# MARION COUNTY

# DEPARTMENT OF PUBLIC WORKS

# ENGINEERING STANDARDS

**The Marion County Board of Commissioners**
**Adopted These Standards on**

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# Table of Contents

# Table Index

# Standard Drawing Index

| Sheet | Standard Drawing Name | Date |
|---|---|---|
| 1 | Typical Cross Sections For Urban Streets | 10/26/93 |
| 2 | Standard Utility Location For Urban Streets | 10/26/93 |
| 3 | Typical 22' Turnpike Section and Utility Location For Rural, Local and Collector Roads | 10/26/93 |
| 4 | Typical 28' Turnpike Section For Rural Arterial Roads | 10/27/93 |
| 5 | Typical Gravel Section For Privately Maintained Rural Roads | 10/27/93 |
| 6A | Typical Cross Section For Paving Gravel Roads | 10/26/93 |
| 6B | Typical Asphalt Penetration Macadam (0-11) Surfacing Details | 10/27/93 |
| 7 | Pavement Patching | 10/28/93 |
| 8 | Rumble Strips | 10/28/93 |
| 9 | Standard For Permanent Barricade | 10/28/93 |
| 10 | Authorized Hydrant Marker Installation Locations | 11/19/93 |
| 11A | Accessible Route Driveways Detail | 10/1/99 |
| 11B | Standard Curbed Section Driveway | 10/1/99 |
| 11C | Standard Ramp Details | 10/1/99 |
| 11D | Wheelchair Ramp Layout and Texturing | 8/3/99 |
| 11E | Miscellaneous Sidewalk Details | 10/1/99 |
| 11F | Standard Curbed Section Driveway | 8/3/99 |
| 11G | Matching Existing Driveway Slopes | 8/3/99 |
| 11H | Curb Removal and Drain Lines | 8/4/99 |
| 11I | Sidewalk/Ramp Finishing and Expansion Joint Details | 10/1/99 |
| 11J | Driveway Access To Non-Curbed (Turnpike) Street | 5/4/99 |
| 12 | 90 deg Arterial Intersections and Major Commercial – Industrial Driveways | 11/22/93 |
| 13 | Arterial Intersections and Major Commercial – Industrial Driveways – Various Angles | 11/23/93 |
| 14 | Standard P.C.C. Curb and Gutter Sections | 11/23/93 |
| 15 | Standard Sidewalk Details | 11/26/93 |

# Standard Drawing Index (continued)

| Sheet | Standard Drawing Name | Date |
|---|---|---|
| 16 | Typical Bicycle and Wheelchair Ramps | 11/23/93 |
| 17 | Standard Catch Basin Details - Type 1 Catch Basin and Cleanout | 11/26/93 |
| 18 | Standard Catch Basin Details – Type 2 (Side Inlet) Catch Basin | 6/22/94 |
| 19 | Type 3 Catch Basin, Frame and Grate | 6/23/94 |
| 20 | Catch Basin Grates and Frames Types A and B | 6/24/94 |
| 21A | Storm Drain - Standard Precast Manhole | 6/25/94 |
| 21B | Storm Drain – Shallow Precast Manhole (H less than 4’ – 0”) | 6/27/94 |
| 22 | Storm Drain Manhole For Pipe 24” and Over | 6/28/94 |
| 23 | Standard Manhole Casting Details | 6/30/94 |
| 24 | Lateral Connection To Storm Drain Pipe | 7/5/94 |
| 25 | Pipe Bedding and Trench Backfill | 7/5/94 |
| 26 | Storm Sewer Design Sheet | 7/6/94 |
| 27 | Rainfall Intensity – Duration Curves | 1/18/83 |
| 28 | Peak Discharge Computation Sheet | 7/6/94 |
| 29 | Determination Of Required Detention Storage | 6/7/94 |
| 30 | Storm Water Detention - For Sites Of 5 Acres or Less (1 of 2) | 7/6/94 |
| 30 | Storm Water Detention – For Sites Of 5 Acres or Less (2 of 2) | 10/10/85 |
| 31 | Drafting Conventions | |

# I. INTRODUCTION

These are the Public Works Engineering Standards of Marion County. They establish the general criteria and detailed standards used for work both within public right-of-ways and dedicated easements of the county. They shall govern:

A. The design of roads, streets, and appurtenances in unincorporated areas within county right-of-ways and roadways in incorporated cities under county jurisdiction.

B. The design of drainage facilities, including those associated with public right-of-ways, roads, paved driveways, and parking and loading areas on private property.

C. The use of public right-of-ways and drainage easements for other purposes and facilities to insure that such other uses do not adversely affect the integrity, use and maintenance of the roadway and drainage facilities.

D. Where improvements to public roadways and drainage facilities are required under the authority of the Marion County Zoning Ordinance and the Marion County Subdivision and Partitioning Ordinance, such improvements shall conform to these standards.

Interpretation and enforcement of these standards shall be the responsibility of the Marion County Department of Public Works.

These standards shall apply to new and reconstructed facilities. Funds will not be available in the foreseeable future to bring all existing facilities up to these standards.

These standards are intended as a working document to provide a common understanding for design affecting Marion County roads and public right-of-ways. As such, they will be revised and updated periodically.

# II. DEFINITIONS

ADT - Average Daily Traffic. The total number of vehicles traveling in both directions in a 24-hour period.

Arterial - A roadway intended to carry large volumes of traffic (1000 ADT or more outside of an Urban Growth Boundary [UGB]) and connect major traffic generators, cities, recreational areas, and major segments of transportation networks. High capacity is achieved through allowing higher speed, limited access, wider roadway and movement preference at intersections with lesser standard roadways.

Collector - A roadway intended to carry intermediate volumes of traffic (500-1500 ADT outside of a UGB) and collect and distribute traffic from local streets to arterials, state highways or small population centers.

County Road - A public road under the jurisdiction of the county that has been designated as a county road through an order by the Board of Commissioners pursuant to ORS 368. This designation causes the roadway to be maintained by the county.

Ditch - A man-made excavation dug in the earth used to convey drainage or irrigation water.

Drainage Facilities - The physical element used to convey, absorb or store runoff such as pipes or channels, dry wells, and detention or retention ponds.

Easement - Right to use property owned by another for specific or general purposes.

Engineer - A registered professional civil engineer licensed by the state of Oregon.

Highway - A major roadway having the connotation of being owned and maintained by the state of Oregon.

Local Road or Street - A roadway serving short distance, intra-neighborhood and residential needs. They are characterized by minimal access limitations, lowest traffic movement preference at intersections with collectors and arterials, and minimum widths. These factors lead to minimum traffic carrying capacity, but provide maximum access to adjacent property.

Local Access Road (NCR) - A public road that is not a county road, as defined herein, and is also not a state or federal highway or road. The roadway is maintained by the abutting property owners rather than by a public agency.

Mini-Subdivision - A small or irregular shaped parcel within an urban growth boundary which cannot be developed in accordance with standard subdivision regulations, usually less than 5 acres in area and served by a cul-de-sac street.

Predevelopment - A site with natural vegetation on native soil.

Private Road - A road which is on private property and which is maintained with private funds.

Public Road - A road which is within a public right-of-way. It may be maintained by either private or public funds (state, city, or county).

Public Right-of-way (R/W) - A right-of-way on which legal right of passage has been given to the public and is under county, state or federal jurisdiction.

Right-of-way - A legal right of passage over a piece of land, generally established by either an easement or ownership.

Road - A roadway having the connotation of serving rural areas.

Roadway - The general term used to describe the strip of land, structures, surfacing, and shoulders over which motorized vehicles travel. Included under this term are roads, streets and highways.

Rural - Those county areas which do not meet the definition of urban areas below.

Storm Water Runoff System - A means to control storm water through natural or man-made elements by conveyance, absorption or storage.

Street – A roadway having the connotation of serving urban or city needs

Turnpike – The most common road in the county road system characterized by graveled shoulders, open roadside drainage ditches and lack of curbs. See Standard Drawing Number 3.

Urban - Those areas within an adopted urban growth boundary (UGB) or having urban characteristics, such as lot sizes smaller than one acre.

Utilities - Any water, gas, sanitary or storm sewer, electrical, telephone, drainageway, wire, or television communication service and all persons, companies, or governmental agencies supplying the same.

# III. CONSTRUCTION PLANS

## A. GENERAL

Complete plans for all proposed improvements within or impacting public right-of-ways and county easements shall be submitted to the Department of Public Works for approval. Such plans shall be prepared under the supervision of and stamped by a Registered Civil Engineer. Construction of any improvements shall not begin prior to plan approval and issuance of a construction permit.

## B. PREPARATION

Construction plans shall be prepared in accordance with the following requirements:

1. Plans shall have a vicinity map showing surrounding streets, including existing and proposed streets.

2. Plans shall have a north arrow, generally pointing to the top or right side of the plans.

3. Elevations shall be based on the current U.S.G.S. datum.

4. Stationing shall run from left to right of plan and profile.

5. Stationing shall commence (usually 0+00) at the south or west end of project and end at the north or east end of project.

6. Plan and profile generally shall be drawn at a scale of 1 inch equals 50 feet horizontal and 1 inch equals 5 feet vertical.

7. Profiles shall show existing ground along proposed centerline and right-of-way lines.

8. Where cut or fill slopes extend outside of the right-of-way, slope easements are required. Easements shall extend one foot outside of the toe of slope and be shown on plans. Street slope arrows shall be pointed down hill.

9. At all vertical curves, plans shall show curve length, stations and elevations or PIVC's, BVC's, and EVC's.

10. On all horizontal curves and curb returns, plan shall show length of curve, radius, deflection angle and stations of P.C.'s, and P.T.'s. Curb returns shall have elevations shown at P.C.'s and P.T.'s.

11. Wheelchair/bicycle ramps are required at each curb return at all intersections. Catch basins shall be located to avoid coinciding with ramps or shall use Type “B” grate.

12. Boundaries of the involved drainage basins, with topographic features and drainage facilities, shall be shown. See Section V, B, 1 for further details.

13. Roadside ditches shall be shown on plan view.

14. Pipe diameter, material and class of pipe shall be indicated on profile.

15. Plans shall show slopes (Ft./Ft.) and inverts on all pipes and channels.

16. Plans shall show typical section of all street sections and/or channel improvements.

17. Plans shall show all existing and proposed utility locations. New utilities in public right-of-ways must comply with the locations shown on Standard Drawings Numbers 2, 3, and 4.

18. Where feasible, general notes shall be consolidated on a single page. Repetition of general notes or inclusion of standard plans requires redundant review and affords unnecessary opportunities for oversight.

19. All traffic control and street signs shall be shown on plans. Cost of signs and installation shall be the responsibility of the developer, but signs may be installed through a work order by county forces on a time available basis.

C. SUBMITTAL

Construction plans and calculations for the proposed improvements shall be submitted as follows:

1. In accordance with Marion County Ordinance No. 671, the first submittal shall be accompanied by a completed Plan Check form and the required fees.

2. The first submittal shall consist of two sets of prints of sewer, water, road and drainage plans, profiles, and detail sheets and one set of drainage area plans and drainage calculations. The Department of Public Works will review the first submittal and indicate the required revisions.

3. The engineer shall revise the plans as required and make a final submittal which shall consist of three sets of prints of sewer, water, road and drainage plans, profiles, and detail sheets. Upon the approval by the

Director of Public Works, written notice will be given to the engineer with a copy to the developer.

4. Revisions: Any design changes made after final approval shall be approved by the Department of Public Works prior to construction.

5. In accordance with Marion County Ordinance No. 671, prior to beginning construction, a Construction Permit shall be obtained from the Department of Public Works and the required fees shall be paid.

D. PRECONSTRUCTION CONFERENCE

At the discretion of the Director of Public Works, a preconstruction conference may be required. The conference shall include representatives of the following groups:

1. Developer

2. Contractor

3. Marion County Department of Public Works

4. Utilities

5. Other groups involved in the project

E. AS-BUILT SUBMITTAL

As a condition of facility acceptance, the county requires the developer's engineer to inspect construction of the project and furnish a complete set of mylar drawings upon completion. Such drawings shall be marked "As-Built" and describe any and all revisions or additions to the approved plans. On the first page of these drawings, the developer's engineer shall make the following statement and affix his stamp adjacent thereto:
"I hereby affix my seal to certify that these improvements have been inspected and constructed in conformance with these plans as approved by the Public Works Director and the general specifications adopted by the Marion County Department of Public Works."

# IV. ROADWAY DESIGN STANDARDS

The roads which are to be constructed within public right-of-ways shall be designed to conform to the following standards. Such standards for a particular road will be in accordance with the most current road classification plan as adopted by the county.

A. GENERAL

All roads which lie within an adopted UGB of an incorporated city shall comply with Table 1, "Urban Geometric Design Standards" and Table 3, "Cul-de-sac Standards."

All roads which are outside any UGB shall comply with Table 2, "Rural Geometric Design Standards" and Table 3, "Cul-de-sac Standards," except adjacent to a UGB where the traffic volumes and use indicate the need for extending the urban type roads. Such extension will be in accordance with the county's adopted road classification plan.

B. MININUM STREET GRADES

To provide adequate drainage, minimum slopes along streets and roads shall be as following:

| | |
|---|---|
| Tangent sections and horizontal curves | |
| Type A monolithic curb and gutter | 0.2% |
| Type C curb and roadside ditches | 0.4% |
| Around cul-de-sacs and corners at intersections (Including both curbs and ditches) | 0.6% |

C. CURB AND PAVEMENT RADII AT 90-DEGREE INTERSECTIONS

To allow sufficient pavement for turning at intersections, the following radii shall be provided:

| Type of Intersection | Radius |
|---|---|
| Curbed local to local and local to collector | 20' |
| Curbed collector to collector | 30' |
| Curbed collector to arterial | 35'* |
| Curbed arterial to arterial | 50'* |
| Turnpike local to local, and local to collector | 30' |
| Turnpike collector to collector | 40' |
| Turnpike collector to arterial | |

# TABLE 1
# URBAN GEOMETRIC DESIGN STANDARDS

| Road Classification | Traffic Volume (ADT) | Minimum Right-Of-Way Width | Minimum Pavement Width | Concrete Sidewalk [4] | Bike Lanes | Parking | Design Speed (mph) | Minimum Horizontal Radius [1] | Maximum Superelevation (ft/ft) | Maximum Grade (%) [6] |
|---|---|---|---|---|---|---|---|---|---|---|
| Basic Arterial [9] | 10000-18000 | 84’ | 60’ | Both Sides | Yes | Prohibited | 35 | 420’ | .04 | 5 |
| Phased Development Arterial [9] | 5000-10000 | 84’ | 34’ | Both Sides | Yes | Prohibited | 35 | 420’ | .04 | 5 |
| Minor Arterial [9] | 6000-10000 | 68’ | 34’ | Both Sides | Yes | Prohibited | 35 | 420’ | .04 | 6 |
| Limited Arterial | 3000-6000 | 68’ | 38’ [8] | Both Sides | No [8] | Yes | 30 | 300’ | .04 | 6 |
| High Volume Arterial [9] | 15000-30000 | Up to 108’ | 4 to 5 lanes up to 80’ including median | Both Sides | Yes | Prohibited | 45 | 730’ | .04 | 6 |
| Beltline [9] | 30000-48000 | Up to 132’ | 4 to 6 lanes up to 104’ including median | Both Sides | Yes | Prohibited | 55 | 1035’ | .06 | 6 |
| Basic Collector | 3000-6000 | 68’ | 34’ | Both Sides | Yes [7] | Prohibited [7] | 35 | 420’ | .04 | 6 |
| Limited Collector | 2000-3000 | 64’ | 38’ | Both Sides | No | Yes | 35 | 420’ | .04 | 6 |
| Industrial/ Commercial | 0-4000 | 60’ | 34’ | Both Sides | No | Prohibited | 25 | 320’ [3] | Normal Crown | 6 |
| Residential | 0-2000 | 60’ | 34’ | Both Sides | No | Yes | 25 | 320’ [3] | Normal Crown | 12 [2,5] |
| Cul-de-sac = 500 (residential) | | 50’ | 34’ | Both Sides | No | Yes | 25 | 320’ [3] | Normal Crown | 12 [2,5] |
| Residential Mini-Subdivision, Cul-de-sac | | 30’ | 22’ | 4’ One Side | No | Prohibited | 25 | 320’ [3] | Normal Crown | 12 [2,5] |

1. For minimum radius shown, maximum superelevation must be used. In all cases, radius is centerline radius. For greater than shown, see Section IV, E.
2. Grades of up to 15% may be approved. They should be less than 500 feet in length and located a distance of 200 feet or more from an intersection with a major street or an intersection requiring a stop.
3. Smaller radii will be allowed for 90-degree turns for looped streets and cul-de-sacs when legs are shorted than 400’.
4. 5’ wide except where otherwise indicated. Along all residential streets, except cul-de-sacs, sidewalks shall be adjacent to the property lines.
5. Maximum slope from center of cul-de-sac to back of sac shall not exceed 8%.
6. At intersections, the maximum longitudinal slope of all non-through streets shall be 8% for at least 50’ from the edge of the intersecting pavement.
7. In some cases, bike lanes may be eliminated and parking allowed on one side.
8. In some cases, the pavement may be wider and bike lanes provided.
9. Salem-Keizer urban area only.

Per Std. dwgs. #12 & 13

Turnpike arterial to arterial

Per Std. dwgs. #12 & 13

* Subject to revisions based on truck volumes, turning volumes and geometry of intersection.

D. SIDE SLOPES ON ROADWAY SECTION

Slopes along and adjacent to the roadway shall be as specified on the standard drawings. In general, they are to be no steeper than:

| | |
|---|---|
| Cut Slopes | 1-1/2 to 1 |
| Fill Slopes | 2 to 1 |

Flatter slopes are preferred and may be required by the Department of Public Works if soils are unstable.

Side slopes exceeding 5 feet in height shall be stabilized by grass sod, seeding, and/or riprap.

E. HORIZONTAL CURVES

In accordance with the minimum design speeds and maximum super-elevations as shown in Tables 1 and 2, the minimum horizontal curve radii are determined by the following formula:

$$R = \frac{V^2}{15\,(e+f)}$$

Where:
R = minimum horizontal centerline radius (ft)
V = design speed (mph)
e = super-elevation, negative on the outside of normal crown and reverse crown (ft/ft)
f = side friction factor

For V = 20 to 30 mph, f = 0.16; for V > 30 mph, f shall be reduced 0.005 for each 5 mph increase in V.

Where a radius greater than the minimum is selected, the super-elevation shall be reduced in accordance with the method in A Policy on Geometric Design of Highway and Streets, 1984, AASHTO.

F. SIGHT DISTANCE

In the design of roads and access onto them, the designer shall provide for

# TABLE 2

## RURAL GEOMETRIC DESIGN STANDARDS

| Road Classification | Traffic Volume (ADT) | Minimum Right-Of-Way Width | Minimum Pavement Width | Gravel Shoulders [5] | Parking | Terrain Cross Slope | Design Speed (mph) | Minimum Horizontal Radius [1] | Maximum Superelevation (ft/ft) | Maximum Grade (%) [6] |
|---|---|---|---|---|---|---|---|---|---|---|
| Arterial | 1000-10000 | 66’ | 28’ | 2’ both sides | None Provided | S < 5<br>5 = S =15<br>S = 15 | 55<br>45<br>35 | 1035’<br>660’<br>380’ | .06<br>.06<br>.06 | 6<br>8<br>10 |
| Collector | 500-1500 | 60’ | 22’ | 5’ both sides | None Provided | S < 5<br>5 = S =15<br>S = 15 | 55<br>45<br>35 | 1035’<br>660’<br>380’ | .06<br>.06<br>.06 | 6<br>8<br>10 |
| Local (Through Road) | 0-500 | 60’ | 22’ [6] | 5’ both sides | On Shoulder | S < 5<br>5 = S =15<br>S = 15 | 50<br>40<br>30 | 925’<br>560’<br>300’ | .04<br>.04<br>.04 | 7<br>9<br>12 |
| Local (Subdivision of Cul-de-sac = 1320’) | 0-500 | 60’ | 22’ [6] | 5’ both sides | On Shoulder | S < 5<br>5 = S =15<br>S = 15 | 30<br>25<br>20 | 460’<br>320’<br>205’ | Normal Crown<br>Normal Crown<br>Normal Crown | 8 [3]<br>10 [3]<br>12 [2,3] |
| Cul-de-sac = 1320’ | 0-500 | 60’<br>(50’ if = 500’ long) | 22’ [6]<br>(20’ if = 500’ long) | 5’ both sides | On Shoulder | S < 5<br>5 = S =15<br>S = 15 | 25<br>20<br>20 | 320’<br>205’<br>205’ | Normal Crown<br>Normal Crown<br>Normal Crown | 8 [3]<br>10 [3]<br>12 [2,3] |

1. For minimum radius shown, maximum superelevation must be used. In all cases, radius is centerline radius. For greater than shown, see Section IV, E.
2. Grades of up to 15% may be approved. They shall be located a distance of 200 feet or more from an intersection with a major street or an intersection requiring a stop.
3. Maximum slope from center of cul-de-sac to back of sac shall not exceed 8%.
4. At intersections, the maximum longitudinal slope of all non-through streets shall be 8% for at least 50’ from the edge of the intersecting pavement.
5. Roads that are designed as bike routes shall have paved shoulders.
6. For paving of existing gravel roads, the minimum pavement width may be 20’.

adequate sight distance to ensure public safety.

