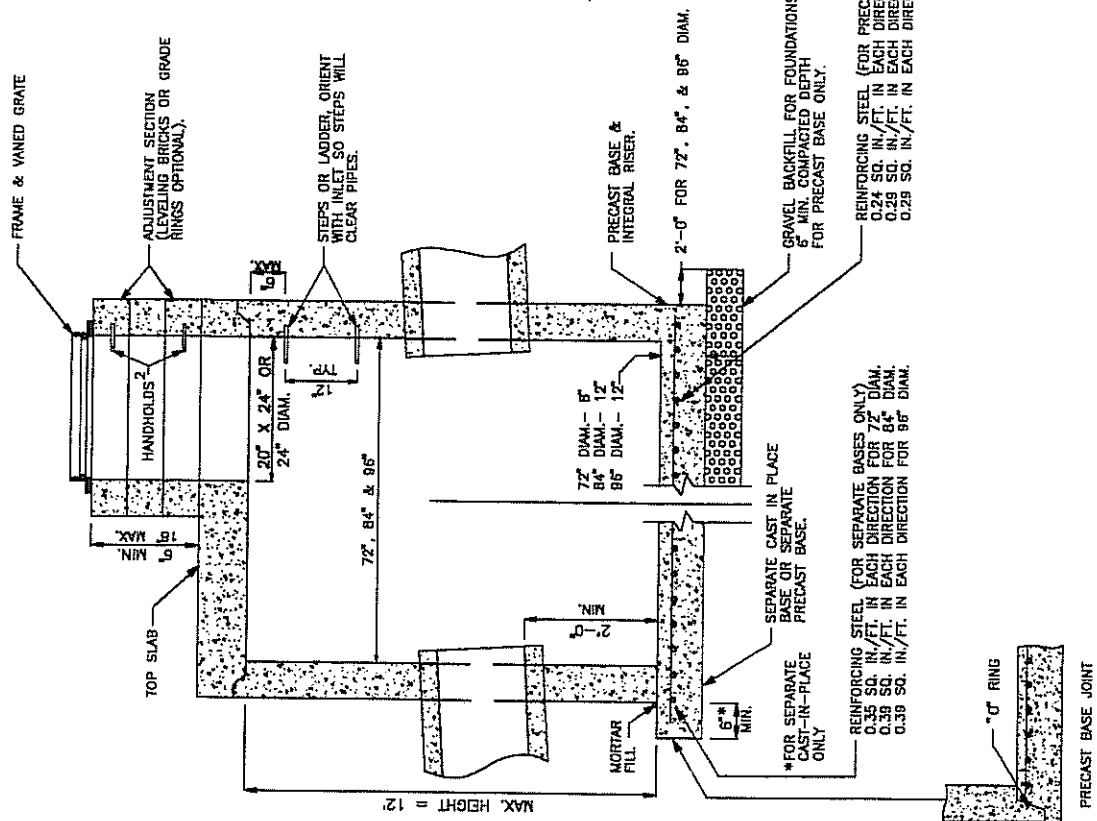
REF: 3-03.DWG
02/21/96

NOT TO SCALE

SNOQUALMIE RIDGE			
TYPE 2 CATCH BASIN 48", 54" AND 60"			
DWN	CKD	DATE 2-22-96	DWG 3-03

NOTES:

- CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M199) AND ASTM C890 UNLESS OTHERWISE SHOWN ON PLANS.
- HANDHOLDS IN ADJUSTMENT SECTION SHALL HAVE 3" MIN. CLEARANCE. STEPS IN CATCH BASIN SHALL HAVE 6" MIN. CLEARANCE. HANDHOLDS SHALL BE PLACED IN ALTERNATING GRADE RINGS OR LEVELING BRICK COURSE WITH A MIN. OF ONE HANDHOLD BETWEEN THE LAST STEP AND TOP OF THE MANHOLE.
- ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
- PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE WALL THICKNESS OF 2" MIN. UNLESS KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT. PIPES SHALL BE INSTALLED ONLY IN FACTORY KNOCKOUTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- KNOCKOUT OR CUTOUT HOLE SIZE SHALL EQUAL PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS. MAX. HOLE SIZE SHALL BE 60" FOR 72" C.B., 72" FOR 84" C.B. AND 84" FOR 96" C.B. DISTANCE BETWEEN HOLES SHALL BE 12" FOR 72", 84" AND 96" C.B.
- CATCH BASIN FRAMES AND GRATES OR COVERS SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-621D. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
- ALL BASE REINFORCING STEEL SHALL HAVE A MIN. YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MIN. CLEARANCE.
- MIN. SOIL BEARING VALUE SHALL EQUAL 3,300 POUNDS PER SQUARE FOOT.
- FOR DETAILS SHOWING LADDER, STEPS, HANDRAILS AND TOP SLABS, SEE DWG. NO. 2-006.
- SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SEC. 7-05.3 FOR JOINT REQUIREMENTS.



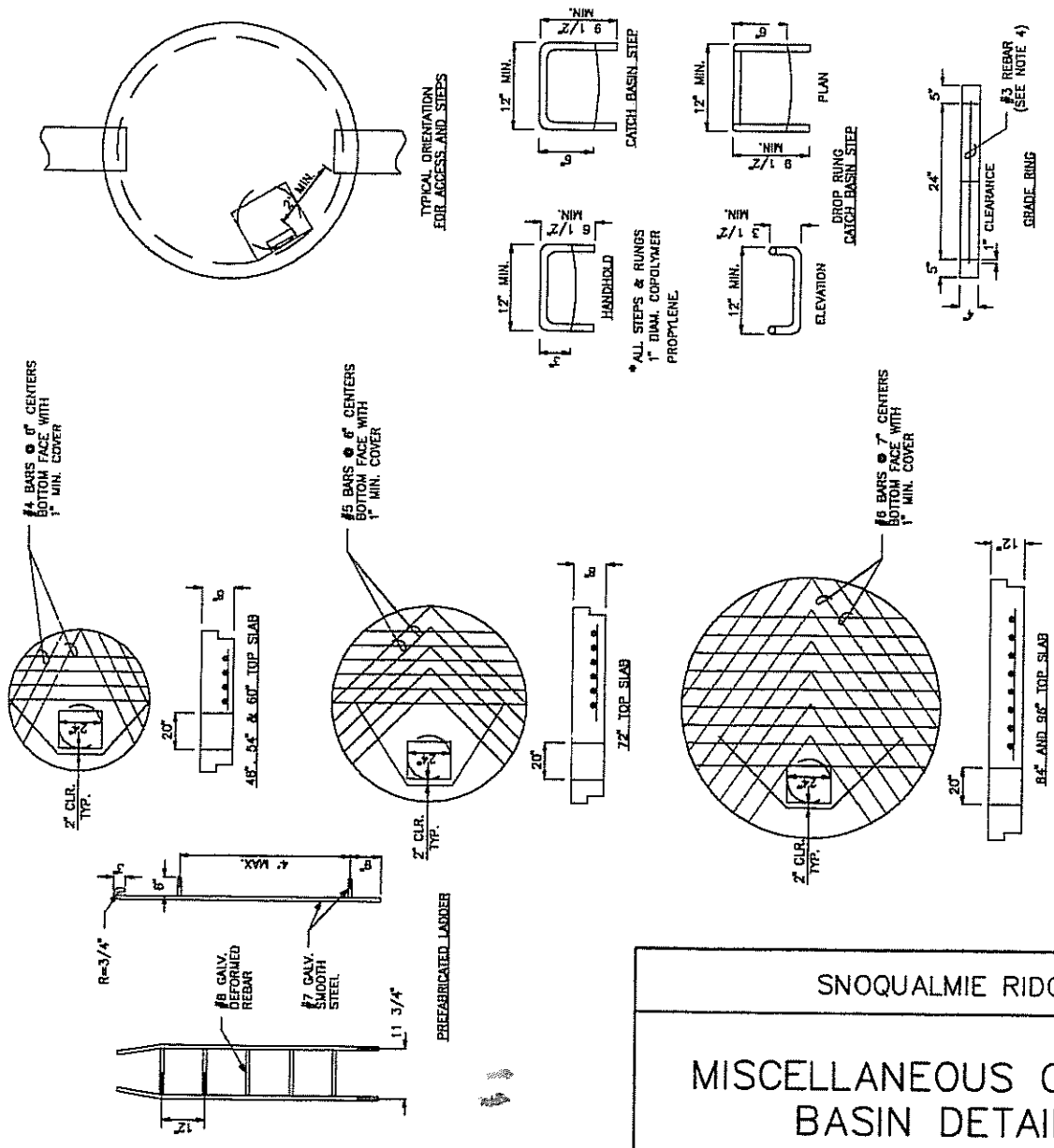
SNOQUALMIE RIDGE			
TYPE 2 CATCH BASIN 72", 84" AND 96"			
DWN	CKD	DATE 2-22-96	DWG 3-04