1. Vertical Curves

To provide adequate stopping sight distance, the minimum lengths of vertical curves shall be as computed from the following formula but in no case shall the lengths be less than 50 feet:

L = KA
Where:
L = length of vertical curve (ft)
K = constant for design, see Table 4
A = algebraic difference in grade (%)

When the algebraic difference in grade is less than 1 percent, a vertical curve will not be required.

2. Horizontal Curves

Horizontal curves shall have long enough curve radii to provide the minimum stopping sight distances, when measured across the inside of the curves, as specified in Table 4. Where there are sign obstructions such as cut slopes, retaining walls, structures, etc. radii longer than the minimums specified in Tables 1 and 2 may be required.

3. Intersections

Intersections shall be located so as to provide the sight distances specified in Table 4. Where conditions do not allow using the Preferred Intersection Sight Distances, the absolute minimum criteria for locating road access is the Minimum Stopping Sight Distance. Access will not be allowed where there is less than the minimum stopping sight distance available for the prevailing speed on the through roadway.

At intersections, the sight distance along the roadway shall be measured from a driver's eye, 3.50 feet above the pavement, to the top of a vehicle, 3.5 feet above the pavement. The driver's eye is at a point on the intersecting roadway which is located as follows:

| Type of Road | Location of Driver's Eye* |
|---|---|
| Curbed | 18' preferred and 15' minimum behind face of curb |
| Turnpike | 18' preferred and 15' minimum behind near edge of pavement |

# TABLE 3

# CUL-DE-SAC STANDARDS

| | Right-of-way Radius | | Curb/Pavement Radius | | | |
|---|---|---|---|---|---|---|
| Road Classification | Turnaround | Entering Turnaround | Turnaround | Entering Turnaround | Sidewalk/ Shoulder | Parking |
| Urban | 45’ | 30’ | 38’ [1] | 35’ [1] | 5’ sidewalk all around | Yes |
| Rural | 45’ | 30’ | 32’ [2] | 30’ [2] | 3’ gravel shoulder | None Provided |
| Mini-Subdivision (Prohibited in rural areas) | 35’ | 20’ | 30’ [1] | 20’ [1] | 4’ sidewalk one side | Prohibited |
| Industrial/Commercial | 52’ | 30’ | 45’ [3] | 35’ [3] | 5’ sidewalk all around | Prohibited |

1. Curb required
2. Turnpike
3. Curb required in urban areas

Note: Maximum slope from center of cul-de-sac to back of sac shall not exceed 8%.

* In a situation where the specified location of the driver's eye is unsafe or is not adequate to provide the required stopping sight distance, the location shall be determined by the Director of Public Works.

4. Effect of Grade

The minimum stopping sight distances specified in Table 4 are for level ground. Where the grade is not level, the minimum stopping sight distance shall be determined by the following formula:

$$SSD = 3.68\ V + \frac{V^2}{30\ (f+g)}$$

Where:
SSD = minimum stopping sight distance (ft)
V = design or driving speed (mph)
g = grade + for upgrade and - for downgrade
f = coefficient of friction for wet pavement from Table 4.

G. STRUCTURAL STANDARDS

1. All construction work and materials shall be in accordance with the current Oregon State Highway Division (OSHD) "Standard Specifications For Highway Construction," except where otherwise specified.

2. Pavement and Aggregate Base thicknesses shall be in accordance with Table 5. At the option of the design engineer or where the Marion County Director of Public Works determines that unusual soil conditions or high volumes of truck traffic exist, pavement and aggregate thicknesses shall be determined in accordance with the current OSHD "Flexible Pavement Design Procedure."

3. Full-depth asphalt and portland cement concrete pavements are allowable. Designs must be approved by the Marion County Director of Public Works.

H. DRIVEWAY ACCESS

Driveway access onto county roads shall be located in a safe manner and conform to following requirements:

1. Permits

Prior to establishing a new driveway, reconstructing or widening an existing driveway or changing its use, a permit shall be obtained from the

# TABLE 4

# SIGHT DISTANCE AND VERTICAL CURVE STANDARDS

| | | | K Values | | F Values |
|---|---|---|---|---|---|
| Design Speed | Preferred Intersection Sight Distance | Minimum Stopping Sight Distance | Crest Curve | Sag | Friction Coefficient |
| 20 | 200 | 125 | 10 | 20 | .39 |
| 25 | 250 | 150 | 20 | 30 | .37 |
| 30 | 300 | 200 | 30 | 40 | .35 |
| 35 | 350 | 250 | 50 | 50 | .33 |
| 40 | 400 | 325 | 80 | 70 | .32 |
| 45 | 450 | 400 | 120 | 90 | .31 |
| 50 | 500 | 475 | 160 | 110 | .30 |
| 55 | 550 | 550 | 220 | 130 | .29 |

1. On level grades. Where grades are not level, stopping sight distances shall be computed per Section IV, F., 4., Effect of Grade.

2. For Wet Pavement

# TABLE 5

# PAVEMENT AND AGGREGATE STRUCTURAL THICKNESS

| Street/Road Classification | Crushed Base Equivalent | Asphalt Concrete | Aggregate Leveling Course (¾"-0) [3] | Aggregate Base Course (1-½"-0) [3] | Curb Exposure |
|---|---|---|---|---|---|
| Rural | | | | | |
| Local (Through Road and Cul-de-sac) | 14" | 2-½" | 1-½" | 7-½" | None |
| Collector | 17-½" | 2-½" | 1-½" | 11" | None |
| Arterial | 23-½" | 4" | 1-½" | 14" | None |
| Urban | | | | | |
| Residential Cul-de-sac less than 500' | 11" | 2-½" | 1-½" | 4-½" | 6" |
| Residential Local | 14" | 2-½" | 1-½" | 7-½" | 6" |
| Collector - | | | | | |
| Basic | 18-½" | 2-½" | 1-½" | 12" | 7" |
| Limited | 16-½" | 2-½" | 1-½" | 10" | 7" |
| Arterial | 21-½" | 2-½" | 1-½" | 15" | 7" |

1. As Defined in OSHD, "Flexible Pavement Design Procedure."

2. In Accordance with OSHD, "Standard Specifications For Highway Construction," except that asphalt content shall not be less than 6%. Mix design must be approved by Marion County Director of Public Works.

3. 1"-0 aggregate may be substituted. Thickness shall equal total thickness for Base.

Director of Public Works.

2. Surfacing

a. All commercial and industrial driveways shall be paved to standards set by the Director of Public Works on a site specific basis so as to support the anticipated traffic.

b. Residential driveways shall have a minimum surface of 6 inches of 1”-0 crushed rock. Where they are to be paved, the minimum surface shall be 2 inches of asphalt concrete over 6 inches of 1’-0 crushed rock.

3. Location and Number

It is the county’s policy to provide access onto county roads in a manner and location that will protect the public safety. In general, the number of access points onto a roadway shall be held to the minimum necessary to provide adequate access to a particular parcel of property.

The location and number of driveways shall be as follows:

a. No access shall be allowed where there is less then the Minimum Stopping Sight Distance as specified in Table 4. The sight distance shall be measured in the same manner as for intersections except that the driver’s eye shall be located a preferred 15 feet and a minimum of 10 feet behind the face of the curb or the near edge of pavement.

b. Driveway access shall intersect a county road at or as near a 90-degree angle as is practical. In no case shall it be less than 45 degrees.

c. Where there are several adjacent parcels with narrow frontage or where sight distance is inadequate, a frontage road or combined driveway may be required.

d. Within a UGB, a maximum of one double driveway or a looped driveway with a 90-degree intersection to the roadway shall be allowed per single family dwelling on a collector or arterial.

e. Within a UGB, no more than 40 percent of the roadway frontage of a lot shall be devoted to driveways.

f. Where property is located at the intersection of an arterial or collector and a local street, the preferred access shall be on the local street.

g. On a corner lot, no portion of any driveway shall be allowed within the curb return or pavement flare of the intersection. On collector or arterial streets it shall be a minimum of 30 feet from the end of the curb return or, if there is no curb, from the end of the pavement flare.

h. Along curbed streets, no portion of any driveway, including taper, flare, transition, apron, etc., shall be allowed within 3 feet of an intersecting property line unless it is an approved joint use driveway.

4. Widths

Within the limits listed in Table 6, the specific driveway widths and flares shall be determined according to anticipated traffic volumes, types of vehicles and widths of the connecting roadways.

5. Slopes

Slopes of driveways within the public right-of-way shall be no greater than 12 percent. On turnpike roads, driveways shall slope down from the edge of the county road pavement at a grade of at least 3 percent. This slope shall be continued the full distance to the ditch line or a distance of 10 feet from the edge of pavement, whichever is greater.

6. Drainage Requirements

Within public right-of-ways, where there are no curbs, there shall be culverts placed under driveways to provide for drainage as needed. The location, type and size of the culvert shall be specified by the Director of Public Works. See Section V, A, 3, a for types of pipe that may be allowed.

## I. PRIVATELY MAINTAINED ROADS WITHIN PUBLIC RIGHT-OF-WAY

The maintenance of roads within public right-of-ways will remain the responsibility of the adjacent property owners until such time as the road has been paved to county standards and accepted as a county road by the Board of Commissioners.

1. Opening of an Unopened Public Right-Of-Way

An existing public right-of-way may be opened and a road constructed thereon with the written approval of the Director of Public Works. The roadway shall be constructed in accordance with the Roadway Improvement Standards listed below and Standard Drawing Number 5.

# TABLE 6

# DRIVEWAY DIMENSIONS

| | Urban | | | Rural | |
|---|---|---|---|---|---|
| | Width [1] | Transition Width | Flare Width | Width [1] | Flare Radius |
| Residential | 12'-24' | 3' | None | 20'-24' | 10'-20' |
| Commercial | | | | | |
| One way, One lane | 14'-16' | 3' | 3' | 20' | 10'-20' |
| Two way, Two lanes | 28'-32' | 3' | 3' | 20'-30' | 20'-35' |
| Two way, Three lanes | 36'-40' | 3' | 3' | 36'-40' | 20'-35' |

1. Driveway width (not including transition flare): 1) Measured at right-of-way line on curbed streets; 2) Measured at ditch line, or if no ditch, at a distance of 10' from edge of pavement on turnpike roads.

2. The allowable dimensions will be determined by the Director of Public Works on a site-specific basis. Only in unusual situations will one-way driveways be allowed.

3. Curb returns will be allowed for driveways that carry at least 1000 vehicles per day or 50 trucks per day.

Private parties wishing to open a public right-of-way shall apply for a permit and submit plans for review and approval by the Department of Public Works prior to doing any work. The private parties shall bear all costs for the improvements.

2. Roadway Improvement Standards

Improvement to an existing or proposed privately maintained public roadway shall have, as a minimum, a gravel surface with adequate drainage and may be paved if desired or required by county ordinance. The minimum roadway improvements shall be as follows:

| Number of Dwellings Served | Gravel Surface Width | Minimum 1”-0 Crushed Rock Depth |
|---|---|---|
| One | 10’ | 6” |
| Two or More | 16’ | 8” |

3. Right-of-Way Requirements

Before a private improvement of a public right-of-way will be permitted, the right-of-way must be wide enough to contain the proposed road surface, the cut and fill slopes and the necessary drainage facilities. Dedication of additional right-of-way may be required prior to the issuance of a permit. The minimum right-of-way widths shall be as follows:

| Street Classification | Minimum Right-of-way Width |
|---|---|
| New Local | 60’ |
| New Cul-de-sac =< 500’ | 50’ |
| Existing unopened | 20’* |

* Adequate only for a 10-foot wide road surface. For a 16-foot wide road surface to serve 2 or more dwellings, a 30-foot right- of-way is required.

J. STOP SIGN WARRANTS

The purpose of stop signs is to enhance safety, improve traffic flow, and control the right-of-way assignment at intersections.

1. Stop signs may be used on the minor leg of intersections which meet any one of the following warrants:

a. On an approach to an arterial or collector.

b. Above average chance of conflict as determined by the following point system. Total of (1) through (4) shall equal 18 or greater to warrant a stop sign.

(1) Volume

(a) Major Street: One point for every 50* vehicles per day (VPD) (maximum 10 points). *75 for area within UGB.

Minor Street: One point for every 30 VPD over 100 VPD (maximum 5 points).

OR

(b) Major Street: One point for every 10 vehicles per hour (VPH) (maximum 10 points).

Minor Street: One point for every 10 VPH during same peak hour (maximum 5 points).

(2) Accidents

Five points are assigned for each accident susceptible to correction by stop signs during a one-year interval.

(3) Visibility

Where the critical approach speed to the intersection is less than 20 mph, one point shall be assigned for each mph under 20 mph (maximum 10 points).

(4) Unusual Conditions

Where unusual conditions exist, such as a school, fire station, playground, steep hill, etc., points are assigned on the basis of engineering judgment (maximum 3 points).

2. Multi-way stop signs may be used at the intersection of two through highways or at intersections which meet any one of the following warrants:

a. Volume [both (1) and (2) must be met]:

(1) Total vehicular volume entering the intersection from all

approaches must average et least 500 (350)* VPH for any 8 hours of an average day.

(2) The combined vehicular and pedestrian volumes entering from the minor street must average at least 200 (140)* per hour for the same 8 hours.

* Major street approach speed greater than 40 mph.

b. Accidents:

When 5 of more reported accidents of a type susceptible to correction by a multi-way stop installation occur during a 12-month interval in the previous 5 years.

c. Where a traffic signal is warranted and is urgently needed, the multi-way stop is an interim measure while arrangements for a signal installation are being made.

d. Limited Sight Distance:

Where sight distance is limited due to physical improvements (other than landscaping, fencing, or roadside vegetation) a multi-way stop may be warranted as an interim measure until such time as the obstruction can be removed in an acceptable manner. A multi-way stop may be placed after an engineering investigation has determined:

(1) the vision from a stopped minor leg, as measured according to the Marion County Engineering Standards, is less than the minimum stopping sight distance required for the posted or prevailing speed on the major leg, and

(2) the ADT on the minor leg exceeds 50, and

(3) the major leg is not an arterial in the adopted classification system of Marion County.

3. Other Factors to Consider When Investigating the Need for a Stop Sign:

a. Vision Hazards - Do any vision hazards exist and can they feasibly be removed?

b. Accident Patterns - Are there any unusual patterns and can they be remedied by other means?

c. Accident Potential - Is there any identifiable accident potential and

is it peculiar to this intersection?

d. Condition of Intersection - Angle of intersection, geometry of approaches, surrounding topography, pavement markings, signing, general visibility.

e. Any miscellaneous factors of importance – Traffic flows, schools in vicinity, particular traffic components

## K. STREET LIGHTS

The following criteria shall be followed by the Marion County Department of Public Works in its determination of where street lights supported by road funds will be installed.

1. Street lights shall be placed as follows on arterials having traffic volume exceeding 10,000 ADT:

   a. At intersections with collector streets.

   b. At major alignment changes.

   c. At a maximum spacing of 1000 feet and at minimum spacings of 200 feet for lights in the 20,000-40,000 luminaire range and 400 feet for lights providing greater than 40,000 luminaire output.

2. Street lights shall be placed on arterials with traffic volumes of 10,000 ADT or less and on collectors at specific locations where an unusually high hazard to motorists is identified by the Director of Public Works.

3. Street lighting shall not be provided within any city corporate limit or within residential, commercial, or industrial developments.

4. Statutory restrictions on use of county road funds preclude expenditure for lighting when not directly required for motor vehicle safety.

## L. GUIDE SIGNS

The Director of Public Works may issue permits to place guide signs within the right-of-way of any public road upon the written request of any person(s) or organization under the following conditions:

1. General Guide Signs:

   a. Permitted signs will be guide signs from the following list:

Parks, game preserves, campgrounds, museums, public buildings or installations (city, county, state, or federal), public golf courses, athletic fields, stadiums, auditoriums, public swimming pools, exposition grounds, historical land marks, homes, or sites, churches, group care homes, schools public and private, domestic or waste water treatment plants, solid waste collection or processing sites, recycle collection centers, transportation facilities such as airports, bus terminals, railroad stations.

b. Criteria for approving other uses:

(1) The facility serves the general public.

(2) Consideration shall be given to the difficulty in locating the facility from the arterial road network without the signs.

(3) Consideration shall be given to the degree the facility is a traffic attractor.

(4) Consideration shall be given to the usefulness of a permanent sign and how often the facility is in use.

c. The sign text will be limited to:

(1) Name of facility or feature.

(2) Distance to the facility or feature.

(3) Arrow point indicating direction to facility or feature.

d. All signs and sign placements will be done by Marion County. All costs related to the permit issuance, inspection, and installation, will be borne by the applicant on a “Private Work Order” basis.

e. All physical characteristics of the sign, namely size, material, shape and color will by determined by the Director, guided by the “Manual on Uniform Traffic Control Devices” as published by the Federal Highway Administration and adopted by the Oregon Department of Transportation. All completed signs must have the approval of the Director prior to installation.

f. The sign will be located within 1 mile of the facility or feature unless circumstances should dictate otherwise. In all cases, the Director will designate the sign location.

g. The number of signs allowed for each facility or feature will be limited to two (2). Up to four (4) signs may be approved by the

Director under extraordinary circumstances.

h. The sign may be removed at any time, by the Director, if justified by conditions such as traffic safety, road improvements, etc., warrant such action, or if permit requirements are not met or maintained.

i. A maintenance and removal agreement clause will be a part of each permit issued. If the existing sign becomes unusable for any reason such as vandalism or traffic accident, the applicant will be required to bear the cost of replacing the sign if they choose to have the sign replaced.

j. The decisions regarding sign placement, number, and wording are determined by the Board of Commissioners to be of a technical, administrative nature and for that reason the Board delegates that to the Director of Public Works. The decision of the Director of Public Works is a final decision subject to review under ORS 203.113.

2. Business Guide Signs:

a. Definitions

As used in these rules, the following definitions shall apply unless the context indicates otherwise:

(1) “Business Guide Sign” means a sign panel with the name of a qualified tourist oriented business, service or activity, qualified historical feature or qualified cultural feature together with directional information erected in advance of or at intersections on the county road system.

(2) “Direction information” means the name of the business, service or activity, qualified historical feature or qualified cultural feature and other necessary information to direct the motoring public.

(3) “Qualified Tourist Oriented Business” means any legal cultural, historical, recreational, educational or entertaining activity or a unique or unusual commercial or non-profit activity the major portion of whose income or visitors are derived during its normal business season from motorists not residing in the immediate area of the activity.

(4) “Qualified Cultural Feature” means a museum approved by the Engineer after consulting with the Oregon Historical

Society and the Oregon Museum Association.

(5) “Qualified Historical Feature” means a district or a property currently listed in the National Register of Historical places or designated as nationally significant by the United States Department of the Interior.

(6) “Main traveled way” means through traffic lanes of said systems exclusive of frontage roads, auxiliary lanes and ramps.

(7) “Owner” means a holder of fee title, or lessee.

(8) “Responsible operator” means a person or entity other than an owner who operates a qualified tourist oriented business and who has authority to enter into an agreement relative to matters covered by these regulations.

(9) “Engineer” means the Marion County Engineer.

(10) “Applicant” means a person applying for a permit for a business guide sign.

b. Location

(1) Business guide signs are intended for use in rural areas outside of Urban Growth Boundaries.

(2) Business guide signs should be located so as to take advantage of natural terrain, to have the least impact on the scenic environment, and to avoid visual conflict with other traffic control devices within the highway right-of-way.

(3) Business guide signs shall not be installed until a thorough investigation by the Engineer determines that no conflict will exist with other official traffic control devices, or any unsafe condition created.

c. Criteria for Eligibility

(1) Each qualified tourist oriented business identified on a business guide sign shall have given written assurance to the Marion County Department of Public Works of its conformity with all applicable laws concerning the provisions of public accommodations without regard to race, religion, color, sex, or national origin, and shall not be in breach of that assurance.

(2) The business qualified as a tourist oriented business must be located within 9 miles of the intersection where the tourist oriented directional signs are proposed to be installed. The distance will be measured as vehicle distance from the center point of the intersection to the nearest point of the intersection of the driveway of the business and a public highway.

(3) Except for undeveloped cultural and historical features, a qualified tourist oriented business shall have:

(a) Restroom facilities and drinking water available.

(b) Continuous operation at least 6 hours per day, 5 days a week, during its normal business season.

(c) Licensing where required.

(d) Adequate parking accommodations.

(4) Qualified undeveloped cultural and historical features shall include:

(a) Adequate parking accommodations.

(b) An informational device to provide public knowledge of the feature.

d. Composition

(1) Business guide signs shall have a blue reflectorized background with a white reflectorized border and message. The intersection sign shall not exceed 18 inches in height and 36 inches in length and shall have not more than two lines of legend including a separate direction arrow and the distance to the facility to the nearest one-quarter mile. The content of the legend shall be limited to the identification of the business and shall not include promotional advertising as determined by the Engineer. Advance business guide signs shall be the same as the intersection business guide sign except that in lieu of the directional arrow and mileage the sign shall include the directional work information “AHEAD” or “NEXT LEFT” or “NEXT RIGHT” as may be required. Messages, symbols and trademarks which resemble any official traffic control devices are prohibited.

(2) All directional arrows, letters and numbers used in the name of the type of service and the directional legend shall be white and reflectorized.

(3) The Engineer must approve the materials, design and workmanship before the signs are placed.

(4) The Department of Public Works will place all signs in county right-of- way.

e. Special Requirements

(1) Location

(a) Business guide signs are to be located at intersections. Advance business guide signs are optional but cannot be used unless the qualifying business also has a panel at the intersection. Wherever possible, advance business guide signs are to be located at least 300 feet in advance of the intersection from which the qualified tourist oriented business is available.

(b) The spacing between sign panels and between signs and other traffic control devices shall be determined on the basis of an engineering study. Sign panels shall not be displayed for any business if it is visible and identifiable from the traveled way the last 300 feet from the intersection.

(2) Composition

(a) A maximum of three tourist oriented business signs may be displayed at each location. A maximum of three locations may be utilized in an intersection.

f. General Provisions

Upon selection and approval of an intersection for an installation of a business guide sign and upon approval of proper application for a permit from one or more qualified tourist oriented businesses at or conveniently accessible from the intersection, a single business guide sign for each qualified tourist oriented business shall be erected at the intersection in each direction of travel.

g. Application and Eligibility

(1) If applications are received for any one intersection for more than the allowable number of signs, the order of priority shall be based on the date of receipt of a properly completed application.

(2) The owner or responsible operator of a business must file an application for installation of its tourist oriented directional sign on a form specified by Marion County and agree to pay the work order costs involved.

(3) Any grant of a new or renewed application shall entitle the applicant to the continuance of its business guide sign for as long as requirements of these regulations are met.

(4) The signs may be removed for any of the following reasons:

(a) If the qualified tourist oriented business fails on a sufficient number of occasions or over a sufficient period of time to provide all of the services, so as to justify a finding by Marion County Public Works that the business is not in substantial compliance with these regulations.

(b) If the qualified tourist oriented business fails during its normal business season to open for business for more than 7 consecutive days or for more than 10 days cumulatively, during any 1 month period, unless Marion County Public Works finds that closure for such period was beyond the control of the owner or responsible operator, or that the closure was justified by extenuating circumstances.

(c) If it fails to comply with Section IV, L, 2, c, (1) except in isolated instances without the knowledge of the owner, responsible operator or manager of the business, or on any occasion unless steps are promptly taken to insure to the fullest extent reasonably possible that such instances will not recur.

(d) If Marion County Public Works Department elects to discontinue the program, in which case sign fees paid within the previous year will be refunded.

(5) If due to fire, accident or similar cause, a qualified tourist oriented business becomes inoperable for an extended period of time, exceeding 7 days but not more than 90

days, its business guide sign shall be temporarily removed, but the business shall not lose its priority, nor be required to reapply prior to the normal time for a renewal application. Further extension may be granted on good cause shown. However, failure of the owner or responsible operator to proceed with necessary repairs as rapidly as possible shall cause loss of the right to continued placement of the business guide sign and require a new application.

(6) Notwithstanding the fact that a tourist oriented business meets all of the other eligibility requirements of these regulations, an application may be denied if it is determined after investigation by the Engineer that adequate direction to the business cannot be given by a reasonable number of allowable business guide signs.

h. Fees and Maintenance

The fee for placement, administration, and if desired, fabrication, will be billed on a work order basis. Maintenance costs such as a replacement of a vandalized or missing sign shall also be borne by the applicant on a work order basis.

i. Temporary Removal and Reinstallation Fees

After the initial installation of any business guide sign, a fee on a work order basis shall be charged for:

(1) Temporary removal because of temporary or seasonal closure of the qualified tourist oriented business.

(2) Reinstallation of any tourist oriented directional sign pursuant to Section IV, L, 2, g, (4) of this rule.

M. ROADWAY DELINEATION

1. Engineering Study

Before any new delineation is installed, an engineering study shall be performed. The engineering study shall include a review of accident rates, day and night lighting conditions, pavement and shoulder widths, roadside vegetation, horizontal and vertical roadway alignment, existing and recommended vehicle speeds, traffic volumes, adjacent land use, weather, and other pertinent items. This engineering study should always include on-site evaluation.

2. Consistency of Installation of Delineation

a. Delineation shall be installed in a consistent manner both along a given section of road and, to the extent economically practicable, throughout the entire road system. For example, if a curve of a particular radius is marked with delineators on a road, similar curves should be similarly marked on that road. It should, however, be recognized that curves that appear similar on a map or construction drawing may have entirely different appearances in their individual surroundings.

b. Both for the purpose of consistency and to avoid diminishing effectiveness due to overuse, delineation shall be installed in accordance with the following hierarchy:

(1) Painted yellow centerline

(2) Painted white “fog” lines

(3) Turn and curve warning signs, with or without advisory speed plates

(4) Raised reflective pavement markers

(5) Delineators (reflectors mounted on posts)

(6) Large arrow signs

(7) Chevron alignment signs

Items (1), (2), (4), and (5) may be used on both tangents and horizontal curves whereas Items (3), (6), and (7) may be used only on horizontal curves.

Items (1), (2), and (4) cannot be installed on gravel roads.

3. The selection of delineation to be installed at a particular location shall be based on the hierarchy listed above, the results of an engineering study and the following warrants:

a. Painted yellow centerlines and painted white “fog” lines constitute the standard delineation for paved roads and other types of delineation shall supplement rather than replace these painted lines.

b. Turn and Curve Warning Signs and Advisory Speed Plates

(1) The turn sign is intended for use where an engineering

study shows that the recommended speed on a turn is 30 mph or less and is equal to or less than the legal speed limit

(2) The curve sign is intended for use where an engineering study shows that the recommended speed on a turn is greater than 30 mph and is equal to or less than the legal speed limit.

(3) The advisory speed plate is intended to supplement the turn and curve signs to give additional warning. It shall not be used alone. It shall show the maximum speed recommended by an engineering study.

c. Raised Reflective Pavement Markers

(1) Raised reflective pavement markers shall be installed on all roads classified as arterials or collectors. On local roads, pavement markers shall be installed only in special situations where justified by an engineering study.

(2) Pavement markers shall be spaced as follows:

(a) Rural areas: 80 feet apart on tangents and 40 feet apart on curves

(b) Urban areas: 40 feet apart on tangents and curves

(3) Where pavement markers are to be installed only on a curve, markers shall also be installed on the approach tangents for a distance of 400 feet in each direction from the curve. On these tangents, the marker spacing shall be the standard 80 feet.

(4) Pavement markers shall not be installed in areas where snow removal operations are expected to be necessary as frequently as once every other year. In the absence of site-specific records, markers shall not be installed at elevations greater than 800 feet above mean sea level.

d. Delineators (Reflectors Mounted on Posts)

(1) Delineators shall be installed in accordance with Table 7:

(a) Delineators should be installed only on curves with a central angle of 20 degrees or greater.

# TABLE 7

# DELINEATOR WARRANTS

| Traffic Volume (ADT) | Road Classification | Install Delineators |
|---|---|---|
| 0-500 | Local | Only in special cases where justified by an engineering study |
| 500-1000 | Collector | On curves sharper than 12 degrees |
| 1000 or more | Arterial | On curves sharper than 6 degrees |

(b) Delineators may be installed on curves when raised reflective pavement markers alone have been found to be inadequate. Such situations may occur where a crest vertical curve blocks the driver's view of the pavement markers within the safe stopping sight distance or where the need for additional advance warning is demonstrated by the occurrence of accidents.

(c) Delineators shall not be installed within any urban growth boundary.

(2) Delineators on horizontal curves shall be spaced in accordance with Table 8:

(a) For curves falling between the values listed, use the spacing given for the next sharper curve.

(b) To clear driveways, crossroads, etc., or for required adjustments at ramps and at intersections, either vary placement of that delineator up to 1/8 of spacing shown, or if that will not work, eliminate that delineator.

(c) On curves with central angles greater than 40 degrees, installation of delineators should be terminated at the location where deflection reaches 40 degrees.

(3) Judgment should be exercised in the installation of delineators on substandard roadway sections, particularly where ditches are narrow and where delineators would hamper

(4) Delineators should not be located in an actively farmed area unless they can be placed far enough off the pavement to avoid being hit by farm machinery and in areas that avoid conflict with agricultural operations.

(5) Delineators should be installed on both sides of horizontal curves with white reflective sheeting or reflectors installed on the side of the delineator visible to the driver's right.

(6) The use of large arrow signs or chevron signs should be considered on all curves sharper than 30 degrees.

e. Large Arrow Sign

# TABLE 8

# DELINEATOR SPACING ON HORIZONTAL CURVES

| | | Spacing in Advance of Curve (ft.) | |
|---|---|---|---|
| Degree of Curve | Spacing on Curve (ft.) | First Space | Second Space |
| 6 | 120 | 200 | 350 |
| 7-8 | 100 | 180 | 300 |
| 9-10 | 90 | 160 | 270 |
| 11-12 | 80 | 140 | 240 |
| 13-18 | 70 | 130 | 210 |
| 19-25 | 60 | 110 | 180 |
| 26-up | 50 | 100 | 150 |

A large arrow sign is intended to be used to give notice of a sharp change in roadway alignment. It should be used to mark curves that have a high accident experience where raised reflective pavement markers or delineators do not provide adequate warning to motorists. The large arrow sign shall be erected on the outside of the curve in line with and at right angles to approaching traffic. It should be visible for at least 500 feet.

f. Chevron Alignment Sign

The chevron alignment sign may be used as an alternate or supplement to delineators and the large arrow sign. The chevron alignment sign is intended to be used to give notice of a sharp change in roadway alignment and to provide additional emphasis and guidance for vehicle operators. Chevron alignment signs are normally installed in groups of three or more with spacing such that drivers always have two in view as they proceed around the curve. Chevron alignment signs are installed on the outside of a curve at right angles to approaching traffic and the first two should be visible for at least 500 feet.

## N. BRIDGES

All vehicular bridges shall be designed to carry at least HS 25 vehicle loading, plus impact.

Structural and geometric design of bridges, including width, shall be in accordance with the current standards in use by ODOT. These include, but are not limited to, Standard Specifications for Highway Bridges (AASHTO). Minimum bridge width shall normally be equal to the total width of the travel lanes plus the shoulders but in no case shall be less than 28 feet.

# V. DRAINAGE STANDARDS

These standards shall apply to all drainage facilities which impact a public right-of-way or easement dedicated to Marion County and within all off-street parking and loading areas as required by the Marion County Zoning Ordinance.

All storm water runoff shall be conveyed to a public storm sewer, or natural drainage channel, having adequate capacity to carry the flow without overflowing or otherwise causing damage to public and private property. In the case of private development, the developer shall pay all costs associated with designing and constructing the facilities necessary to meet this requirement.

## A. DESIGN

### 1. Calculations

Design calculations shall be submitted for all drainage facilities, and shall be completed on Marion County standard forms or an approved facsimile.

Peak design discharges shall be computed using the rational formula, Q=CiA, only for basins under 1,000 acres. For larger basins, gauged flows or Soil Conservation Service or other approved methods shall be used.

a. Design Storm

The intensity-duration frequency is based on the type area through which the facility (pipe or ditch) passes and the size of the drainage facility. The adopted criteria are listed in Table 9.

b. Rainfall Intensity-Duration Curve

The rainfall intensity-duration curve for Marion County is shown on Standard Drawing No. 27.

c. Runoff Coefficients

The recommended coefficients of runoff (C) are listed in Table 10.

d. Time of Concentration

For land in a pre-development condition, the minimum time of concentration from the most remote point in the basin to the first defined channel (e.g. gutter, ditch or pipe) shall be 10 minutes. (Pre-development is defined in Section II.) Longer times using the

# TABLE 9

## DESIGN STORM FREQUENCY

| Area | Frequency |
|---|---|
| Residential Area | 5-year storm |
| Commercial and high value districts | 10-year storm |
| Trunk lines ( 24" pipe and larger ) | 25-year storm |
| Minor creeks and drainage ways (not shown as a flood plain on the Flood Insurance Rate Map (Firm) | 50-year storm |
| Major Creek (shown as a flood plain on the FIRM) | 100-year storm |

# TABLE 10

## RUNOFF COEFFICIENTS

| Soil Cover | Flat Terrain s<2% | Rolling Terrain 2%<s<10% | Steep Terrain s>10% |
|---|---|---|---|
| Relatively high permeability ( lawns, pasture, woods ) | 0.20 | 0.25 | 0.30 |
| Moderate impermeability | | | |
| 1) Single-family residential in urban areas, except corner lots with duplex potential | 0.40 | 0.45 | 0.50 |
| 2) Gravel parking lots | 0.50 | 0.55 | 0.60 |
| 3) Mobile home parks | 0.60 | 0.65 | 0.70 |
| 4) Multi-family residential, zero-lot-line single-family residential and potential duplex lots in Single-family residential | 0.70 | 0.75 | 0.80 |
| High impermeability (roofs and paved areas ) | 0.90 | 0.90 | 0.90 |

Soil Conservation Service (SCS) method or other approved methods shall be used where appropriate.

For developed residential and commercial/industrial property, the maximum time of concentration from the most remote point in the development to the closest inlet shall be 10 minutes, unless calculations by an acceptable method show the time to be longer.

2. Detention Facilities

a. Where Required

Peak storm water runoff shall be controlled by detention facilities for all subdivisions, all commercial and industrial developments and all parking lots with a total developed acreage of 0.5 acres or more and all other developments where the county engineer determines control is needed to prevent flooding or damage downstream. This requirement may be waived if the applicant can show that it is not effective for the basin as a whole.

b. Allowable Runoff Rate ( Outflow )

Peak runoff rate shall be limited to that which would occur in a 5-year frequency storm with predevelopment conditions (C=0.2 ). Pre-development is defined in Section II.

c. Required Storage Capacity

Detention facilities shall have storage capacities to detain the difference between a 5-year frequency storm with pre-development conditions and a 10-year frequency storm with development conditions.

d. Design

(1) The design shall be done in accordance with the Oregon Department of Transportation Publication 78-4, “Procedure Manual, Application of Detention Storage for Limiting Runoff”, or other methods approved by the Director of Public Works.

(2) The orifice size and the hydraulic head shall be adjusted to produce the allowable outflow.

(3) To prevent excessive plugging, the minimum orifice diameter shall be 1-1/2 inches.

(4) Detention facilities shall be designed to protect public and private

property.

(a) Freeboard

At maximum storage, the water surface elevation shall be a minimum of 0.5 feet below the top of the structure (curb, bank, berm, etc. ) designed to contain the water.

(b) Overflow System

The detention facility shall have an overflow system with the capacity to pass a 50-year frequency storm. The overflow shall discharge into a public storm drain facility or the natural drainage course for the drainage basin where the development is located.

(5) Simplified design for sites between 0.5 acres and 5 acres.

For developments in this size range, the detention facility may be designed in accordance with Standard Drawing No. 30. This method is based on the following conditions:

(a) The sites are small enough so that there is an insignificant difference between the times of concentration for the different site sizes. For calculating the allowable runoff rate, a uniform time of concentration of 10 minutes is applicable and, as a result, the allowable runoff rate is 0.2 cfs per acre.

(b) The sites, when developed, will have surfaces that are almost entirely impermeable (buildings, pavement, etc.). For a site not conforming to this condition, the required storage capacity can be reduced by doing a detailed analysis instead of following the standard drawing.

3. Pipes

a. Concrete pipe shall be used, except for temporary or unusual conditions, with a minimum diameter of 10 inches and a minimum cover of 12 inches. Based on the cover and anticipated loading, the required type ASTM C-76 ( reinforced ) or ASTM C-14( non-reinforced ) and class of pipe shall be specified. Within county right-of-ways, under all public roadway areas, the pipe shall have rubber gasket joints. When the pipe has less that 12 inches of cover, Ductle Iron, Class 52 shall be installed. High-density polyethylene pipe with a corrugated exterior and a smooth interior ( Advanced Design Systems, Inc., N-12 or equivalent ), ASTM F-405 and F-667 or AASHTO M-252 and M-294, may be used for driveway culverts, provided a minimum cover of 18 inches can be placed and still

keep the surface of the driveway (at the ditch line ) lower than the surface of the county road, in accordance with Standard Drawing No. 11J.

b. Pipes shall be designed for free flow (i.e., not under head).

c. Allowance for energy loss due to turns, structures, pipe size change, etc., shall be considered in the design of the storm drainage facilities.

d. Mannings “n” valve shall be 0.013 for concrete pipe.

e. Minimum velocity shall be 3.0 fps at peak design flow. Minimum velocity of 2.5 fps will be allowed if the developer provides a construction bond, or similar assurance, for the cost of relaying the pipe if it is laid flatter than 80% of the design grade between structures or pipe ends.

f. Pipe slopes greater than 20% shall have concrete encasement or anchor walls at 21-foot spacing, and shall be reviewed by the Director of Public Works for impact or excessive velocity and the need for energy dissipators.

g. Storm sewer and other utility lines should not meander across the road right-of-way, creating conflicts with existing and future utilities and preempting orderly future installation. With a few exceptions, underground utilities should parallel the roadway centerline and be placed per Standard Drawings Nos. 2, 3, and 4.

h. When fill or trench depths exceed 10 feet, design calculations for pipe loading and strength shall be submitted.

i. Pipe bedding and trench backfill shall conform to Standard Drawing No. 25.

j. Storm sewers crossing private property shall have minimum easement widths of 10 feet. Deep storm sewers, large pipe or unstable soil situations will require wider easements.

4. <u>Storm Drain Manholes, Junction Boxes and Cleanouts</u>

a. Manholes shall be required at:

(1) All changes in horizontal or vertical alignment. Minor horizontal curvature in pipe less than 15 degrees may be allowed, (without manholes or cleanouts), depending on pipe size, street alignment, degree of curvature and reason. Maximum joint deflection shall be per manufacturer’s recommendation.

(2) All connections.

(3) All changes in pipe size.

(4) At a spacing no greater than 500 feet.

b. Standard catch basins, junction boxes, or cleanouts may be used in place of manholes for pipe no larger than 18 inches and with a depth less than 4.0 feet.

c. In place of manholes, on new main line and lateral construction, catch basing laterals of 30 feet or less in length and 10 inches in diameter may connect to the main line with a shop fabricated 90 degree “T”, provided the connection is located not more than 100 feet from a manhole or cleanout on the main line and the main line is 15 inches or larger in diameter.

d. In place of manholes or cleanouts, laterals draining private property may be connected directly to the main line, provided the lateral diameter is 8 inches or less and is no more than one half the diameter of the main line. The hole in the main line shall be made with a drill designed for cutting concrete. The connection shall be properly grouted to provide a strong, leak-proof point. The lateral shall not project inside the main line.

5. Inlets and Catch Basins

Inlets and catch basins shall be required at:

a. All low spots, whether on public or private property, and shall be connected to a storm drainage facility.

b. A maximum gutter flow length of 500 feet.

6. Drywells and French Drains

Drywells and French drains shall not be allowed as the exclusive method for draining public right-of-ways but may be used for developments on private property for paved driveways, parking and loading areas, subject to the following conditions:

a. There are no public storm drain facilities, available within a reasonable distance of the development.

b. A soils test shall be provided to show that there is adequate permeability.

c. The system shall be engineered to insure that adequate capacity is available.

d. Provisions shall be made for grease and fines removal.

e. The site shall be graded so that it does not drain onto a public right-of-way in the event that the drywell or French drain fails.

f. The design shall be approved by the Department of Public Works.