REF: 3-04.DWG
02/21/96

NOT TO SCALE

NOTES:

1. PROPRIETARY CATCH BASIN HANDHOLDS AND STEPS ARE ACCEPTABLE, PROVIDED THAT THEY CONFORM TO SEC. R, ASTM C478, AASHTO M-199 AND MEET ALL WISHA REQUIREMENTS.
2. CATCH BASIN STEP/HANDHOLD LEGS SHALL BE PARALLEL OR APPROXIMATELY RADIAL AT THE OPTION OF THE MANUFACTURER, EXCEPT THAT ALL STEPS IN ANY CATCH BASIN SHALL BE SIMILAR. PENETRATION OF OUTER WALL BY A LEG IS PROHIBITED.
3. HANDHOLDS AND STEPS SHALL HAVE "DROP" RUNGS AS SHOWN ON DETAIL OR PROTUBERANCES TO PREVENT SIDEWAYS SLIP.
4. SLAB OPENING MAY BE 24" X 20" OR 24" DIAM.
5. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497.
6. LADDERS OR STEPS SHALL EXTEND TO WITHIN 16" OF BOTTOM OF CATCH BASIN.
7. HANGING LADDERS SHALL BE PERMANENTLY FASTENED AT TOP BY HANGING ON STEP OR BY BOLTING OR EMBEDDING IN CONCRETE. EACH SHALL BE EMBEDDED AT BOTTOM IN BASE.
8. ADDITIONAL SAFETY FEATURES MAY BE REQUIRED IN VERY DEEP OR UNUSUAL STRUCTURES.
9. DEFORMED AND PLAIN REINFORCING BAR SHALL CONFORM TO ASTM A 615, GRADE 60.
10. STEEL LADDERS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123.

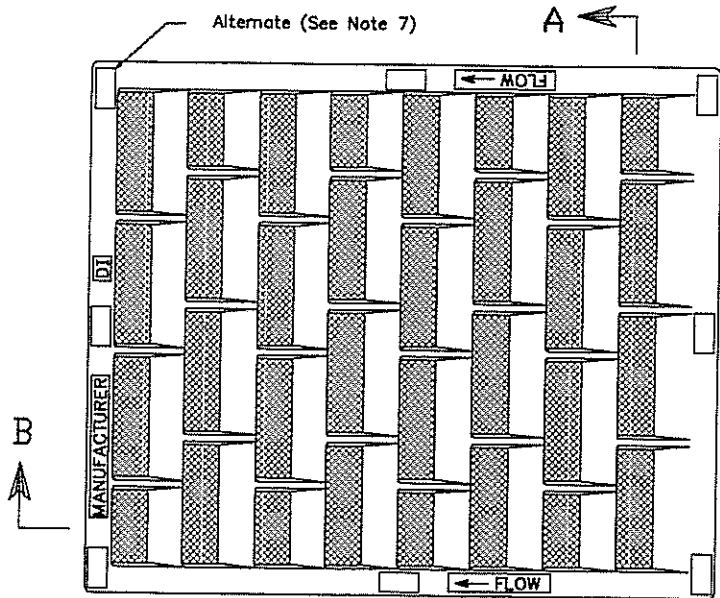


*ALL STEPS & RUNGS 1" DIAM. COPOLYMER PROPYLENE

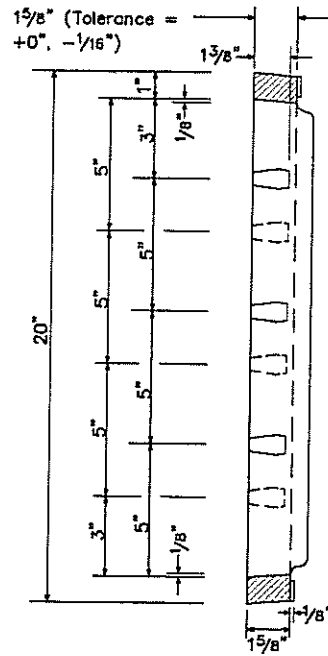
SNOQUALMIE RIDGE			
MISCELLANEOUS CATCH BASIN DETAILS			
DWN	CKD	DATE 2-22-96	DWG 3-05

REF: 3-05.DWG
02/21/96

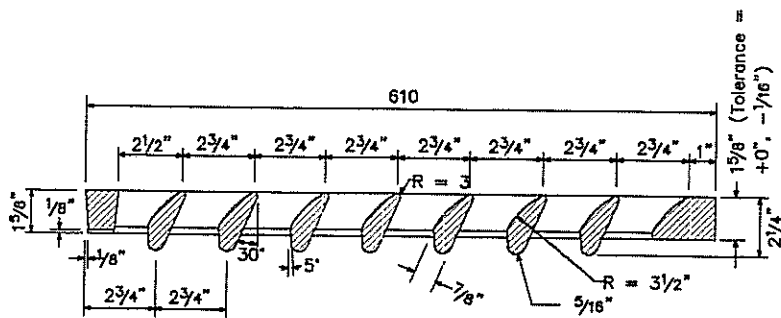
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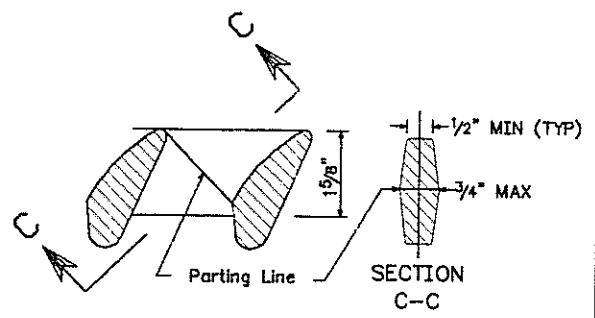
PLAN VIEW



SECTION A-A



SECTION B-B



VANE DETAIL

NOTES

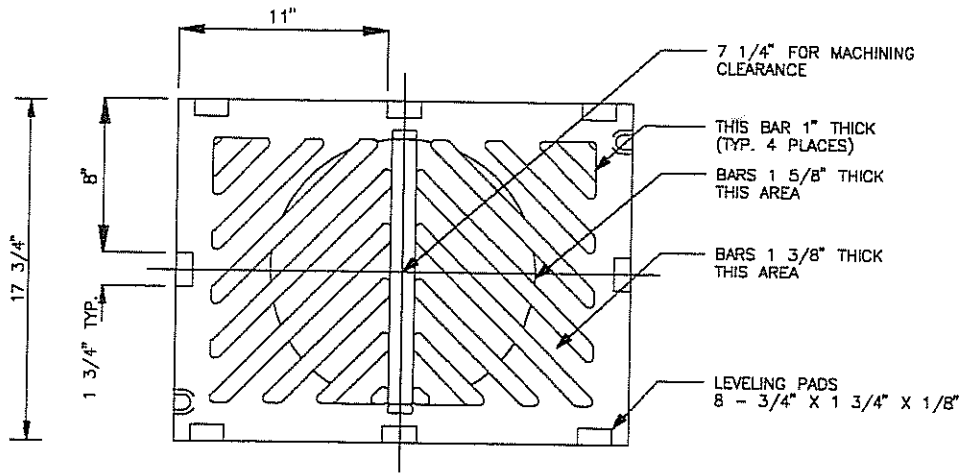
1. The name of the manufacturer and direction of flow shall be embossed on the top surface of each grate. Lettering to be recessed 1/16".
2. The material used for the grate shall be designated by embossing either DI (Ductile Iron) or CS (Cast Steel) near the name of the manufacturer.
3. Dimensions shall have a ±1/16" tolerance, except as noted.
4. Edges shall have 1/8" radius, 1/8" chamfer or complete deburring.
5. The frame shall be in accordance with the Standard Plan "Metal Frame and Grate for Catch Basin and Inlet".
6. Welding is not permitted.
7. As an alternate, eight pads 1 1/2" x 1/8" x 3/4" integrally cast with the grate may be used.

SNOQUALMIE RIDGE			
VANED GRATE FOR CATCH BASIN AND INLET			
DWN	CKD	DATE 2-22-96	DWG 3-06

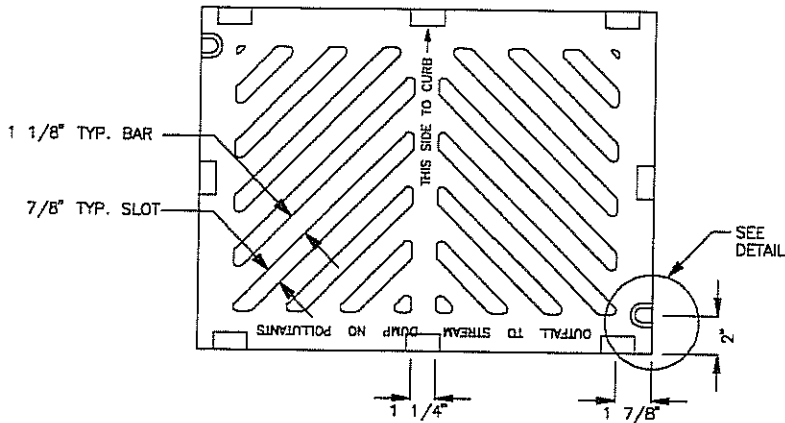
REF: 3-06.DWG
02/21/96

NOT TO SCALE

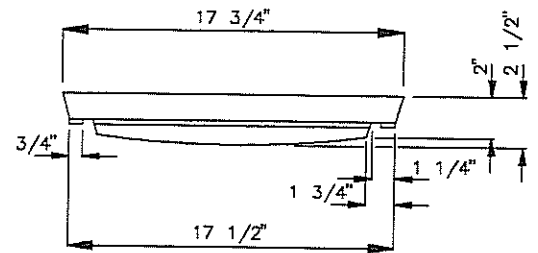
REV. NO.



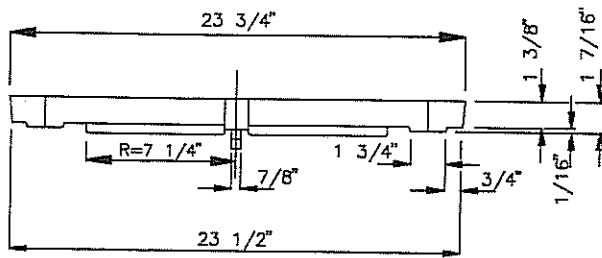
BOTTOM VIEW



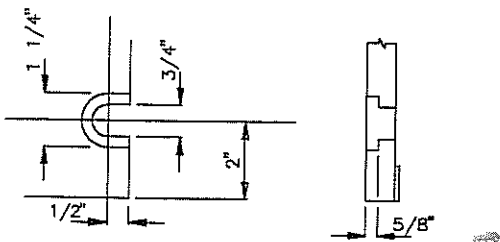
TOP VIEW



END VIEW



SIDE VIEW



SLOT DETAIL

SEE NOTE 1

NOTES:

1. SLOT FORMED AND RECESSED FOR 5/8"-11 NC X 2" SOCKET HEAD (ALLEN HEAD) CAP SCREW.
2. GRATE SHALL BE CAST IRON PER ASTM A48 CLASS 30 UNLESS OTHERWISE SPECIFIED.

SNOQUALMIE RIDGE

STANDARD GRATE

REF: 3-07a.DWG
04/02/95

ju

NOT TO SCALE

DWN

CKD

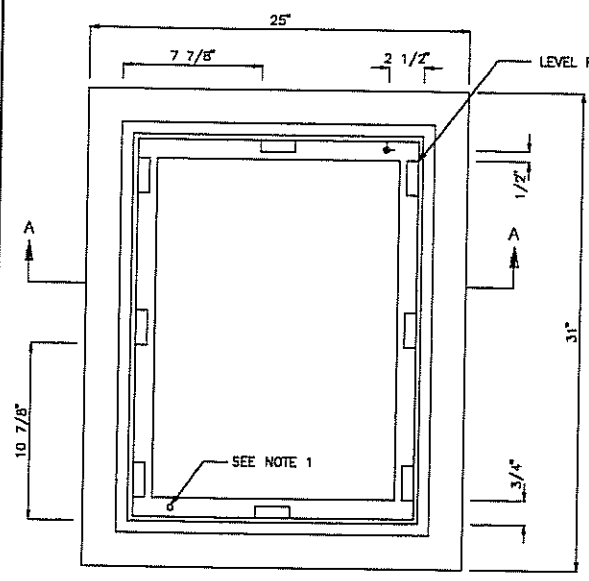
DATE

2-22-96

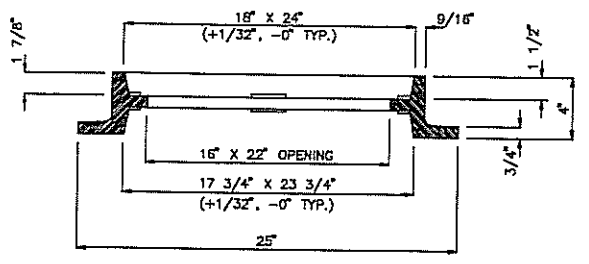
DWG

3-07

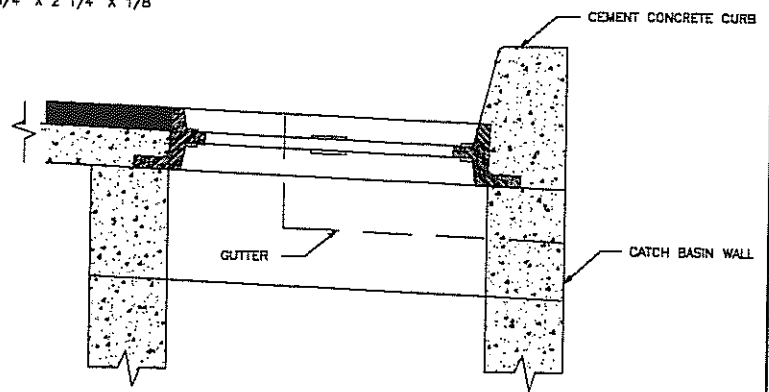
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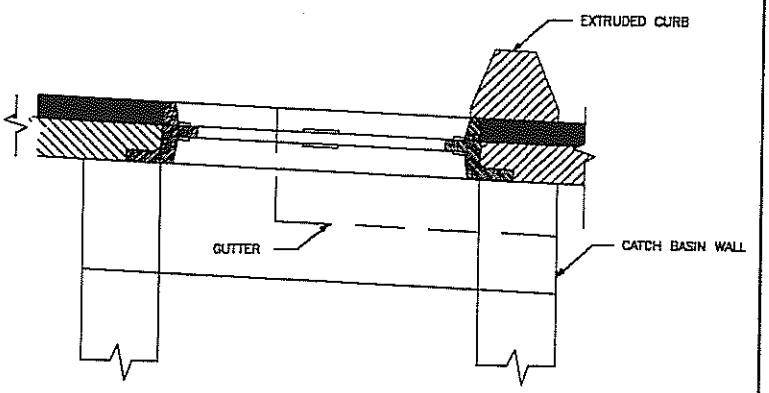
PLAN