7. Open Channels

a. All existing streams and ditches and other open channels requiring a pipe diameter greater than 36 inches shall remain open channel except at road crossing.

b. Where possible, ditches shall be located along or adjacent to lot lines. Within the UGB, creation of new open channels will not be allowed, unless it is to relocate an existing open channel.

c. For reasons of maintenance and safety, bank slopes generally shall be 4:1 or flatter but may be a maximum of 2:1 with Department of Public Works approval.

d. The maximum allowable design velocity shall be 7 fps.

e. The minimum allowable design velocity shall be 2 fps. The installation of a concrete lined low-flow channel may be required to achieve minimum velocity.

f. The normal maximum depth for an open ditch shall be 4 feet outside of road rights-of-way and 2 feet adjacent to the roadways.

g. Channels crossing private property shall have a minimum easement width equal to the channel width at the top plus 10 feet along one side of the channel.

B. PLANS

1. All plans shall include a map outlining the drainage basin boundaries for which a storm water runoff system is being designed and those adjacent basins which may be affected. This drainage basin map shall show the existing and proposed drainage swale, stream or body of water. The scale of this map may vary from 1" equals 200' to 1" equals 2,000' depending on the size of the drainage basins.

2. All crossings and potential conflicts between storm sewers and other underground utilities shall be shown on the profile.

3. Means of preventing erosion along new channels, ditches and at pipe outfalls, are required and shall be shown on the plans.

4. Pipe sizes, types, classes and bedding shall be specified on the plan.

5. Pipe bedding and trench backfill shall be specified on plans and shall be per Standard Drawing No. 25.

# VI. USE OF COUNTY RIGHT-OF-WAY BY OTHERS

Written permission to work in or modify a county right-of-way or easement, including the construction of driveway accesses, must be obtained from the Director of Public Works or his representative prior to actual commencement of said work. Such work must restore the road structure to its present physical characteristics, including any additional work or materials necessary to compensate for weaknesses caused by disturbing the structural integrity of the roadway. Standard Drawing No. 25 shows backfill requirements for excavation work undertaken in the right-of-way.

The location of utilities or other facilities in the right-of-way shall be as shown on Standard Drawing Nos. 2, 3, and 4, or as authorized by the Director of Public Works.

Underground utility crossing shall in general be installed by boring, jacking, or tunneling, rather than excavating or ditching. Unless there are special circumstances approved by the Director of Public Works, (e.g., rock subgrade), open cuts for utilities in paved roads shall not be permitted for:

1. Conduits 4 inches and smaller in diameter.

2. Roads classified as arterials.

3. Roads overlayed within the last 3 years.

Where the Director of Public Works has approved an open cut, the pavement shall be saw cut and the crossing shall be perpendicular to the centerline of the road.

# VII CHECK LIST FOR SUBDIVISION REVIEW

On the following pages appear check lists to be used in the various stages of subdivision review listed below:

A. Preliminary Plat

B. Engineering Plans

C. Final Plat ( hard copy )

CHECK LIST FOR PRELIMINARY SUBDIVISION PLAT REVIEW

Name of Subdivision_____ Review By_____
Date_____

_____ 1. Is it inside or outside an urban growth boundary ( U.G.B. ) ?
_____ 2. If inside a U.G.B., is it in sewer and water districts?
_____ 3. Are permits or approvals from other government agencies required?
_____ 4. Streets and Roads:
- _____ a. Existing county roads or other public right-of-way ( R/W ) ?
  - _____ 1) Classification ( arterial, collector or local ) ?
  - _____ 2) Is additional R/W required?
  - _____ 3) Is it a gravel road that must be paved?
    - _____ a) Along frontage of subdivision?
    - _____ b) Off-site to connect to a paved county road?
  - _____ 4) Is widening of existing pavement required?
  - _____ 5) Are curb and sidewalk required?
  - _____ 6) Access:
    - _____ a) New streets and roads:
      - _____ (1) Does spacing meet minimum standards?
      - _____ (2) Is sight distance adequate?
    - _____ b) Driveways for individual lots:
      - _____ (1) Are locations available that have adequate sight distance?
      - _____ (2) Are combined or joint-use driveways required?
      - _____ (3) Is a limited access street involved? ( e.g., Cordon Road )
- _____ b. New Streets and Roads:
  - _____ 1) Will they be public or private?
    - _____ a) Public or private R/W?
    - _____ b) Type of maintenance?
      - _____ (4) County? ( Must be public R/W and built to county standards. )
      - _____ (5) Private? Homeowners Association required?
  - _____ 2) Classification?
  - _____ 3) Required R/W width?
  - _____ 4) Required pavement width?
  - _____ 5) Are curb and sidewalk required?
  - _____ 6) Curve radii - do they meet standards?
    - _____ a) Horizontal curves.
    - _____ b) Curb returns or pavement flares.
    - _____ c) Property corners at intersections.
  - _____ 7) Grades - does it appear that standards can be met?
  - _____ 8) Will future street extensions be needed to serve adjoining property?
  - _____ 9) Are one-foot reserve strips needed?
  - _____ 10) Are there existing easements that must be cleared before county can accept R/W dedication?

_____ 5. Drainage:
- _____ a. Where does runoff currently go?
- _____ b. Is there an existing public facility or natural drainage course nearby that can serve the property?
- _____ c. What and where is the ultimate receiving swale, stream or body of water?
- _____ d. Do existing facilities need improvement, enlargement or rerouting?
- _____ e. Is a detention system required?
- _____ f. Are there special or unusual problems?
  - _____ 1) Is subdivision in a flood plain?
  - _____ 2) Are existing storm drains too shallow?
  - _____ 3) Does the ground slope so as to make it ver difficult or impossible to get water into existing facilities or natural streams?
  - _____ 4) Will solution to drainage problem require significant revision of street alignment or lot lines?
  - _____ 5) Does a drainage plan need to be prepared and approved by DPW prior to the granting of detailed approval by Planning Commission?
- _____ g. Are special or unusual easements required?

_____ 6. Is subdivision in a landslide hazard area?
- _____ a. Is a geologic study required?

CHECK LIST FOR ENGINEERING PLAN REVIEW

Name of subdivision or other Development

_____

Review by _____ Date _____

_____ 1. Vicinity Map on Cover Sheet?
_____ 2. Title Block?
_____ 3. Engineers Stamp and Signature?
_____ 4. Streets and Roads?

- _____ a. Typical Sections?\
  - _____ 1) Pavement?
    - _____ a) AC Class?
    - _____ b) Thickness?
    - _____ c) Width?
    - _____ d) Cross-slope?
  - _____ 2) Aggregate Base?
    - _____ a) Grading (1" - 0, etc. ) ?
    - _____ b) Thickness?
  - _____ 3) Turnpike?
    - _____ a) Shoulder?
      - _____ (1) Width. Narrower around cul-de-sac?
      - _____ (2) Cross-slope?
    - _____ b) Ditch?
      - _____(1) Width to C.L.?
      - _____(2) Entering slope?
      - _____(3) Backslope?
  - _____ 4) Curbs?
    - _____ a) Type?
    - _____ b) Height of Exposure?
    - _____ c) Aggregate base underneath?
    - _____ d) Weep holes?
  - _____ 5) Sidewalks?
    - _____ a) Location (Curb line or property line)?
    - _____ b) Width?
    - _____ c) Concrete?
- _____ b. Profiles?
  - _____ 1) Stationing and scales ( vertical and horizontal ) ?
  - _____ 2) Existing ground at centerline and right-of-way lines?
  - _____ 3) Vertical Alignment?
    - _____ a) Grades: centerline for turnpike, top of curb for curbed section?
      - _____ (1) Maximum?
      - _____ (2) Minimum ( Including cul-de-sac and curb returns ) ?
    - _____ b) Vertical curves?
      - _____ (1) Minimum length?
      - _____ (2) Curve data ( stations and elevations of PIVC, BVC, EVC ) ?

_____ c. Plans?
- _____ 1) North arrow, scale, street centerline, right-of-way lines, stationing, and street names?
- _____ 2) Horizontal alignment?
  - _____ a) Curves?
    - _____ (1) Minimum radii?
    - _____ (2) Maximum superelevation?
    - _____ (3) Superelevation runoff?
      - _____ (a) Minimum length?
      - _____ (b) Method of obtaining?
      - _____ (c) Shown on profile?
    - _____ (4) Curve data ( radius, length, deflection angle, stations of P.C. and P.T.. ) ?
  - _____ b) Cul-de-sac minimum radii?
    - _____ (1) Entering sac?
    - _____ (2) Around sac?
  - _____ c) Intersections?
    - _____ (1) Sight distances?
    - _____ (2) Angles?
    - _____ (3) Turnpike flare radii?
    - _____ (4) Curb returns?
      - _____ (a) Radii?
      - _____ (b) Wheelchair/bicycle ramps?
- _____ 3) Slope easements required?
- _____ 4) Traffic signs and barricades?
  - _____ a) Shown on plans?
  - _____ b) Note specifying that they are to be furnished and installed by Subdivider/developer/contractor?
- _____ 5) Note specifying that all utilities and utility laterals that will lie under the street must be placed prior to paving of street.

_____5. Drainage?
- _____ a. Drainage basins and receiving facility, swale, stream or body of water shown?
- _____ b. Hydraulic calculations?
  - _____ 1) Method applicable. Maximum area for rational formula?
  - _____ 2) Parameters and assumptions?
- _____ c. Detention system required?
  - _____ 1) Hydraulic calculations ( methods, parameters, assumptions ) ?
  - _____ 2) Storage basin capacity?
  - _____ 3) Method of flow restriction?
- _____ d. Existing stream or ditch to be piped? Maximum size?
- _____ e. Provisions for draining adjacent property?

_____ f. Pipe?
- _____ 1) Diameter?
- _____ 2) Type ( concrete ) ?
- _____ 3) ASTM type and class?
- _____ 4) Rubber casket joints in roadway?
- _____ 5) Crushed rock trench backfill in roadway?

_____ g. Open channel?
- _____ 1) New open channels not allowed in UGB?
- _____ 2) Typical section?
  - _____ a) Width?
  - _____ b) Depth ( also see profile ) ?
  - _____ c) Side slopes?

_____ h. Profile?
- _____ 1) Existing ground surface?
- _____ 2) Finished grade of street, ground, etc.?
- _____ 3) Invert with elevations and slopes?
- _____ 4) Inlets, cleanouts and manholes?
  - _____ a) Location by station?
  - _____ b) Elevation of inverts and rims?
- _____ 5) Minimum or maximum cover over pipe?
- _____ 6) Maximum depth in open channel?

_____ i. Plan?
- _____ 1) Alignment of pipe or ditch with ties to centerline, curb, right-of-way or property lines?
- _____ 2) Location of inlets, cleanouts and manholes?
- _____ 3) Curved pipelines?
  - _____ a) Radius
  - _____ b) Maximum joint pull?

_____ j. Capacity? Free flow ( not under head ) in pipes?

_____ k. Velocity?
- _____ 1) Minimum for self cleaning?
- _____ 2) Maximum?
  - _____ a) Thrust blocks on pipe?
  - _____ b) Rip Rap or lining in ditches?

_____ l. Inlets?
- _____ 1) Type?
- _____ 2) Type of grate?
- _____ 3) Maximum spacing?
- _____ 4) Maximum pipe size?
- _____ 5) At all low points ( including curb returns ) ?
- _____ 6) Maximum depth of catch basins?

_____ m. Cleanouts/junction boxes and/or manholes?
- _____ 1) Required at:
  - _____ a) Changes in alignment or grade?
  - _____ b) Lateral connections of lateral pipe $\geq$ ½ diameter of main line?
  - _____ c) Changes in pipe size?
  - _____ d) Maximum cleaning intervals?

_____ 2) Manholes required because of pipe size and/or depth?
_____ n. Outfalls: Rip or rap or structure to prevent erosion?
_____ o. Conflicts with sewers or other utilities?
_____ p. Easements over private property?
_____ 1) Minimum width?
_____ 2) Extra width required by pipe size, depth or special conditions?
_____ 3) Access to easement?

CHECK LIST FOR FINAL ( HARD COPY ) SUBDIVISION PLAT REVIEW

Name of Subdivision_____
Reviewed By_____ Date_____

_____ 1. Signatures: Are all the following signatures and spaces for subsequent signatures on plat?
- _____ a. Owner(s) ? Notarized?
- _____ b. Private licensed surveyor? Stamp or seal? Notarized?
- _____ c. County
  - _____ 1) Planning Director?
  - _____ 2) Sanitarian? ( Required only outside UGB or where private septic systems will be used inside UGB )
  - _____ 3) County Surveyor?
  - _____ 4) Tax Collector? Statement that taxes have been paid to DATE?
  - _____ 5) Tax Assessor?
  - _____ 6) Space for three (3) Commissioners?
    - _____ a) Spelling of Commissioners names?
    - _____ b) Signatures spaces for Commissioners and Tax Collector located together under approval statement?
  - _____ 7) Space for County Clerk to attest commissioner's signatures?
  - _____ 8) Space for County Clerk to list recording data and sign?
  - _____ 9) Space for County Engineer?

_____ 2. Dedication statement?
- _____ a) Is it located above owner's signature?
- _____ b) Does it include:
  - _____ 1) Streets?
  - _____ 2) Easements?
- _____ c) Separate statement dedicating 1-foot reserve strips to county in fee simple? ( If omitted, may use separate warranty deed. )

_____ 3. Improvement agreement submitted by subdivider?
- _____ a) Date at top of first page left blank?
- _____ b) Subdivider's name on first page?
- _____ c) Completion dates listed for all items of work?
- _____ d. Signed by subdivider?

_____ 4. Bond or alternate financial guarantee ( if required ) provided by subdivider?
- _____ a. Reviewed and approved by county legal counsel?

_____ 5. Warranty deed for 1-foot reserve strips submitted by subdivider ( only if not included in dedication statement - see 2, c. above ) ?

_____ 6. Engineering plans: Have they been approved?
- _____ a. Road and storm drain plans approved by county engineer?

_____ b. "Plan check" fee paid? "Plan check" form signed by subdivider and by Department of Public Works?
_____ c. Sewer and water plans approved by City ( required only if inside UGB ) ? ( Copy of approval letter required. )

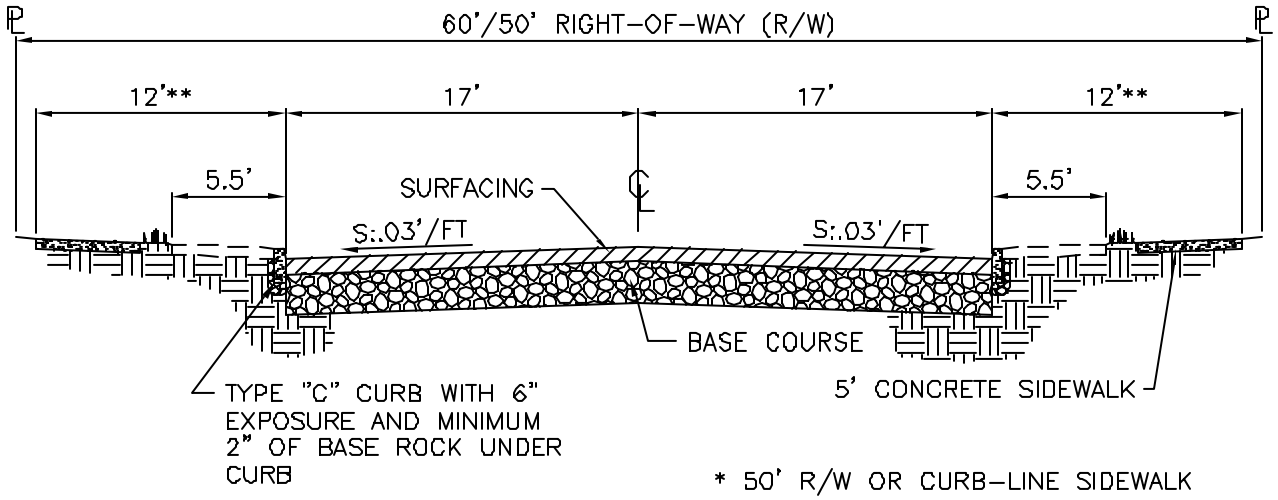
_____ 7. Roads: Do they conform to approved engineering plans and subdivision ordinance?
_____ a. Right-of-way widths?
_____ b. Horizontal curve radii?
_____ c. Cul-de-sac right-of-way radii?
_____ 1) Radii entering a cul-de-sac?
_____ 2) Radii around cul-de-sac?
_____ d. Intersections: Property corner radii?
_____ e. Additional right-of-ways dedicated along existing public roads?
_____ f. Are all new right-of-ways clear of easements other than utility easements?

_____ 8. Easements:
_____ a. Preexisting recorded easements?
_____ b. New 5-foot utility easements along all side and rear lot lines ( may use note in lieu of showing each one on plat ) ?
_____ c. Special purpose easements: Do widths and alignments conform to approved engineering plans?
_____ 1) Slope?
_____ 2) Storm drain?
_____ 3) Sewer?
_____ 4) Access ( including combined driveways and frontage roads ) ?
_____ 5) Do easements need to be made exclusive ( other utilities or uses excluded ) ?

_____ 9. One-foot reserve strips shown on plat?
_____ 10. Notes limiting access or requiring combined driveways?
_____ 11. Unusual or special conditions–check:

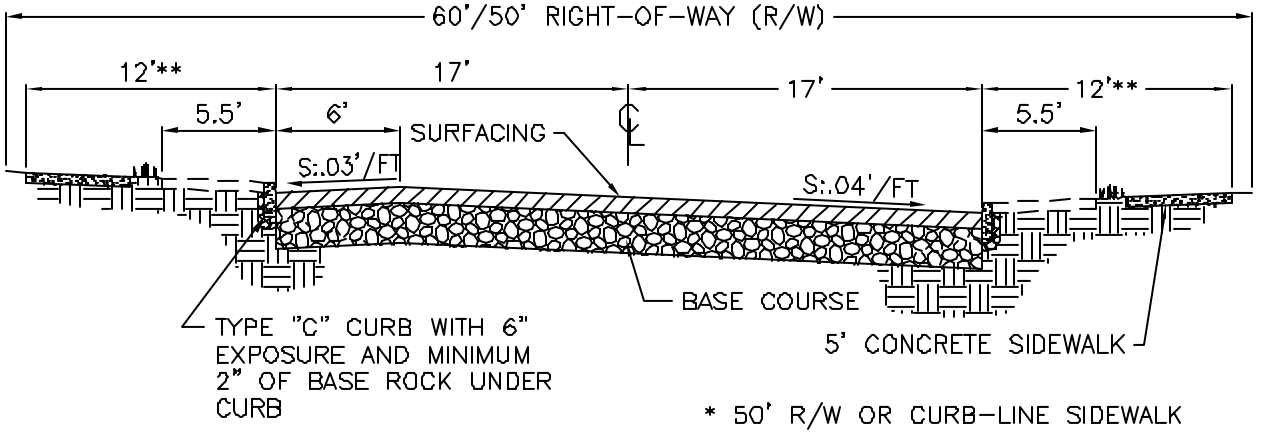
_____ a. DPW memos and letters?
_____ b. Planning Commission decisions?
_____ c. Board of Commissioners' decision ( if ) any?
_____ d. Approved engineering plans?

## STANDARD CROSS SECTION




* 50' R/W OR CURB-LINE SIDEWALK
** REQUIRES 60' R/W

## TILTED CROSS SECTION




* 50' R/W OR CURB-LINE SIDEWALK
** REQUIRES 60' R/W

## NOTE:

SURFACING AND BASE COURSE SHALL CONFORM TO MARION COUNTY D.P.W. ENGINEERING STANDARDS.