SECTION A-A



VERTICAL CURB
SEE NOTE 4



EXTRUDED CURB
SEE NOTE 4

NOTES:

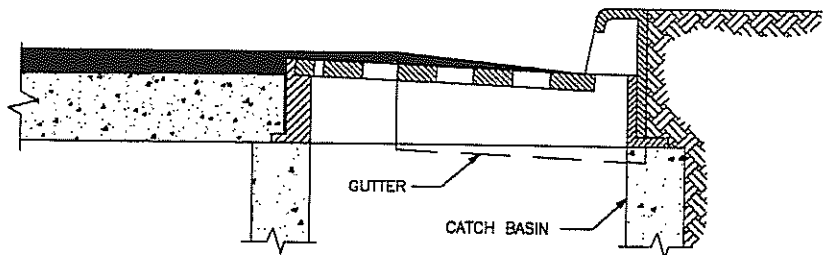
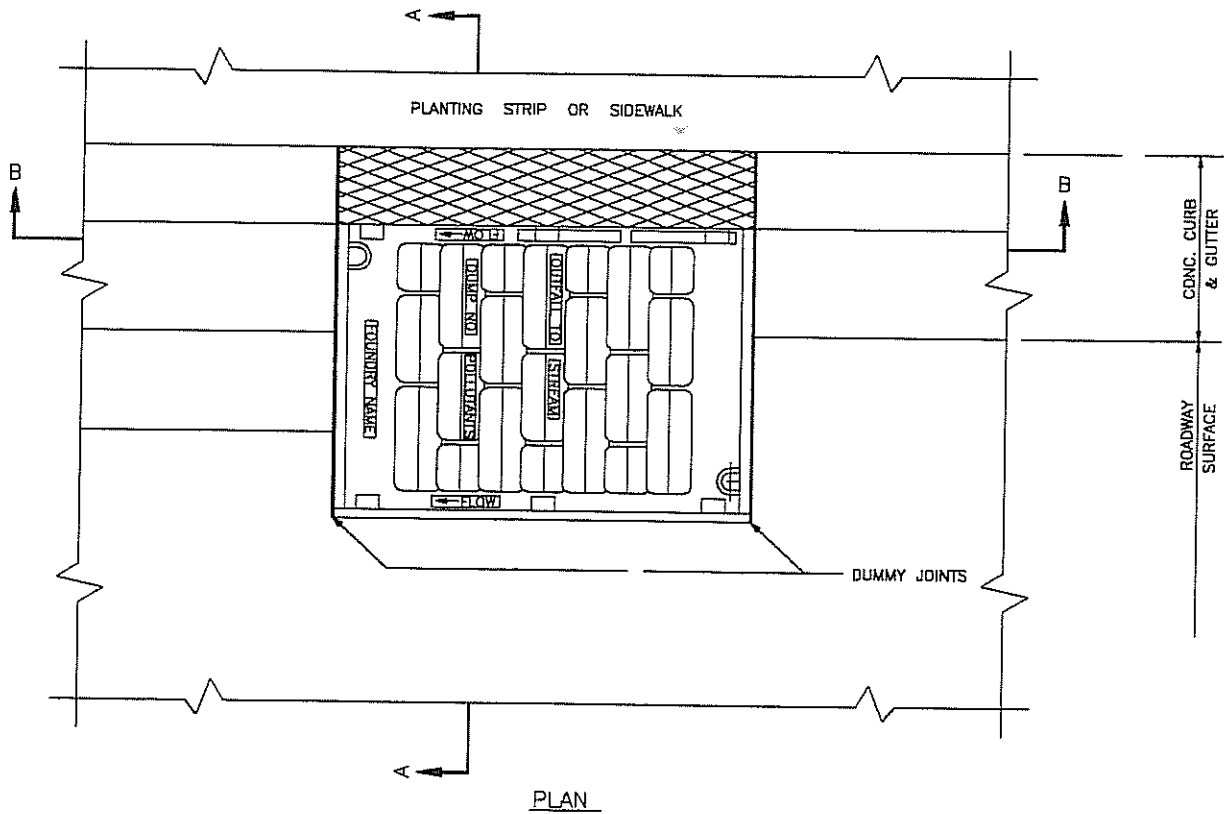
1. DRILL AND TAP FOR, AND PROVIDE, TWO LOCKING BOLTS 5/8"-11 NC STAINLESS TYPE 304 STEEL SOCKET HEAD (ALLEN HEAD) CAP SCREWS 2" LONG WHEN SPECIFIED BY ENGINEER.
2. FRAME MATERIAL IS CAST IRON PER ASTM A48 CLASS 30.
3. SET FRAME TO GRADE AND CONSTRUCT ROAD AND GUTTER TO BE FLUSH WITH FRAME.

SNOQUALMIE RIDGE			
STANDARD FRAME DETAILS			
DWN	CKD	DATE 2-22-96	DWG 3-08

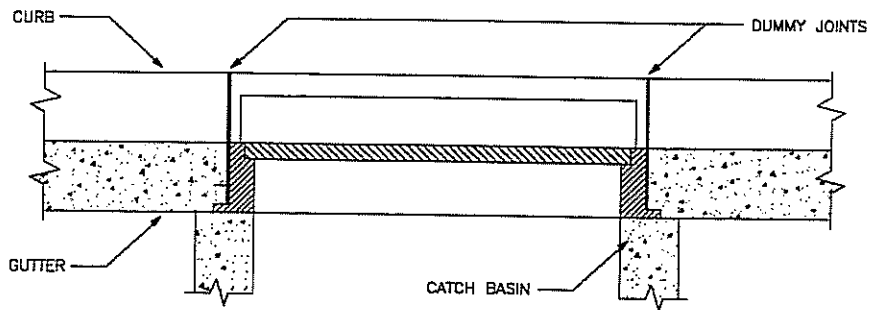
REF: 3-07.DWG
04/02/96

ju

NOT TO SCALE



SECTION A-A



SECTION B-B

NOTES:

1. SET TO GRADE AND CONSTRUCT ROAD AND GUTTER TO BE FLUSH WITH FRAME.

SNOQUALMIE RIDGE

THROUGH-CURB INLET FRAME & GRATE INSTALLATION

REF: 3-08.DWG
04/02/96

NOT TO SCALE

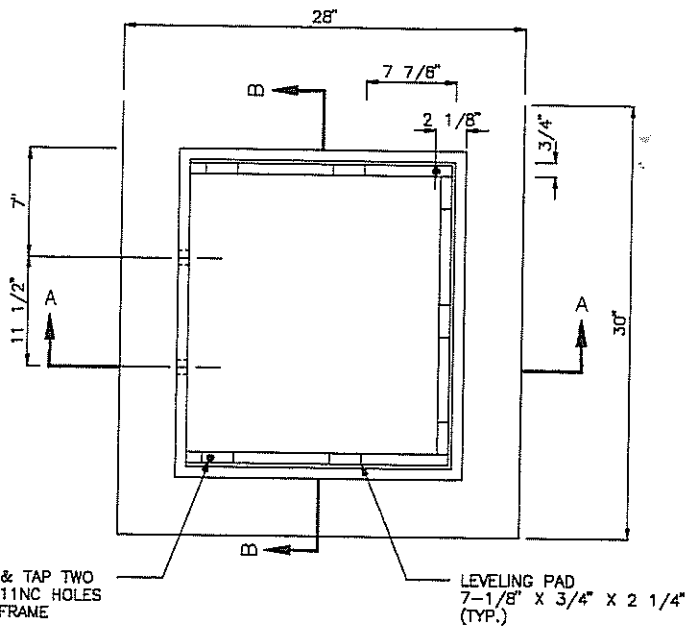
DWN

CKD

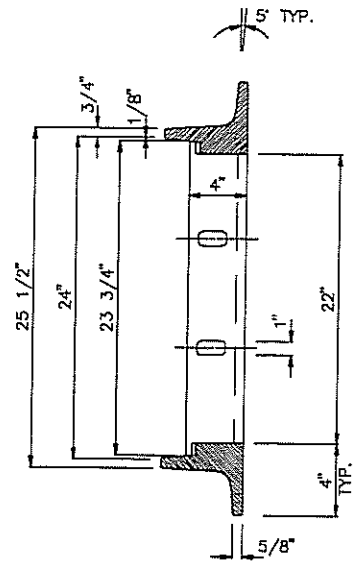
DATE
2-22-96

DWG
3-09

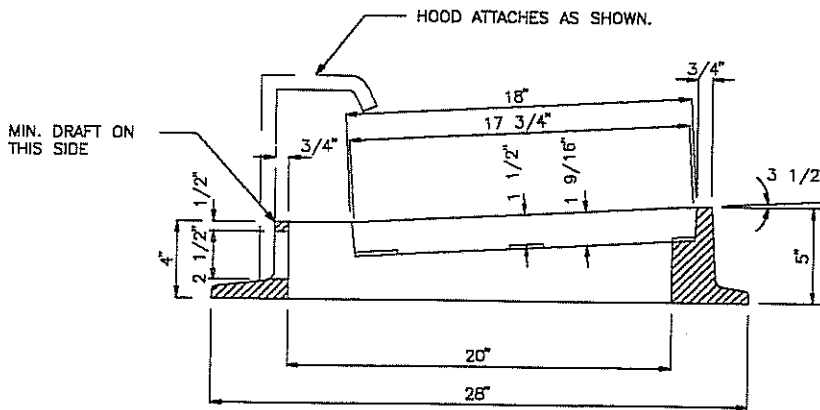
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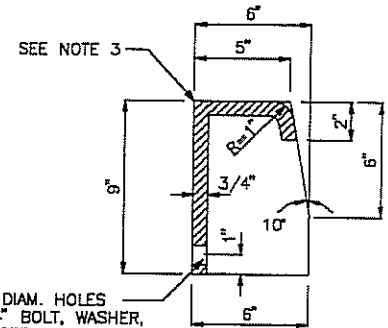
PLAN



SECTION B-B



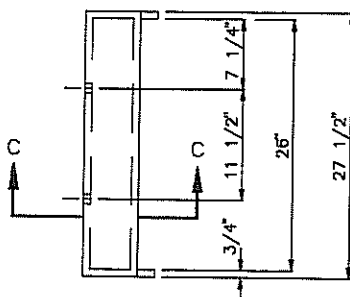
SECTION A-A



SECTION C-C

NOTES:

1. MATERIAL IS CAST IRON ASTM A48 CLASS 30.
2. SEE STANDARD DRAWING FOR VANED GRATE.
3. PATTERN ON TOP SURFACE OF HOOD SHALL BE 3/16" NON-SKID DIAMOND.
4. BOLT, WASHER AND NUT SHALL BE GALV. OR CORROSION RESISTANT.



HOOD DETAIL

SNOQUALMIE RIDGE

THROUGH-CURB
INLET FRAME

REF: 3-09.DWG
04/02/96

NOT TO SCALE

DWN

CKD

DATE

2-22-96

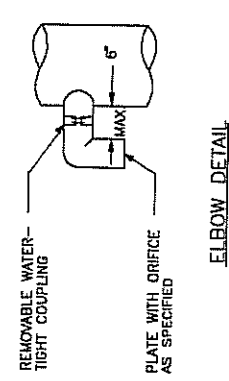
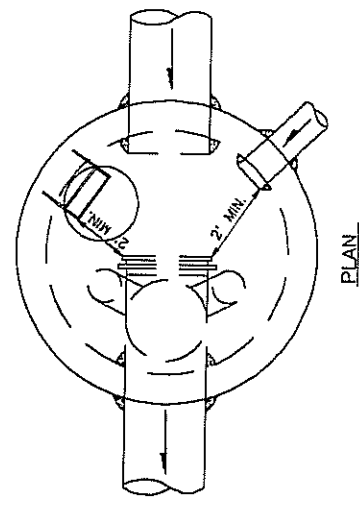
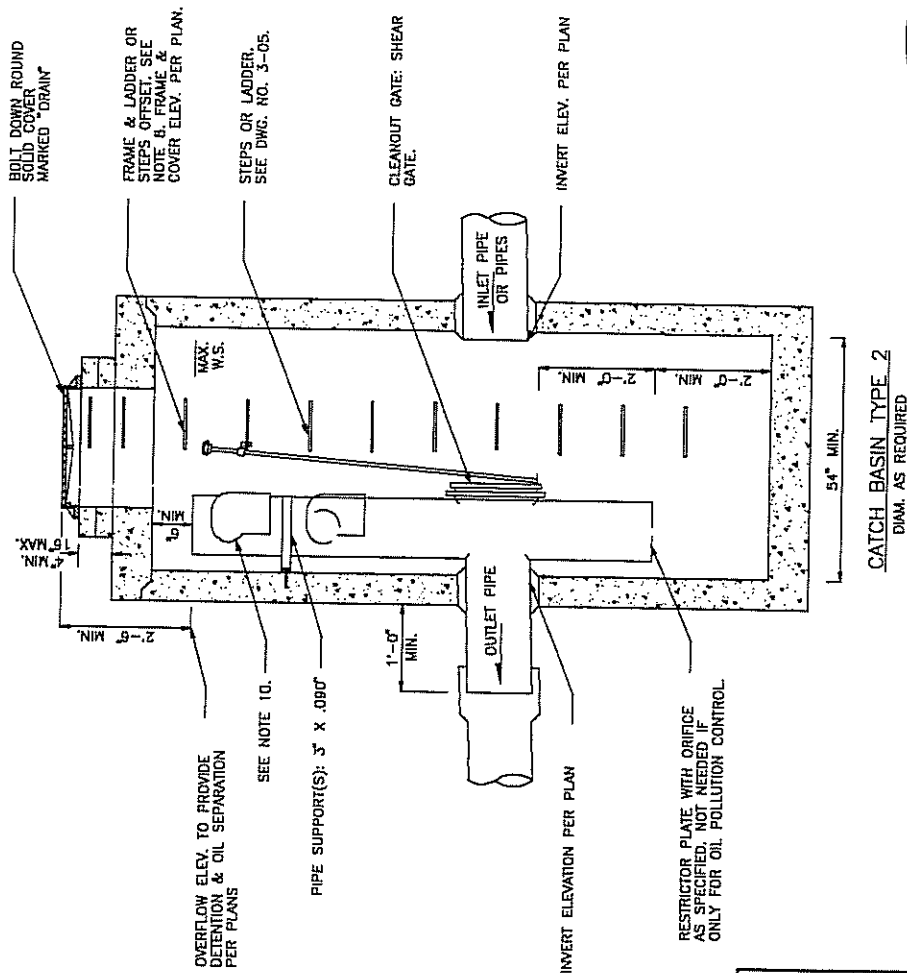
DWG

3-10

REV. NO.