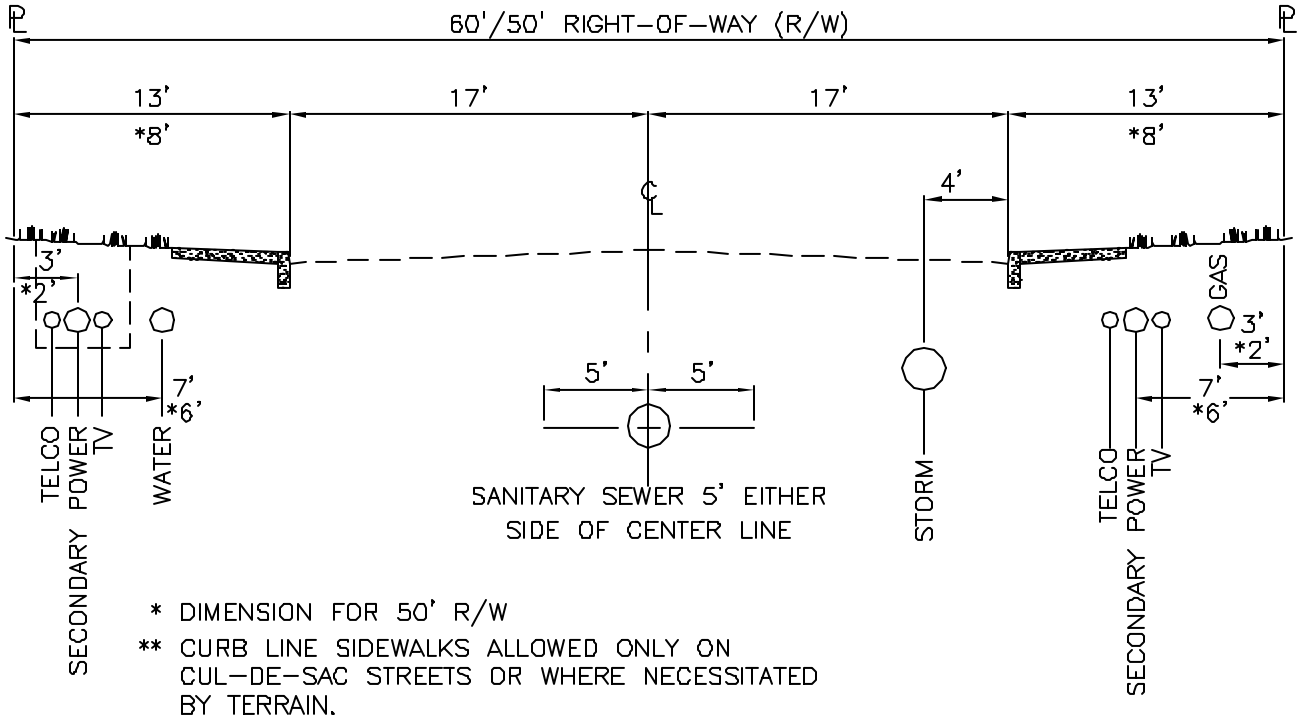
Marion County Dept. of Public Works
Engineering Tel. 588-5038 Salem, Oregon

SHEET 1 OF

# TYPICAL CROSS SECTIONS FOR URBAN STREETS

| Des. | Eng: | Date: 10-28-93 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HJT | Hor: NONE Vert: NONE |

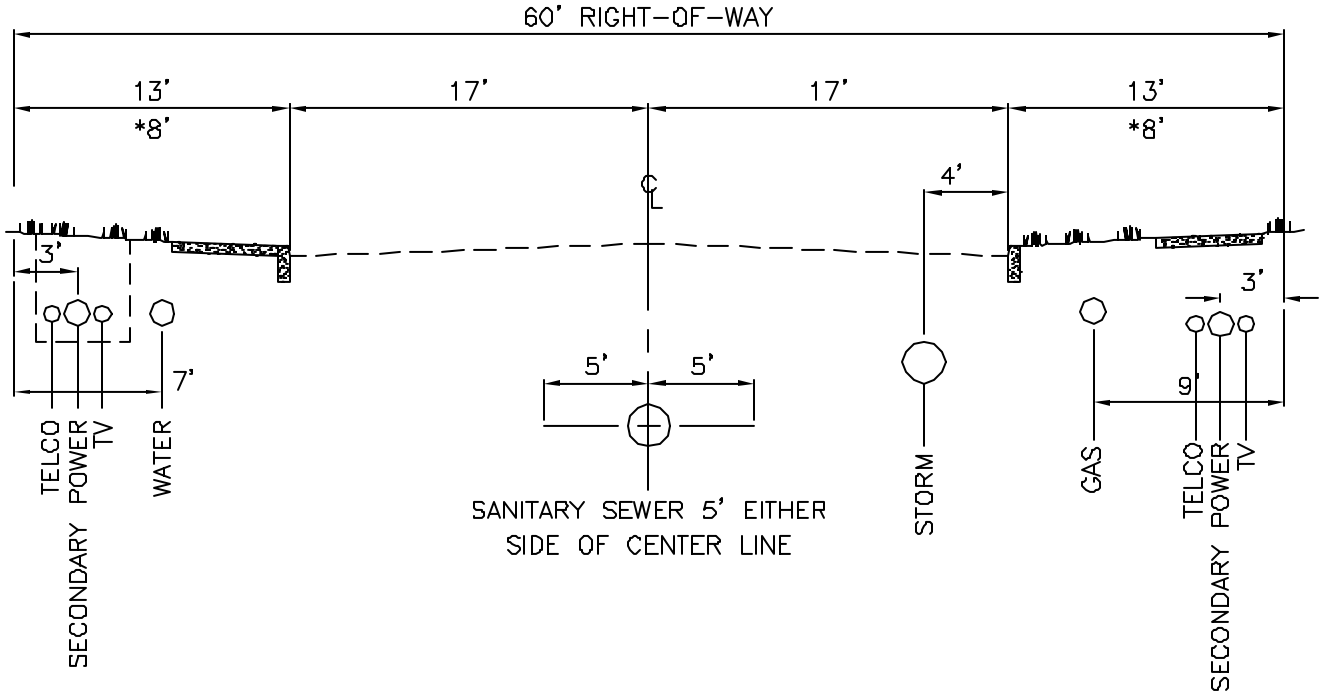
## CURB LINE SIDEWALK




* DIMENSION FOR 50' R/W

** CURB LINE SIDEWALKS ALLOWED ONLY ON CUL-DE-SAC STREETS OR WHERE NECESSITATED BY TERRAIN.

## PROPERTY LINE SIDEWALK




## NOTES:

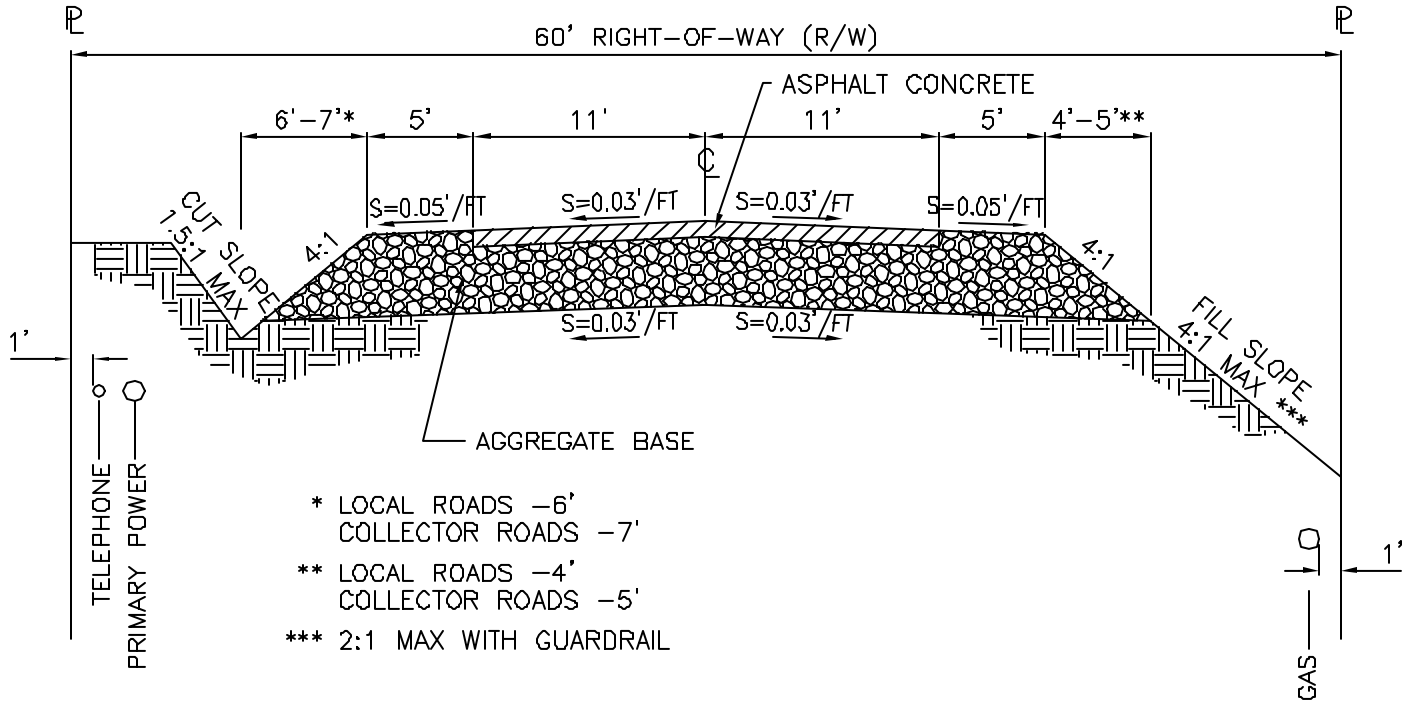
1. TELCO, POWER, T.V., WATER – SOUTH AND WEST SIDE
   GAS – NORTH SIDE
2. TELCO, POWER, T.V., WATER – MINIMUM COVER 30 INCHES

Marion County Dept. of Public Works
Engineering Tel. 588-5038 Salem, Oregon

Sheet 2 of 2

# STANDARD UTILITY LOCATION FOR URBAN STREETS

| Des. | Eng: | Date: 10-26-93 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




NO SCALE

## NOTES:

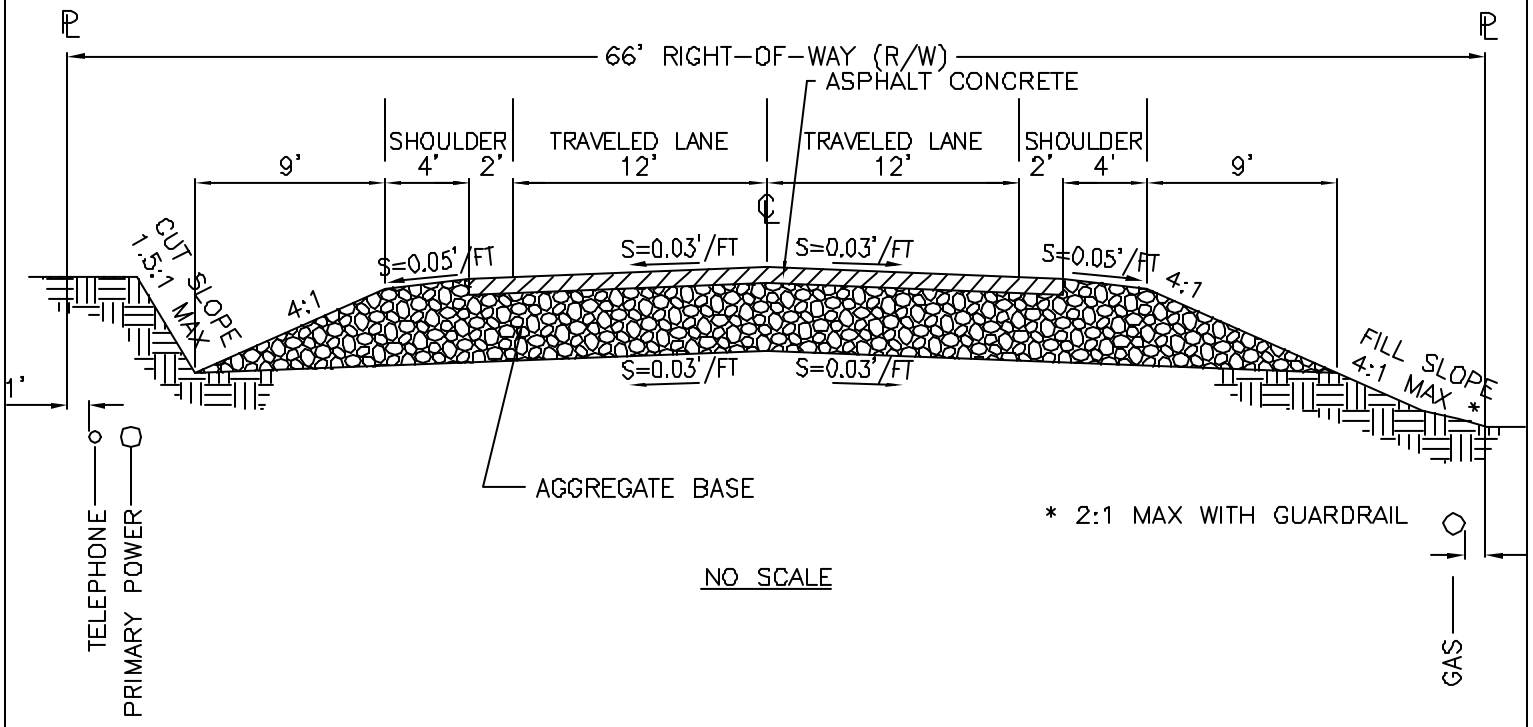
1. ASPHALT CONCRETE AND AGGREGATE BASE SHALL CONFORM TO MARION COUNTY D.P.W. ENGINEERING STANDARDS.
2. UTILITIES MAY BE PLACED IN SHOULDER AREA IF CUT OR FILL SLOPES EXTEND OUTSIDE OF R/W.
3. IN NEW SUBDIVISIONS: TELCO AND POWER -SOUTH AND WEST SIDE; GAS -NORTH AND EAST SIDE.
4. TELCO, POWER, GAS -MINIMUM COVER 30 INCHES.
5. 50' R/W WIDTH IS PERMITTED ON CUL-DE-SACS LESS THAN 500' LONG.

Marion County Dept. of Public Works
Engineering Tel. 588-5038 Salem, Oregon

Sheet 3 of 7

# TYPICAL 22' WIDE TURNPIKE SECTION AND UTILITY LOCATION FOR RURAL, LOCAL AND COLLECTOR ROADS

| Des. | Eng: | Date: 10-26-93 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




## NOTES:

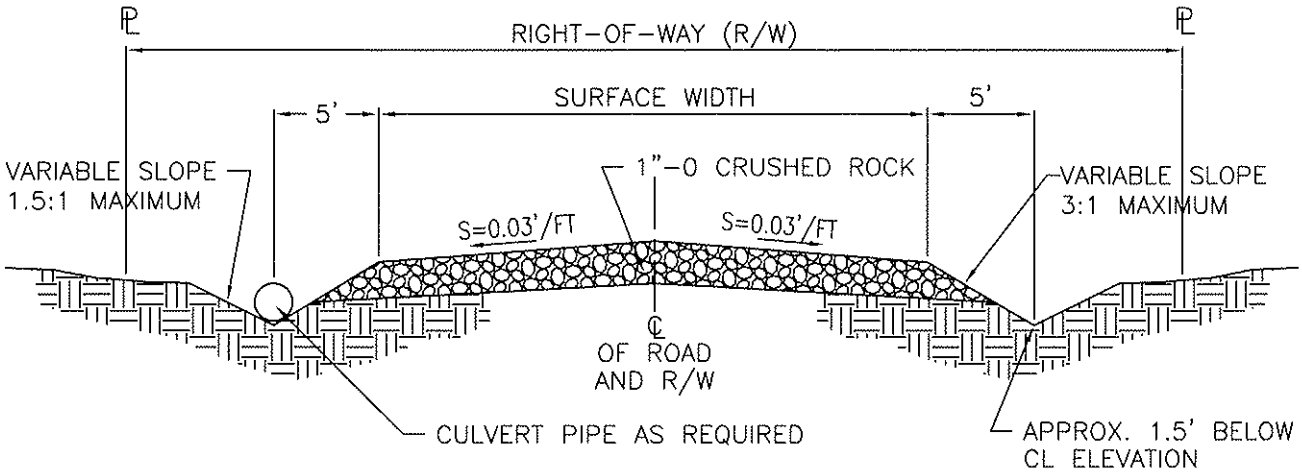
1. ASPHALT CONCRETE AND AGGREGATE BASE SHALL CONFORM TO SECTION IV OF THE MARION COUNTY D.P.W. ENGINEERING STANDARDS.
2. UTILITIES MAY BE PLACED IN SHOULDER AREA IF CUT OR FILL SLOPES EXTEND OUTSIDE OF R/W.
3. IN NEW SUBDIVISIONS: TELCO AND POWER –SOUTH AND WEST SIDE; GAS –NORTH AND EAST SIDE.
4. TELCO, POWER, GAS –MINIMUM COVER 30 INCHES.

Marion County Dept. of Public Works
Engineering Tel. 588-5038 Salem, Oregon

Sheet 4 of 4

# TYPICAL 28' WIDE TURNPIKE SECTION AND UTILITY LOCATION FOR RURAL ARTERIAL ROADS

| Des. | Eng: | Date: 10-27-93 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




## NOTES:

1. SURFACE WIDTH AND CRUSHED ROCK SHALL CONFORM TO THE FOLLOWING:

| NUMBER OF DWELLINGS SERVED | SURFACE WIDTH (FEET) | 1"-0 CRUSHED ROCK THICKNESS (INCHES) |
|---|---|---|
| 1 | 10' | 6" |
| 2 OR MORE | 16' | 8" |

2. UTILITIES SHALL BE LOCATED AS SHOWN ON TYPICAL 22' TURNPIKE SECTION FOR RURAL ROADS (MARION COUNTY STANDARD DRAWING NUMBER 3)

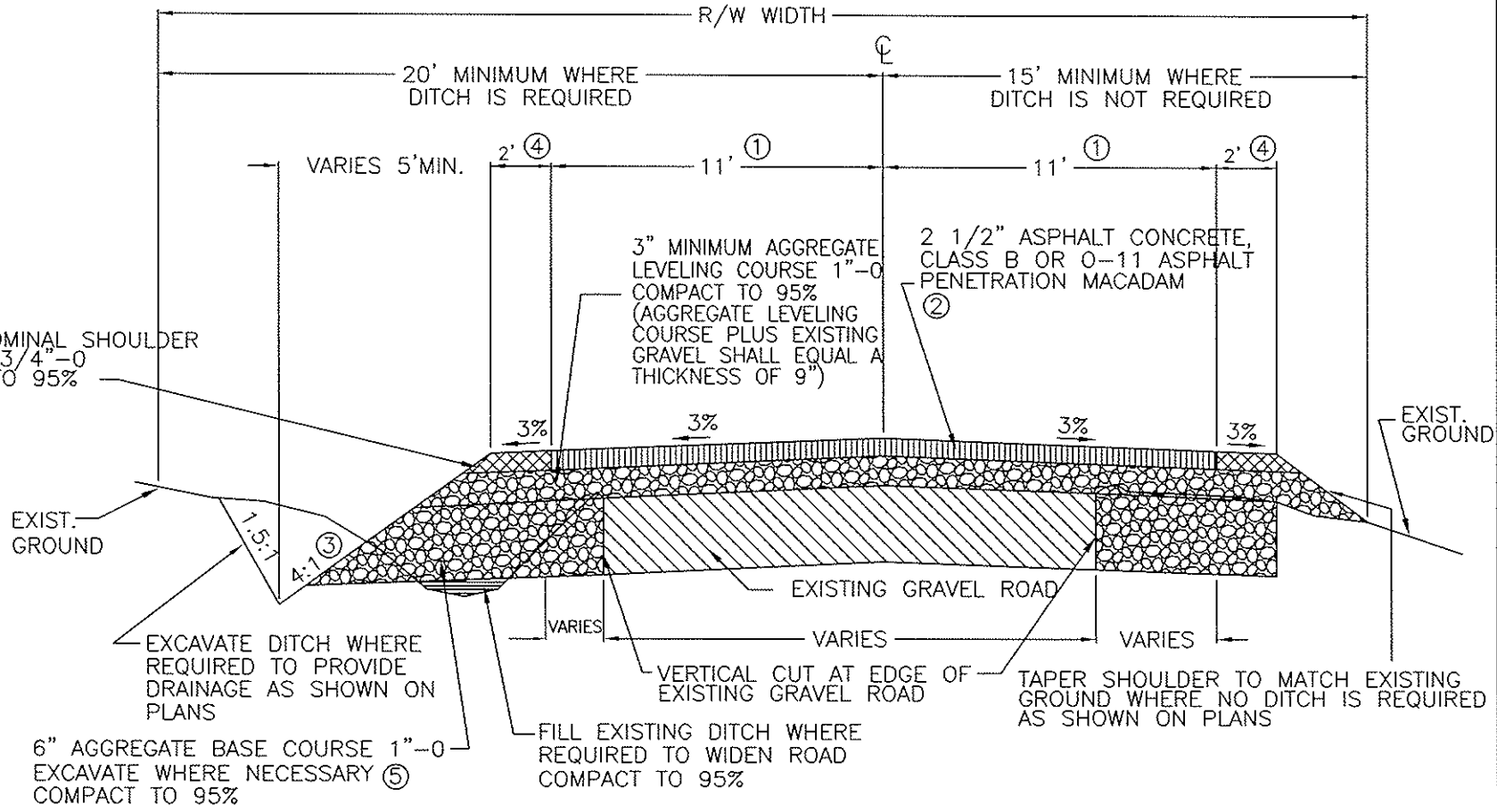


Marion County Dept. of Public Works
Engineering Tel. 588-5036 Salem, Oregon

STD. DWG. 5 OF 1

# TYPICAL GRAVEL SECTION FOR PRIVATELY MAINTAINED RURAL ROADS

| Des. | Eng: | Date: 12-15-09 | Revised: |
|---|---|---|---|
| Reviewed By: | Survey: | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