NOTES:

1. PIPE SIZES AND SLOPES: PER PLANS.
2. OUTLET CAPACITY: NOT LESS THAN COMBINED INLETS.
3. EXCEPT AS SHOWN OR NOTED, UNITS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS FOR CATCH BASIN TYPE 2, 54" MIN. DIAM.
4. PIPE SUPPORTS AND RESTRICTOR/SEPARATOR SHALL BE OF SAME MATERIAL, AND BE ANCHORED AT 3' MAX. SPACING BY 5/8" DIAM. STAINLESS STEEL EXPANSION BOLTS OR EMBEDDED 2" IN WALL.
5. THE RESTRICTOR/SEPARATOR SHALL BE FABRICATED FROM .060" ALUMINUM OR .064" ALUMINIZED STEEL, OR .064" GALVANIZED STEEL PIPE; IN ACCORDANCE WITH AASHTO M 36, M 196, M 197 AND M 274. GALVANIZED STEEL SHALL HAVE TREATMENT 1.
6. OUTLET SHALL BE CONNECTED TO CULVERT OR SEWER PIPE WITH A STANDARD COUPLING BAND FOR CORRUGATED METAL PIPE, OR GROUDED INTO THE BELL OF CONCRETE PIPE.
7. THE VERTICAL RISER STEM OF THE RESTRICTOR/SEPARATOR SHALL BE THE SAME DIAM. AS THE HORIZONTAL OUTLET PIPE, WITH AN 8" MIN. DIAM.
8. FRAME AND LADDER OR STEPS OFFSET SO THAT:
 - A. CLEANOUT GATE IS VISIBLE FROM TOP.
 - B. CLIMB DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE.
 - C. FRAME IS CLEAR OF CURB.
9. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS 1/4".
10. MULTI-ORFICE ELBOWS MAY BE LOCATED AS SHOWN OR ALL ON ONE SIDE OF RISER TO ASSURE LADDER CLEARANCE.



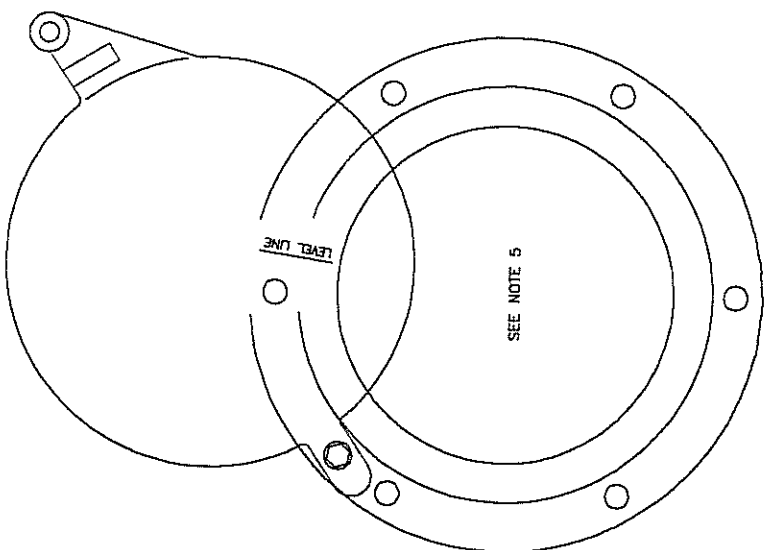
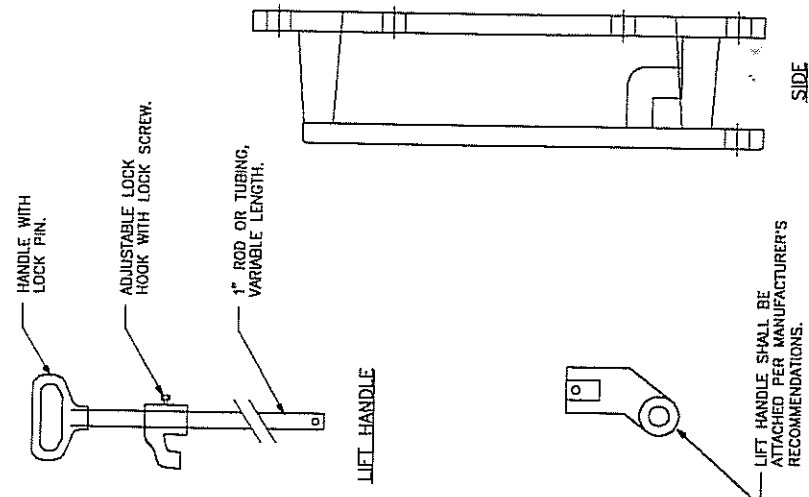
SNOQUALMIE RIDGE

**TYPE 2 CATCH BASIN
w/TEE TYPE OIL SEPARATOR**

REF: 3-10.DWG
04/02/96

NOT TO SCALE

DWN	CKD	DATE 2-22-96	DWG 3-11
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MAXIMUM OPENING OF GATE

NOTES:

1. GATE SHALL BE ALUMINUM ALLOY PER ASTM B-26-ZG-32a OR CAST IRON ASTM A48 CLASS 30B AS REQUIRED.
2. GATE SHALL BE 8" DIAM. UNLESS OTHERWISE SPECIFIED.
3. GATE SHALL BE JOINED TO TEE SECTION BY BOLTING OR OTHER MEANS WHICH WILL ALLOW REMOVAL OR REPLACEMENT.
4. LIFT ROD: AS SPECIFIED BY MFR WITH HANDLE EXTENDING TO WITHIN ONE FOOT OF COVER AND ADJUSTABLE HOOK LOCK FASTENED TO FRAME OR UPPER HANDHOLD.
5. GATE SHALL NOT OPEN BEYOND THE CLEAR OPENING BY LIMITED HINGE MOVEMENT, STOP TAB, OR SOME OTHER DEVICE.
6. NEOPRENE RUBBER GASKET REQUIRED BETWEEN RISER MOUNTING FLANGE AND GATE FLANGE.
7. MATING SURFACES OF LID AND BODY TO BE MACHINED FOR PROPER FIT.
8. FLANGE MOUNTING BOLTS SHALL BE 3/8" DIAM. STAINLESS STEEL.
9. ALTERNATE CLEANOUT/SHEAR GATES TO THE DESIGN SHOWN ARE ACCEPTABLE, PROVIDED THEY MEET THE MATERIAL SPECIFICATIONS ABOVE AND HAVE A SIX BOLT, 10 3/8" BOLT CIRCLE FOR BOLTING TO THE FLANGE CONNECTION.