① 10' WHERE R/W WIDTH IS LESS THAN 50'

② FOR EACH PROJECT, THE LEAST EXPENSIVE METHOD OF PAVING SHALL BE SELECTED

③ 3:1 WHERE R/W WIDTH IS LESS THAN 50'

④ 1' WHERE R/W WIDTH LESS THAN 40'

⑤ DISPOSE OF EXCAVATED MATERIAL OFF–SITE

# TYPICAL CROSS SECTION FOR PAVING GRAVEL ROADS

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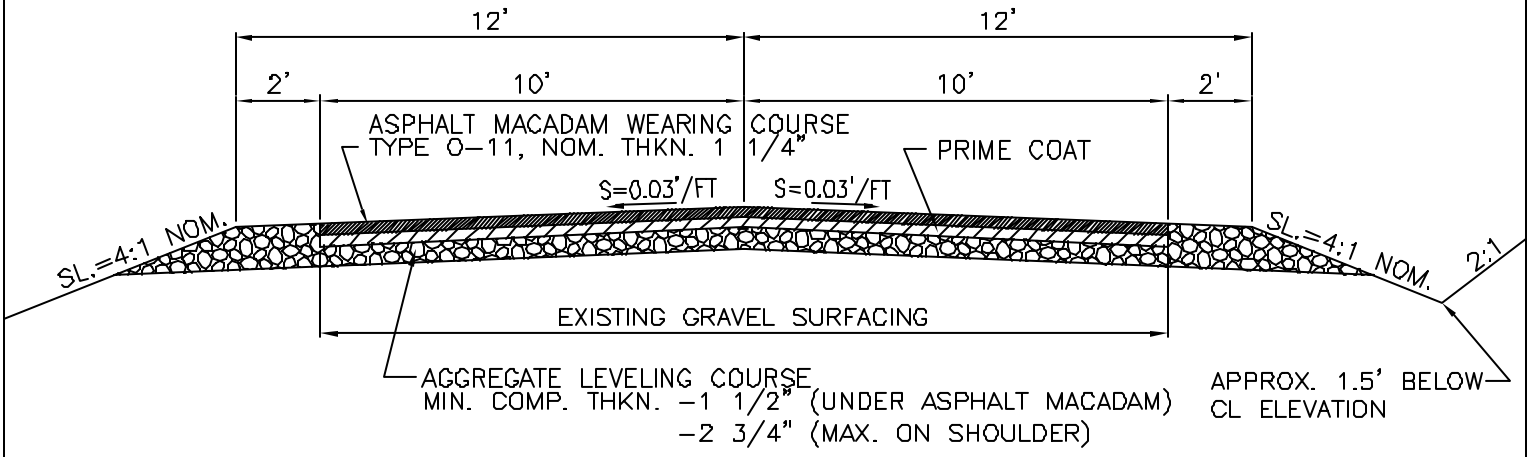
Salem, Oregon

Des.
Reviewed By—Survey:
Eng:
Appd.
Inspec:
Drwn. HOT
Date: 12-15-09
Datum: NONE
Revised:
SCALES
Hor: NONE
Vert: NONE

6A

# ASPHALT PENETRATION MACADAM
# (O-11)

## TYPICAL SECTION




WHERE THE MACADAM PAVEMENT IS WIDER THAN THE EXISTING GRAVEL SURFACE, THE AGGREGATE LEVELING COURSE SHALL HAVE A MINIMUM THICKNESS OF 6"

## MINIMUM

| | ASPHALT | | AGGREGATE | |
|---|---|---|---|---|
| | TYPE | GALS./S.Y. | GRAVEL | CU.YDS./S.Y.* |
| PRIME COAT | MC-250 | 0.55 | 3/4"-0 | 0.019 |
| 1ST SPREAD | CRS-2 | 0.45 | 1 1/4"-3/4" | 0.019 |
| 2ND SPREAD | CRS-2 | 0.55 | 3/4"-1/2" | 0.019 |
| 3RD SPREAD | CRS-2 | 0.55 | 1/2"-1/4" | 0.014 |
| SEAL COAT | CRS-2 | 0.45 | 1/4"-#10 | 0.009 |

* MEASURED IN TRUCK

THE CATIONIC EMULSION ASPHALT SHALL MEET THE SPECIFICATIONS OF AASHTO M208-72 OR ASTM D2397-73. AGGREGATES SHALL BE IN DESIGNATED SIZES AND SHALL CONFORM TO THE REQUIREMENTS OF SUBSECTION 703.12 OF THE STANDARD SPECIFICATIONS OF THE OREGON STATE HIGHWAY DEPARTMENT, CURRENT ISSUE.

## NOTES:

1. THE MINIMUM THICKNESS OF THE AGGREGATE LEVELING COURSE MAY HAVE TO BE INCREASED, DEPENDING ON THE THICKNESS AND CONDITION OF THE EXISTING GRAVEL SURFACE.

2. CONSTRUCTION OF DRAINAGE CULVERTS, ROADSIDE DITCHES AND/OR ELEVATION OF ROADWAY MAY BE REQUIRED.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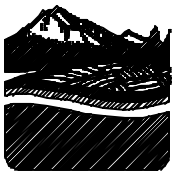
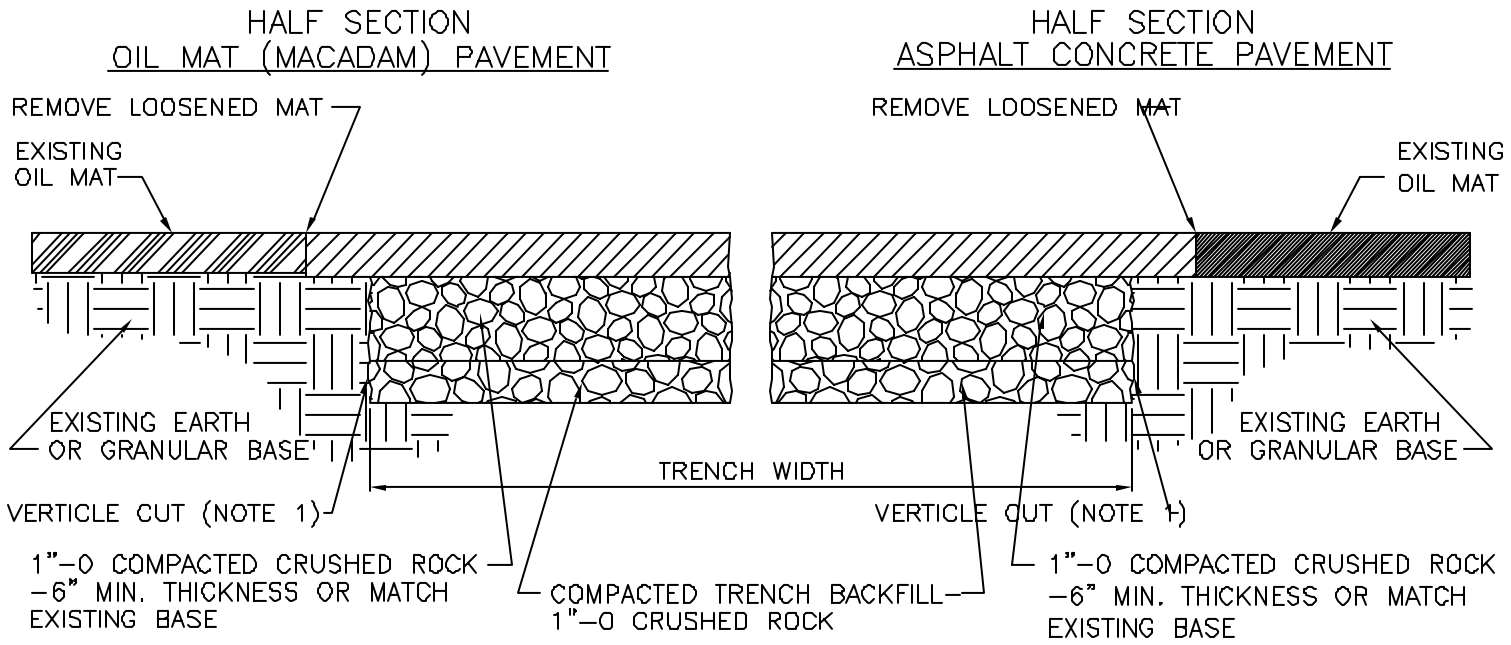
Sheet 6B of 7

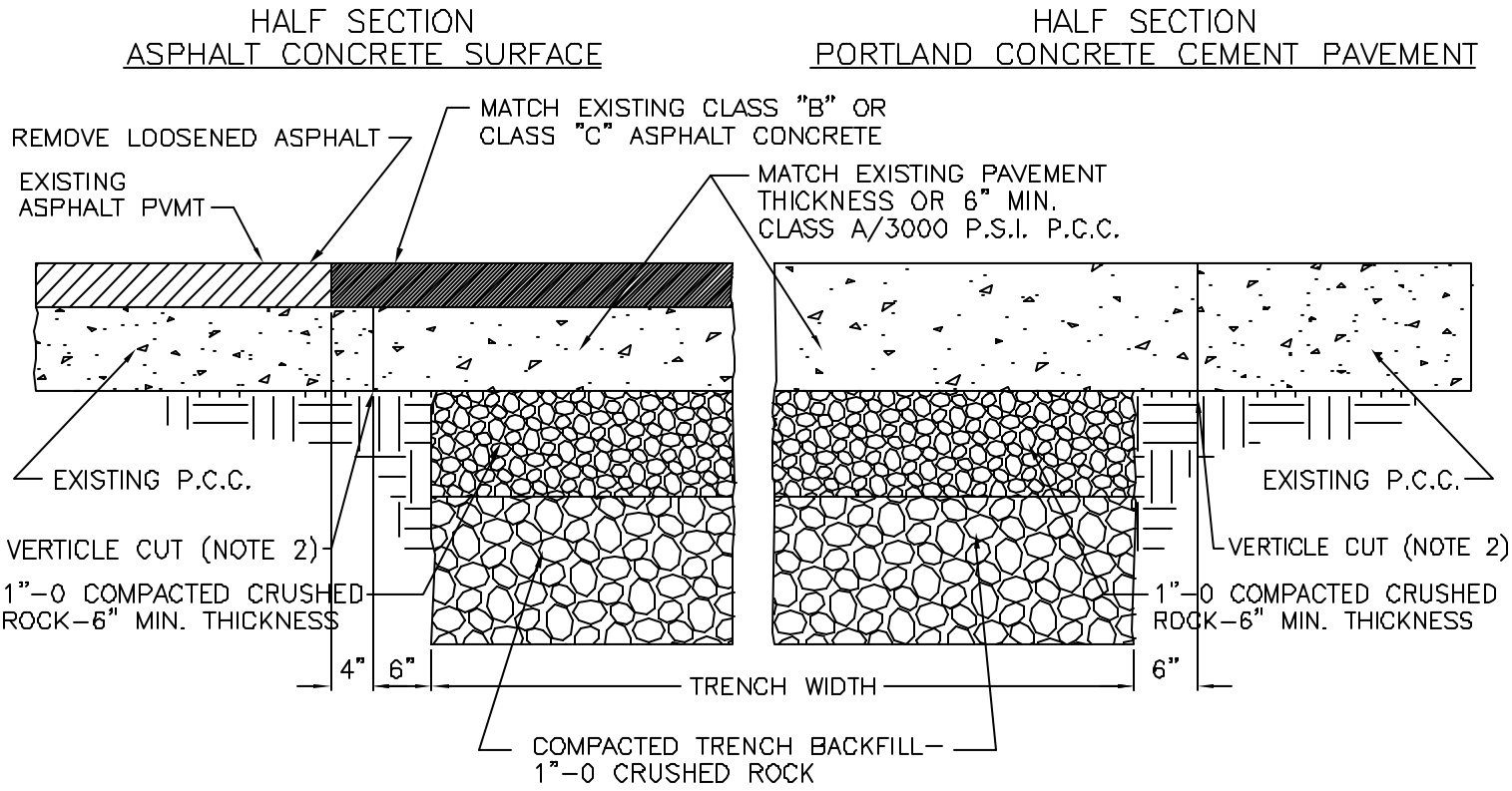


# TYPICAL ASPHALT PENETRATION MACADAM (O-11) SURFACING DETAILS

| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 10-27-93 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




## TYPICAL PATCH FOR FLEXIBLE PAVEMENT




## TYPICAL PATCH FOR RIGID PAVEMENT

**NOTES:**

1. CUTS IN ASPHALT CONCRETE PAVEMENT SHALL BE MADE WITH HYDRAULICALLY-OPERATED SPADE-TIPPED PAVEMENT BREAKER, CUTTING WHEEL, CONCRETE SAW, OR OTHER APPROVED METHOD. INTERMITTENT PUNCHING WITH A POINTED JACK HAMMER BIT WILL NOT BE PERMITTED.

2. CUTS IN PORTLAND CONCRETE CEMENT PAVEMENT SHALL BE MADE WITH A CONCRETE SAW.

3. ALL JOINTS BETWEEN EXISTING AND NEW ASPHALT SHALL BE SEALED WITH AR-4000 (OR EQUIVALENT) AND SANDED.

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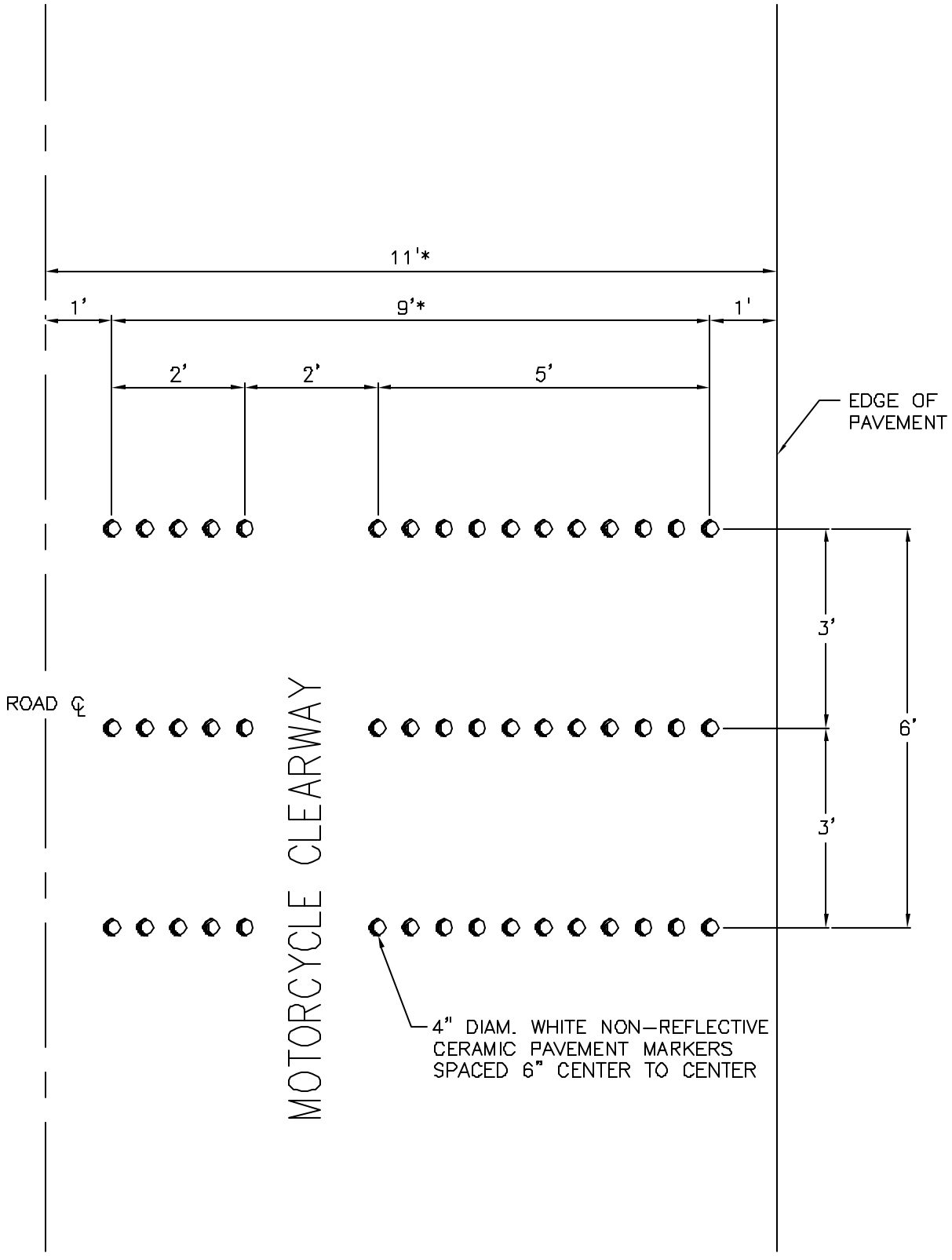
Sheet 7 of 7

# PAVEMENT PATCHING

| Des. | Eng: | Date: 10-28-93 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




* DIMENSION SHOWN ARE TYPICAL. THEY SHALL BE VARIED AS NECESSARY TO CONFORM TO PAVEMENT WIDTH

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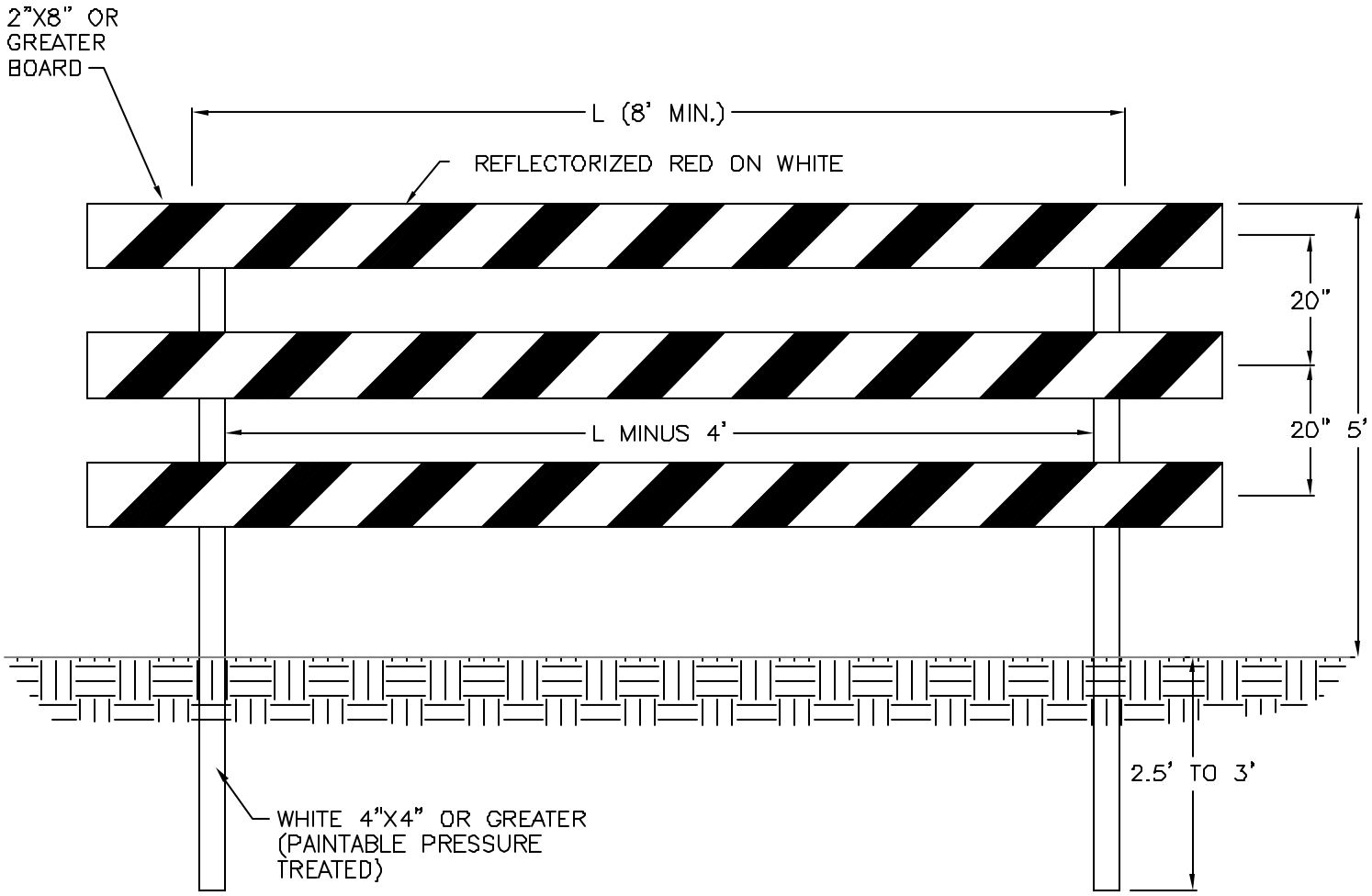
Sheet 9 of

# RUMBLE STRIPS

| Des. | Eng: | Date: 10-28-93 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




***NOTES:***

1) REFLECTORIZED SHEETING SHALL BE ENGINEERING GRADE, CONFORMING TO THE OSHD "STD. SPECS. FOR HWY. CONSTRUCTION" 02910

2. THE LENGTH OF THE BARRICADE UNIT "L" NORMALLY WILL BE SHOWN ON PROJECT PLANS OR PERMITS. WHEN NO "L" IS SHOWN, THE 8' MIN. SHALL BE USED

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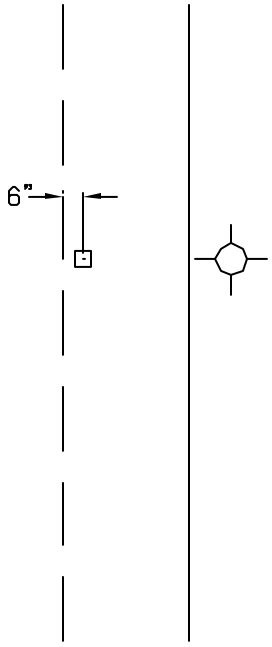
Sheet 9 of

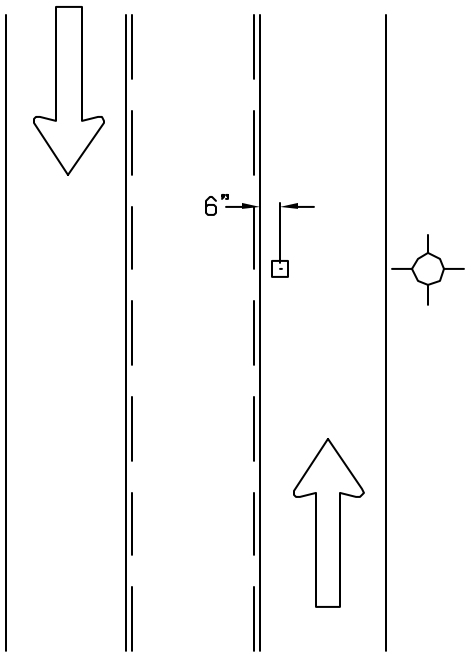
# PERMANENT BARRICADE UNIT

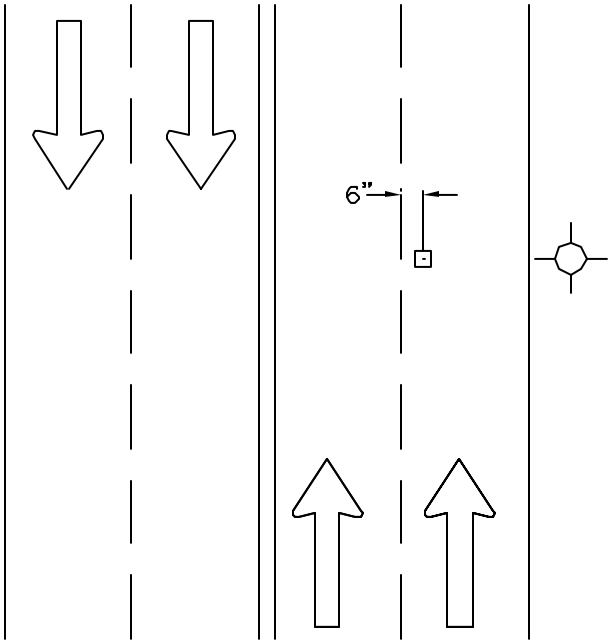
| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 10-28-83 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |

## 2 LANE
## ONE-WAY OR TWO-WAY

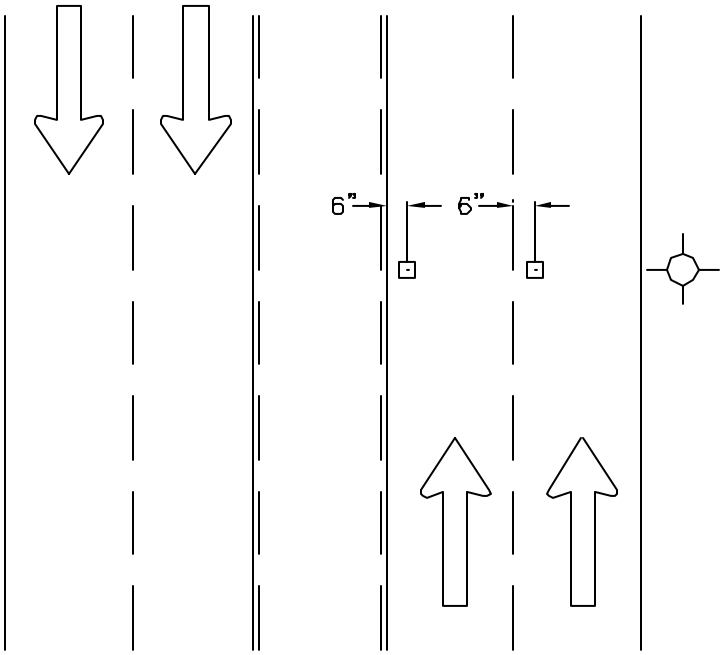



## 2 LANE TWO-WAY
## CONTINUOUS LEFT TURN LANE




## 4 LANE TWO-WAY
## UNDIVIDED




## 4 LANE TWO-WAY
## CONTINUOUS LEFT TURN LANE

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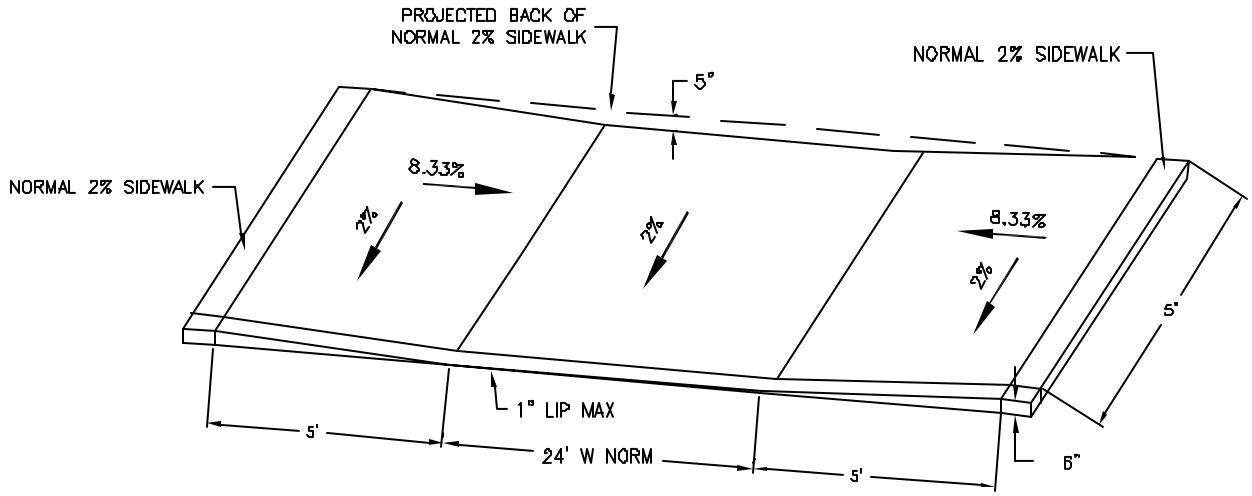
Sheet 10 of

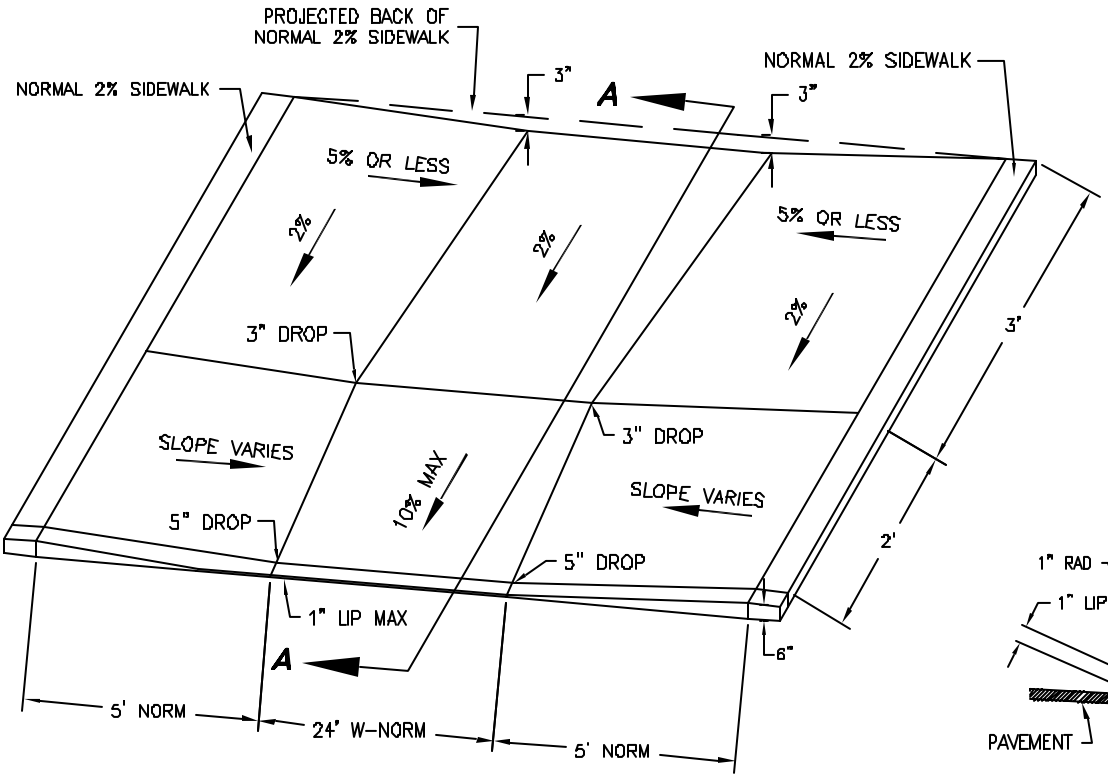
# AUTHORIZED HYDRANT MARKER INSTALLATION LOCATIONS

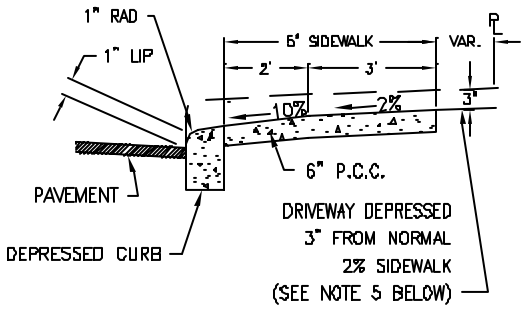
| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 11-19-93 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HDT | Hor: NONE Vert: NONE |




## DRIVEWAY APPROACH WITH CURB-LINE WALK

*OPTION #1 OF 3 - 2% CROSS SLOPE*




## DRIVEWAY APPROACH WITH CURB-LINE WALK

*OPTION #2 OF 3 - SPLIT 2%/10% CROSS SLOPE*

**SECTION A-A**

NO SCALE

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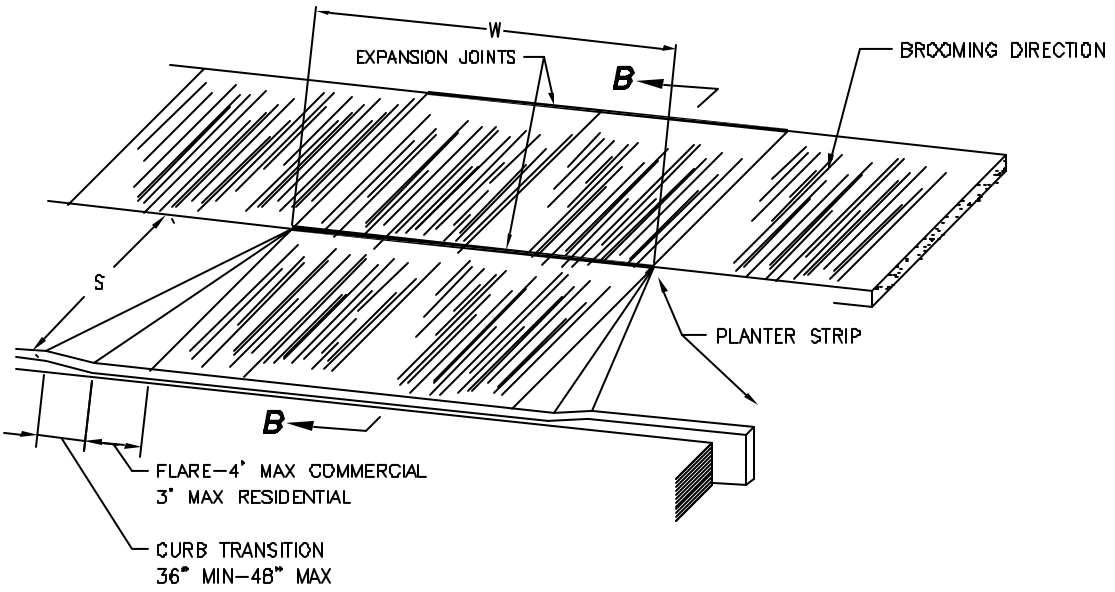
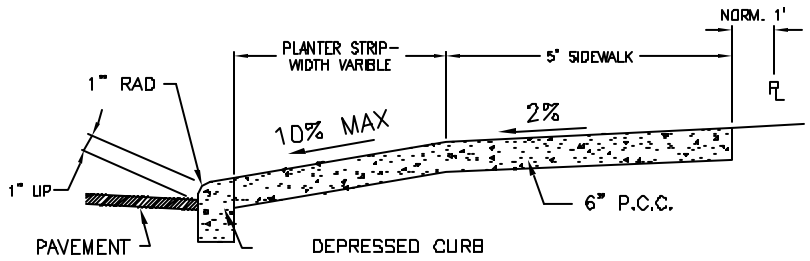
Sheet 11A of

# STANDARD DRAWING ACCESSIBLE ROUTE DRIVEWAYS DETAIL

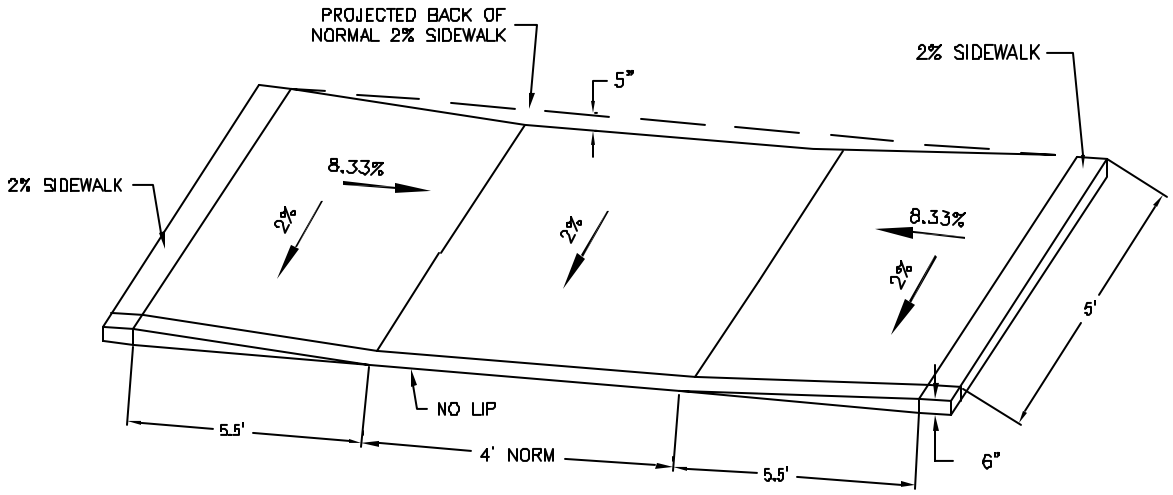
| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 2-9-98 | Revised: 10-98 |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. LJR | Hor: NONE Vert: NONE |




## DRIVEWAY APPROACH WITH PROPERTY-LINE WALK




**SECTION B-B**
NO SCALE




## CURBLINE SIDEWALK WHEELCHAIR RAMP DETAIL

*(FOR CORNERS AND STRAIGHT WALKS)*
*RAMP OPTION #1 OF 3 - 2% CROSS SLOPE*

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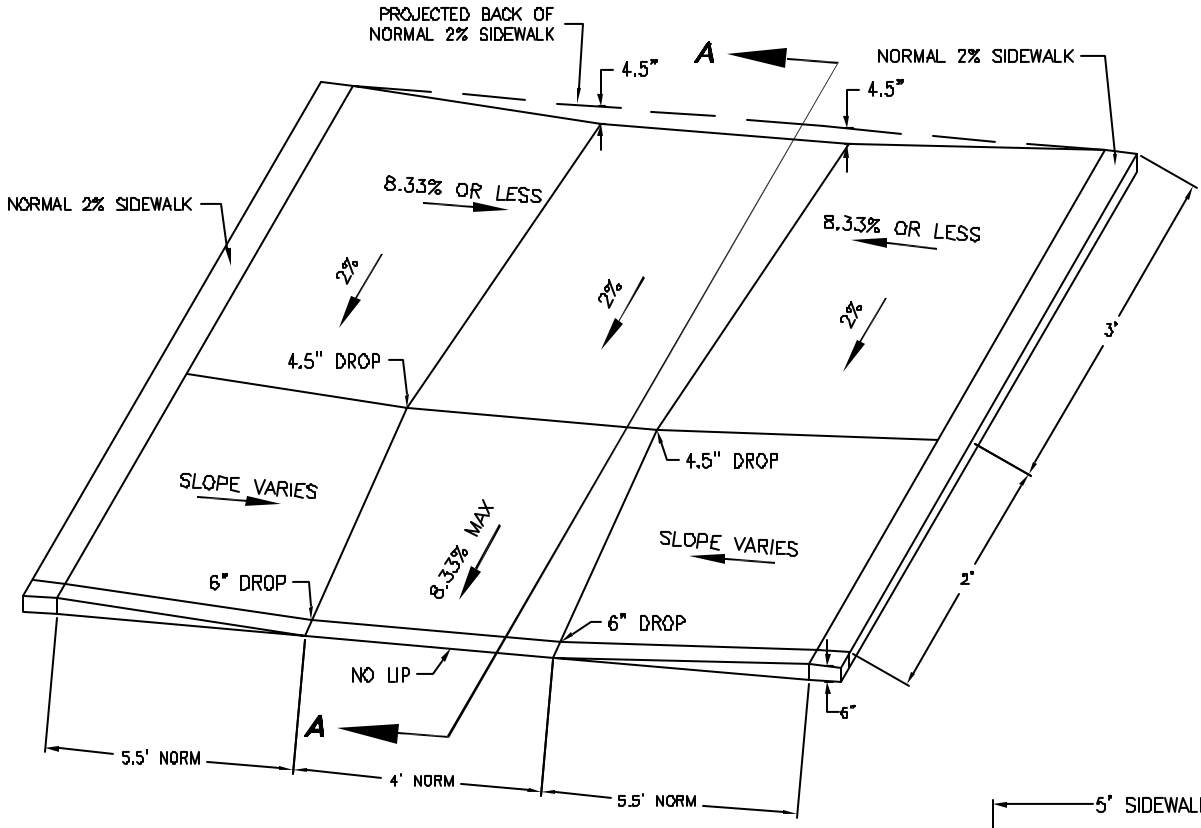
Standard 11B

# STANDARD CURBED SECTION DRIVEWAY

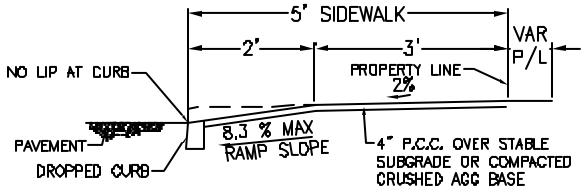
| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 11-22-83 | Revised: 10-88 |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT/LJR | Hor: NONE Vert: NONE |




## CURBLINE SIDEWALK WHEELCHAIR RAMP DETAIL

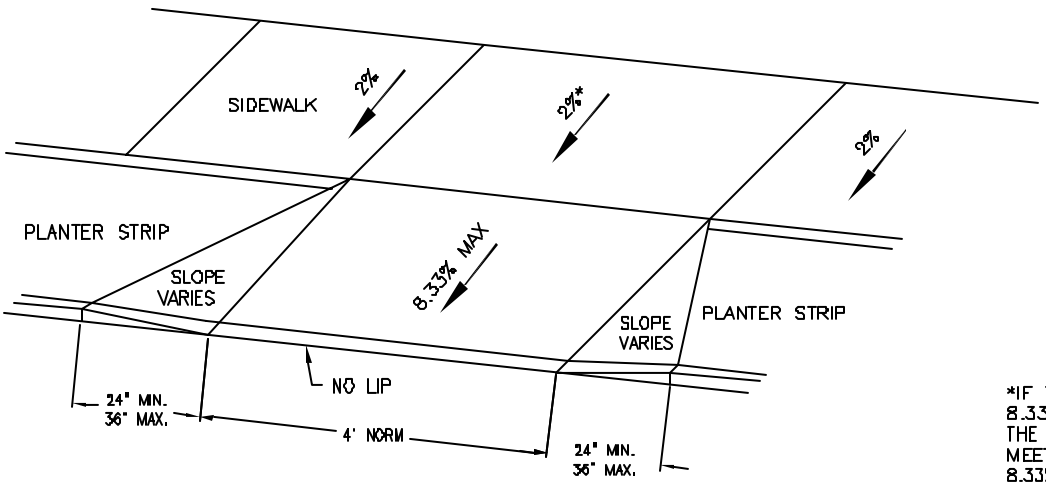
**(FOR CORNERS AND STRAIGHT WALKS)**

**RAMP OPTION #2 OF 3 - SPLIT 2/8.33% CROSS SLOPE**




**SECTION A-A**

**NO SCALE**




*IF THE EXISTING SIDEWALK IS MORE THAN 8.33% HIGHER THAN THE TOP OF CURB, THE SIDEWALK SECTION WHERE THE RAMP MEETS MUST BE LOWERED TO HOLD THE 8.33% MAX ON THE RAMP.