SNOQUALMIE RIDGE

CLEANOUT GATE

REF: 3-11.DWG
04/02/96

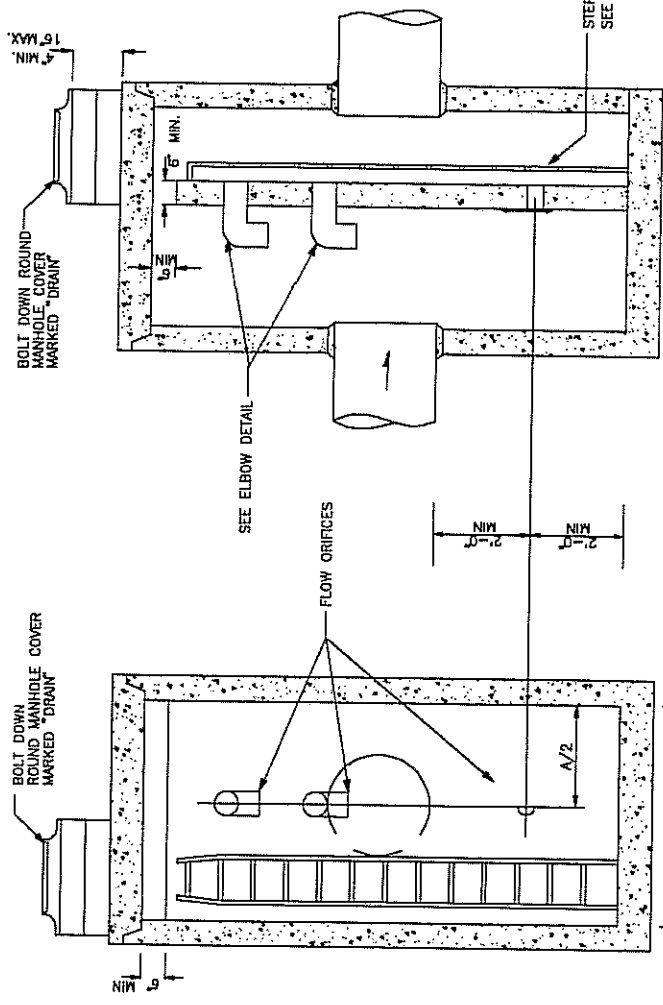
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NOT TO SCALE

DWN	CKD	DATE 2-22-96	DWG 3-12
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NOTES:

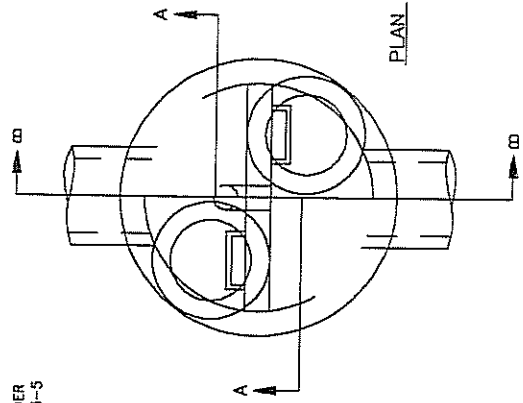
1. PIPE SIZE, SLOPES AND ALL ELEVATIONS: PER PLANS.
2. OUTLET CAPACITY: NOT LESS THAN COMBINED INLETS.
3. EXCEPT AS SHOWN OR NOTED UNIT SHALL TO BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF CATCH BASIN TYPE 2 72", 84" OR 96".
4. COVERS: ROUND, SOLID MARKED "DRAWN," WITH LOCKING BOLTS
5. ORIFICES: SIZED AND LOCATED AS REQUIRED, WITH LOWEST ORIFICE MIN. 2' FROM BASE.
6. BAFFLE WALL SHALL HAVE #4 BAR AT 12" SPACING EACH WAY.
7. PRECAST BAFFLE WALL SHALL BE KEYS AND GROUTED IN PLACE.
8. BOTTOM ORIFICE PLATE TO BE 1/4" MIN. GALVANIZED STEEL AND ATTACHED WITH 1/2" STAINLESS STEEL BOLTS. OMIT ORIFICE PLATE IF ONLY FOR OIL SEPARATION.
9. UPPER FLOW ORIFICE SHALL BE ALUMINUM, ALUMINIZED STEEL OR GALVANIZED STEEL. GALVANIZED STEEL SHALL HAVE TREATMENT



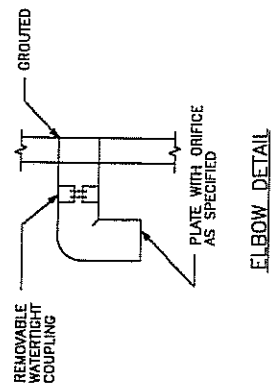
SECTION B-B

ELEVATION

SECTION A-A



PLAN



ELBOW DETAIL

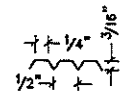
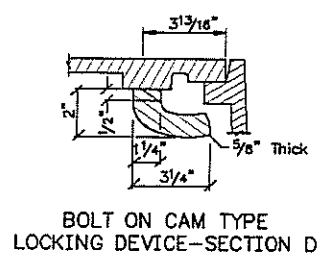
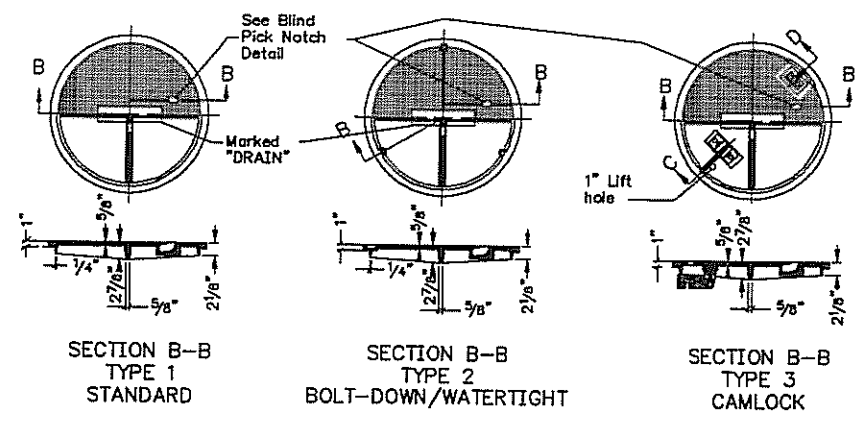
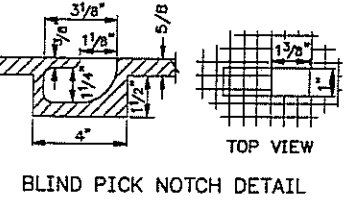
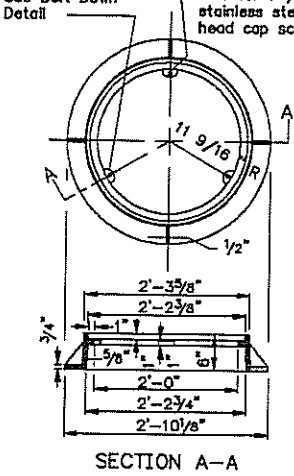
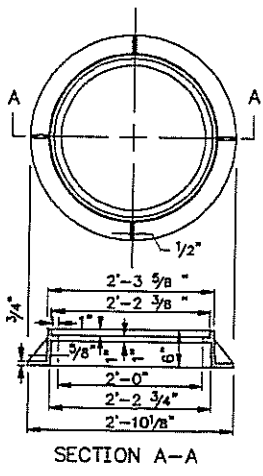
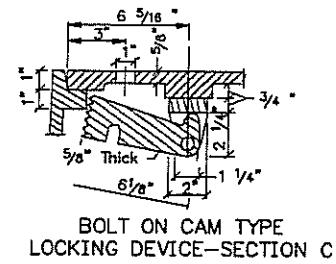
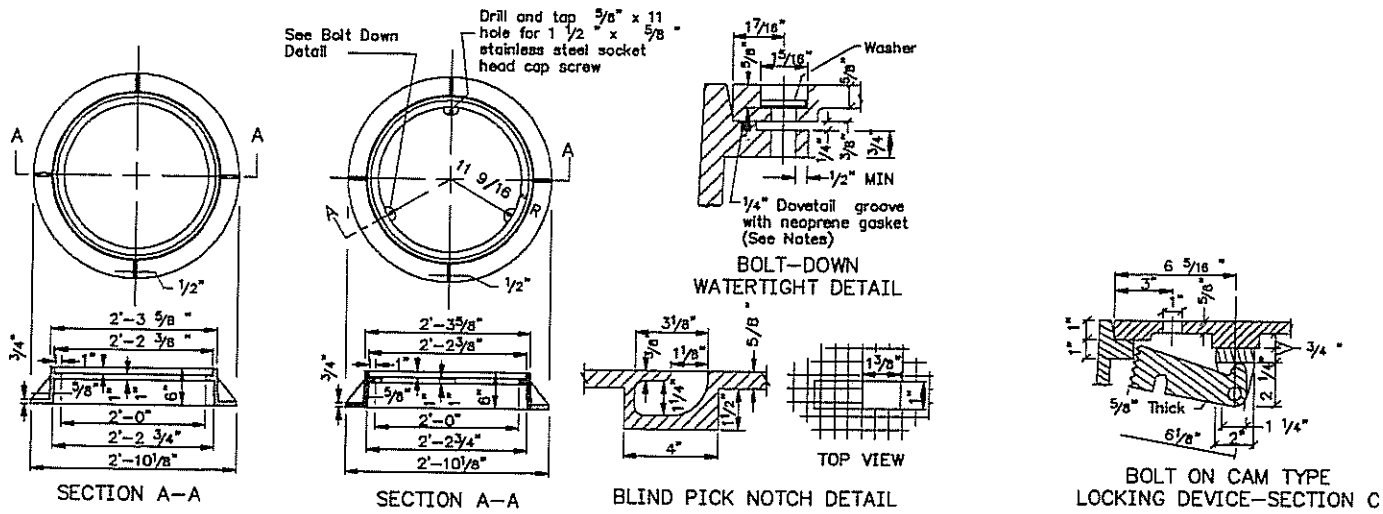
SNOQUALMIE RIDGE