## PROPERTY-LINE SIDEWALK WHEELCHAIR RAMP DETAIL

**RAMP OPTION #3 OF 3 - 8.33% MAX CROSS SLOPE**

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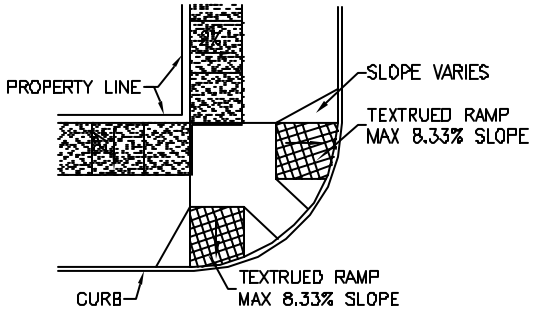
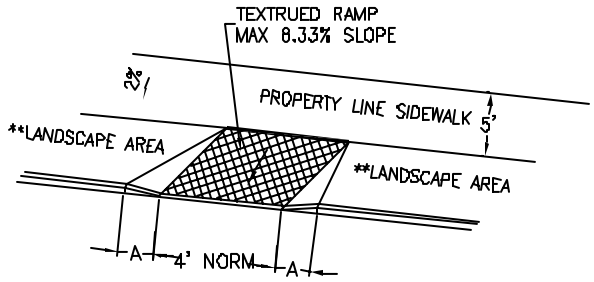
Sheet 11C of

# STANDARD DRAWINGS
# RAMP DETAILS

| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 8-98 | Revised: 10-98 |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. LJR | Hor: NONE Vert: NONE |




## END RAMPS
### (PROPERTY-LINE WALKS)

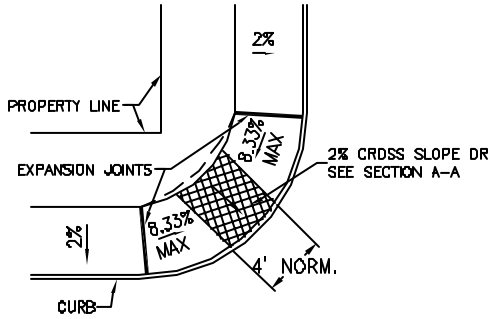



A=24" MIN., 36" MAX.

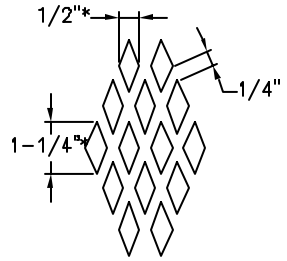
## PROPERTY LINE
## SIDEWALK RAMP DETAIL

NOTE:

** IF THE "LANDSCAPED AREA" IS PAVED, TREAT CURB TRANSITION LENGTH AND SURFACE TEXTURING LIMITS THE SAME AS CURBLINE SIDEWALK RAMP DETAIL.




## CENTER RAMP
### (CURB-LINE WALKS)




* NOMINAL DIMENSIONS

## RAMP TEXTURE DETAIL

## LEGEND

——— EXPANSION JOINTS

PORTION OF RAMP THAT IS TEXTURED

NOTE:

RAMP TEXTURING IS TO BE DONE WITH AN EXPANDED METAL GRATE PLACED AND REMOVED FROM WET CONCRETE TO LEAVE A DIAMOND PATTERN AS SHOWN OR APPROVED EQUAL DIAMOND PATTERN. THE LONG AXIS OF THE DIAMOND PATTERN SHALL BE PERPENDICULAR TO THE CURB. GROOVES SHALL BE 1/8" DEEP AND 1/4" WIDE. THE TEXTURED PORTION OF THE RAMP SHALL BE 5 FEET MINIMUM LENGTH MEASURED PERPENDICULAR TO THE CURB.

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Sheet 11D of

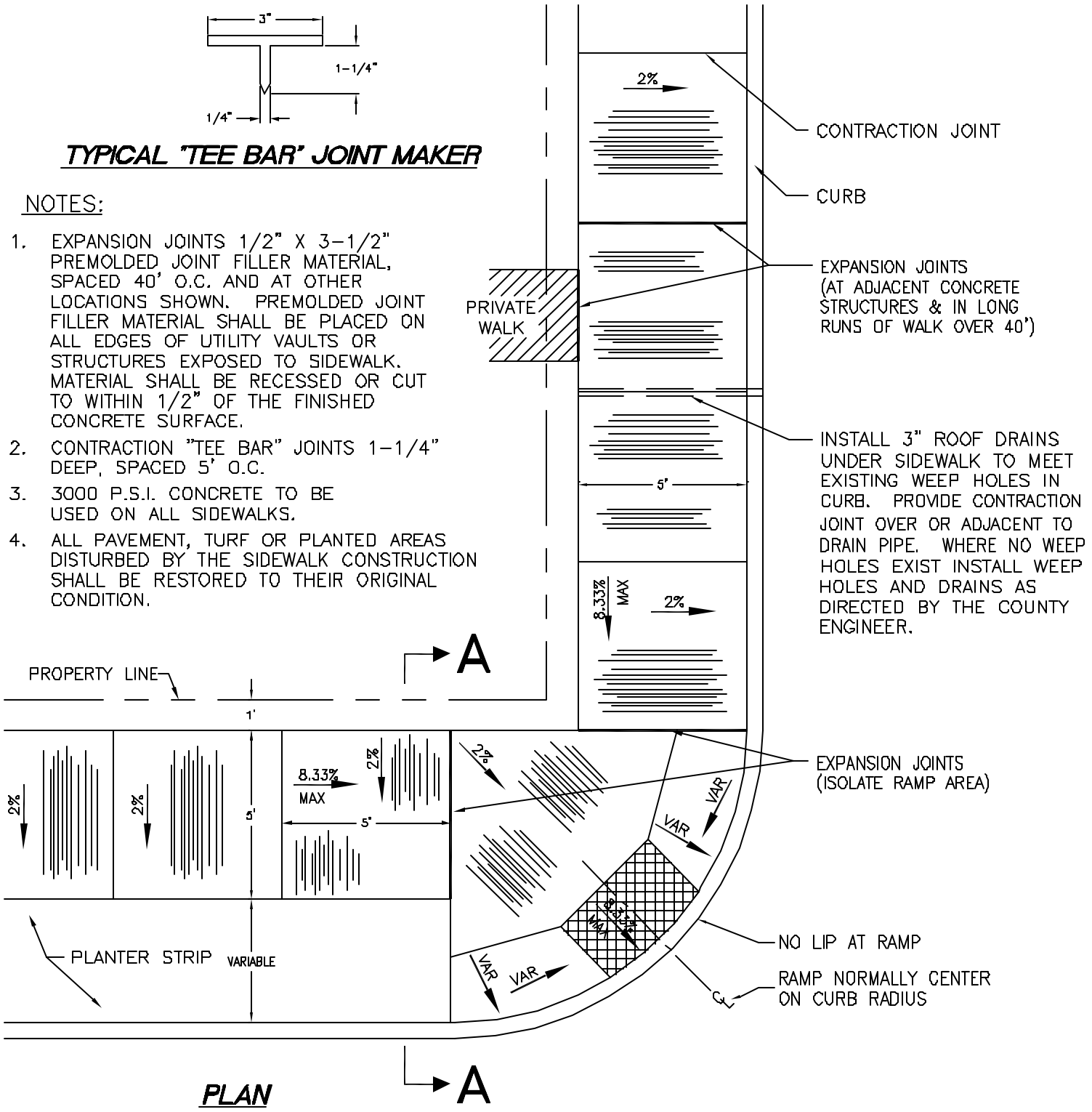
# WHEELCHAIR RAMP LAYOUT AND TEXTURING

| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 12-97 | Revised: 8-98 |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. LJR | Hor: NONE Vert: NONE |

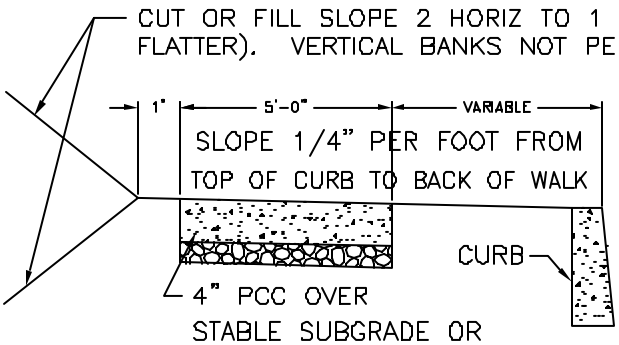
## TYPICAL "TEE BAR" JOINT MAKER

NOTES:

1. EXPANSION JOINTS 1/2" X 3-1/2" PREMOLDED JOINT FILLER MATERIAL, SPACED 40' O.C. AND AT OTHER LOCATIONS SHOWN. PREMOLDED JOINT FILLER MATERIAL SHALL BE PLACED ON ALL EDGES OF UTILITY VAULTS OR STRUCTURES EXPOSED TO SIDEWALK. MATERIAL SHALL BE RECESSED OR CUT TO WITHIN 1/2" OF THE FINISHED CONCRETE SURFACE.
2. CONTRACTION "TEE BAR" JOINTS 1-1/4" DEEP, SPACED 5' O.C.
3. 3000 P.S.I. CONCRETE TO BE USED ON ALL SIDEWALKS.
4. ALL PAVEMENT, TURF OR PLANTED AREAS DISTURBED BY THE SIDEWALK CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.




## PLAN




## SECTION A-A

**Marion County Dept. of Public Works**
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Sheet 11E of

# MISC. SIDEWALK DETAILS

| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 11-26-93 | Revised: 10-98 |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT/LJR | Hor: NONE Vert: NONE |

NOTES:

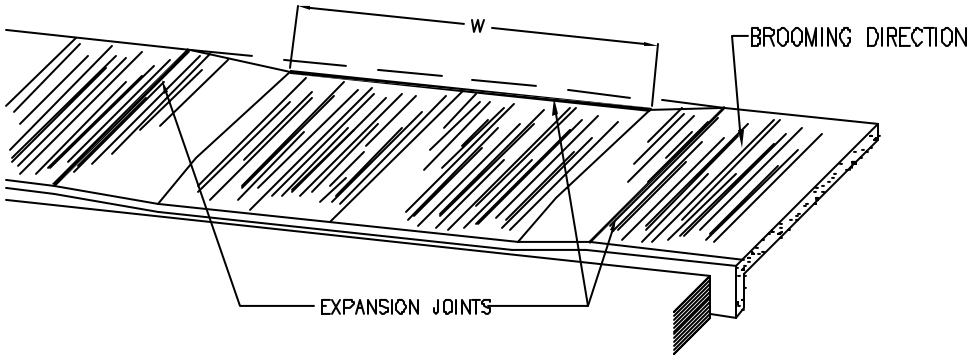
A. APPROACH WIDTH (W):
RESIDENTIAL 12'–24'
COMMERCIAL* 28'–40'

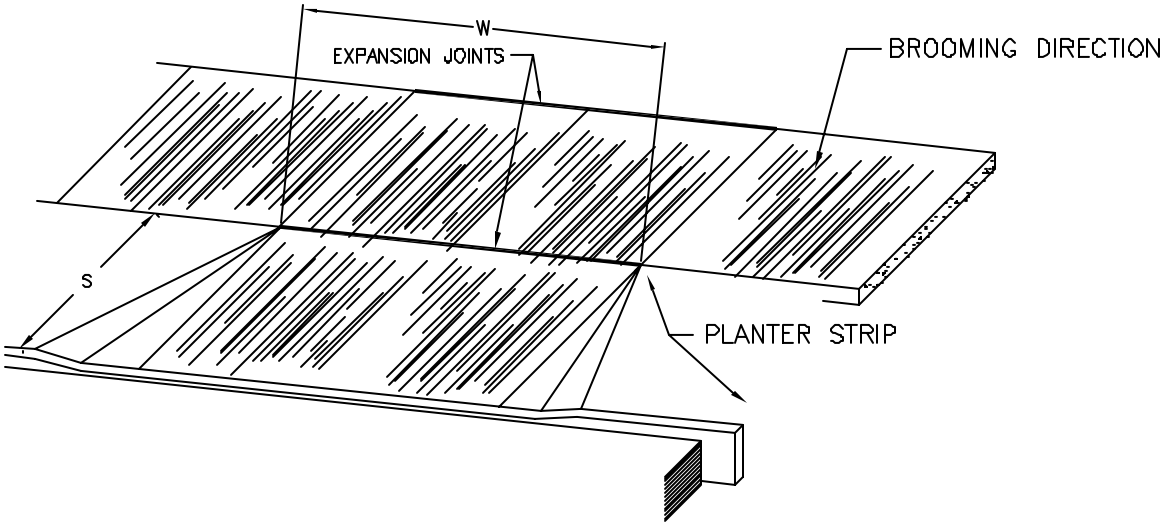
* FOR COMMERCIAL DRIVEWAYS, W SHALL BE SET BY THE DIRECTOR OF PUBLIC WORKS ON A SITE SPECIFIC BASIS.

B. FLARE
A. 36" FOR COMMERCIAL AND INDUSTRIAL WHERE TRAVELED LANE IN STREET IS ADJACENT TO THE CURB. (I.E. PARKING PROHIBITED).

B. NONE REQUIRED FOR RESIDENTIAL AND COMMERCIAL WHERE PARKING IS ALLOWED IN STREET ADJACENT TO CURB.

C. BROOMING DIRECTIONS

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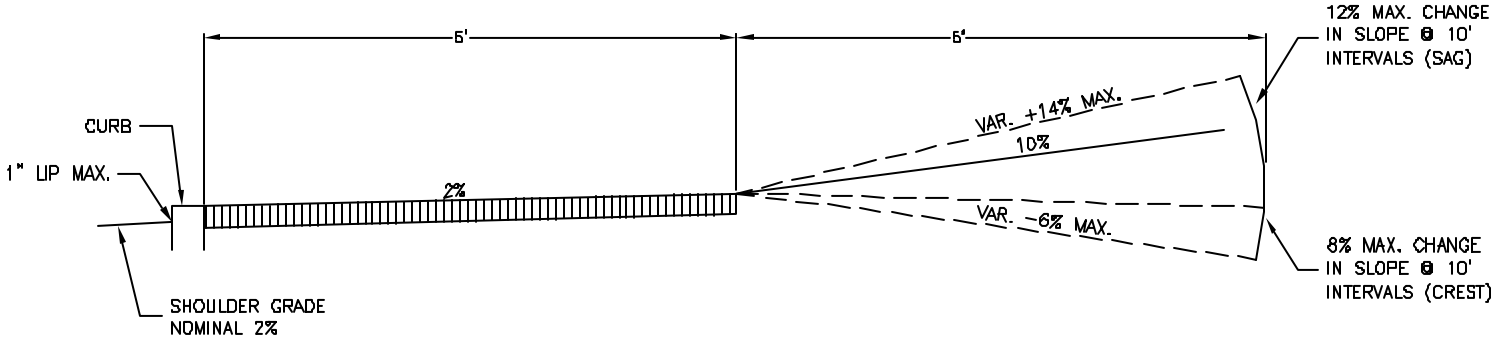
Engineering Tel. 588-5036 Salem, Oregon

Page 11F

# STANDARD CURBED SECTION DRIVEWAY

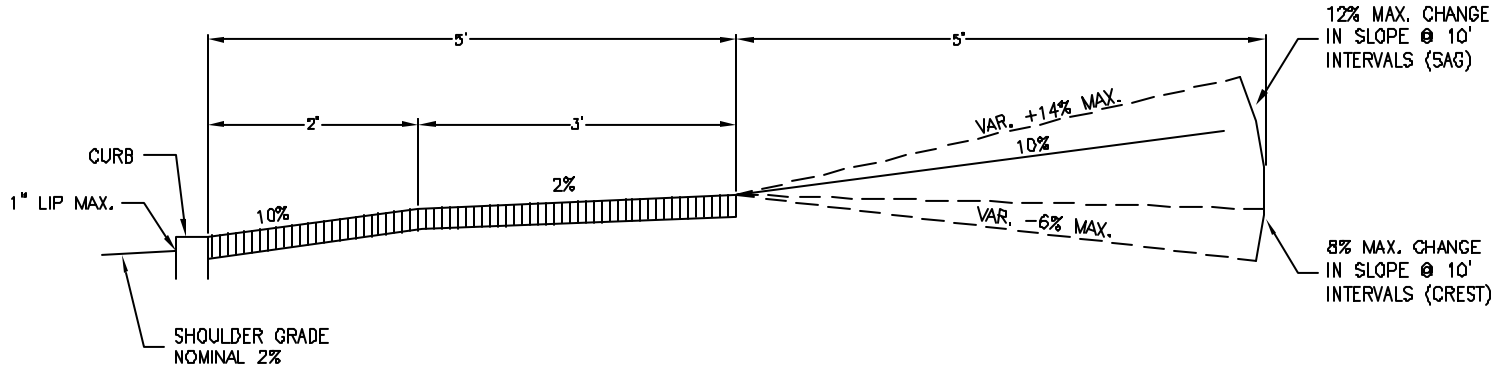
| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 8-J-98 | Revised: |
| Reviewed By--Surveyc | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. LJR | Hor: NONE Vert: NONE |

D. MATCHING EXISTING DRIVEWAY SLOPES.




## 2% SIDEWALK

**-5% STREET SLOPE +7% MATCHING GRADE=12% MAX.**




## SPLIT SLOPE SIDEWALK

NOTES:

WHEN EXISTING DRIVEWAY CANNOT BE MATCHED TO THE NEW APPROACH WITHIN SLOPE LIMITATION AS SHOWN, ADJUST THE EXISTING DRIVEWAY; NOT THE CURB, APPROACH OR SIDEWALK.

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Sheet 11G of

# STANDARD DRAWING
# MATCHING EXISTING DWY SLOPES

| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 8-J-98 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. LJR | Hor: NONE Vert: NONE |

## E. CURB REMOVAL

WHEN AN EXISTING FULL HEIGHT CURB SECTION IS REMOVED FOR CONSTRUCTION, THE FOLLOWING PROVISIONS SHALL APPLY:

1. VERTICAL SAW CUTS SHALL BE MADE OUTSIDE THE EDGES OF THE CURB TRANSITIONS (THIS APPLIES TO BOTH TYPE A AND C CURBS). WHERE WEEP HOLES ARE TO BE INSTALLED, ADDITIONAL CURB WILL NEED TO BE REMOVED.

2. TYPE A "CURB AND GUTTERS": THE ENTIRE CURB AND GUTTER SHALL BE REMOVED AND REPOURED; OR, A LONGITUDINAL VERTICAL CUT SHALL BE MADE AT THE FLOW LINE OF THE GUTTER LEAVING THE APRON IN TACT. ALL MATERIAL IN THE CURB AREA SHALL BE REMOVED TO SUBGRADE AND REPOURED. PROVIDE 6" OF CONCRETE BELOW THE FLOW LINE IN THE CURB AREA.