TYPE 2 CATCH BASIN W/
BAFFLE OIL SEPARATOR

REF: 3-12.DWG
04/02/96

NOT TO SCALE

DWN	CKD	DATE 2-22-96	DWG 3-13
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COVER SKID DESIGN DETAIL

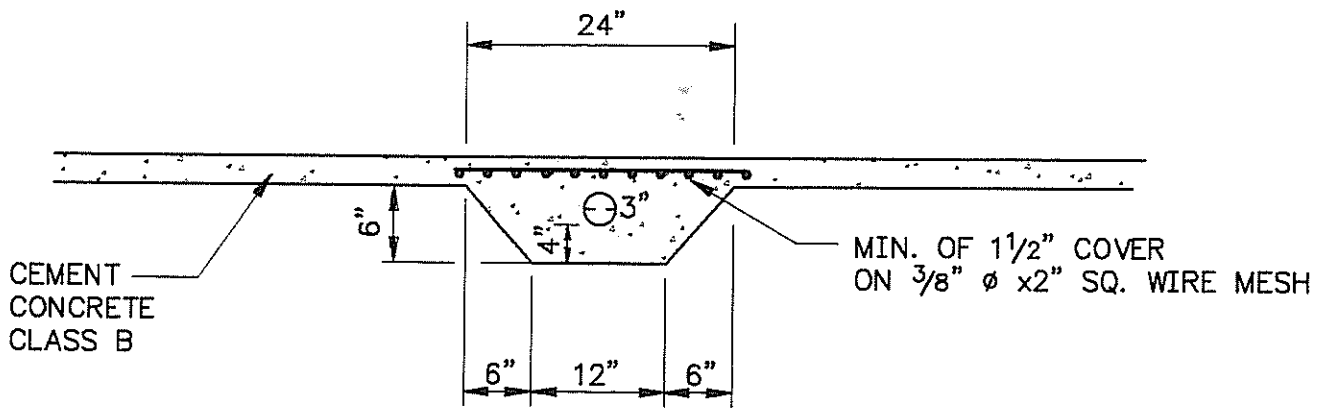
NOTES

- Gasket and groove may be in the seat or underside of cover.
- For bolt down manhole ring and covers that are not required to be watertight, the neoprene gasket, groove and washer are not required.
- Washer shall be lead or neoprene.
- Type 1, Standard Manhole Rings and Covers shall be used, unless otherwise shown on the Plans, or specified in the Special Provisions.
- In lieu of blind pick notch for storm sewer manhole covers, drill three 1" diameter holes at 120° spacing.
- Proprietary manhole covers without bottom ribs are acceptable, provided they meet the Standard Specifications requirements for "Metal Castings."

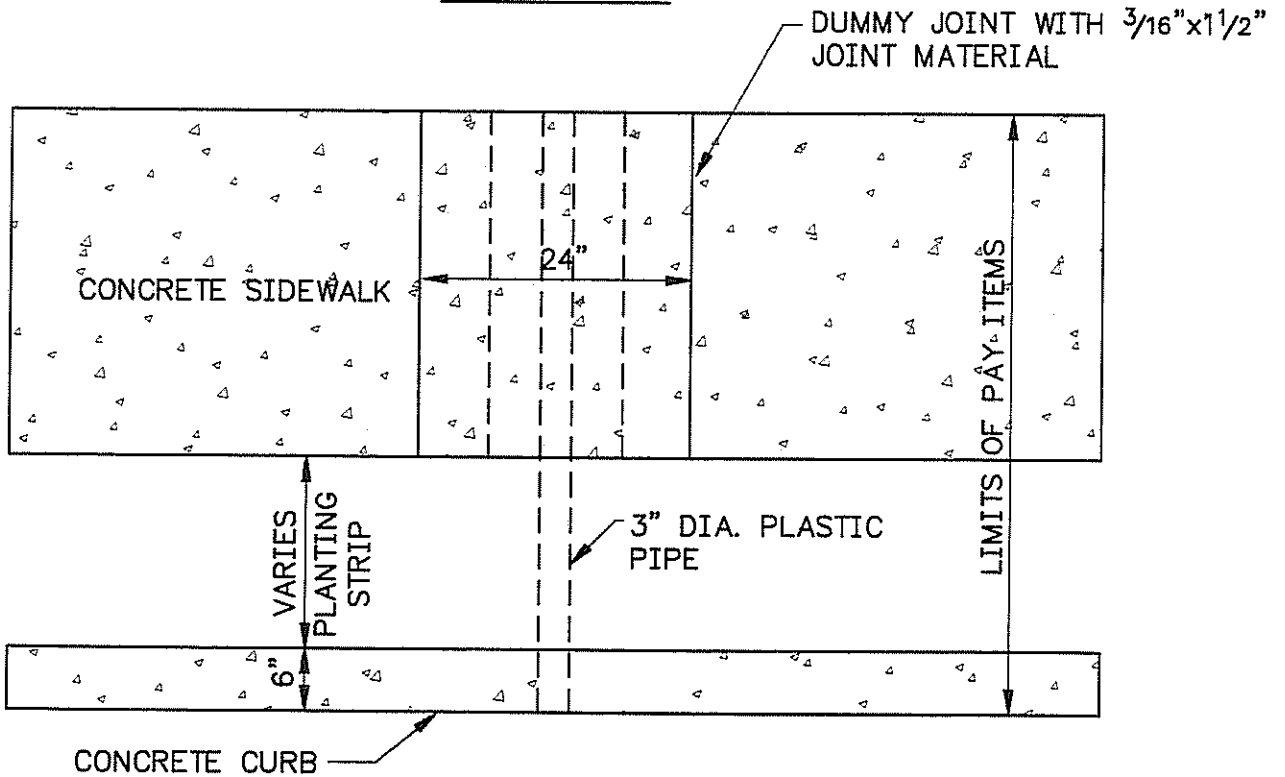
SNOQUALMIE RIDGE			
MANHOLE RING AND COVER			
DWN	CKD	DATE 2-22-96	DWG 3-14

REF: 3-13.DWG
04/02/96

NOT TO SCALE



ELEVATION



PLAN

SIDEWALK DRAIN—RESIDENTIAL

NO SCALE

SNOQUALMIE RIDGE

SIDEWALK DRAIN
RESIDENTIAL

REF: 3-15.DWG
04/02/96

NOT TO SCALE

DWN

CKD

DATE

2-22-96

DWG

3-15

REV. NO: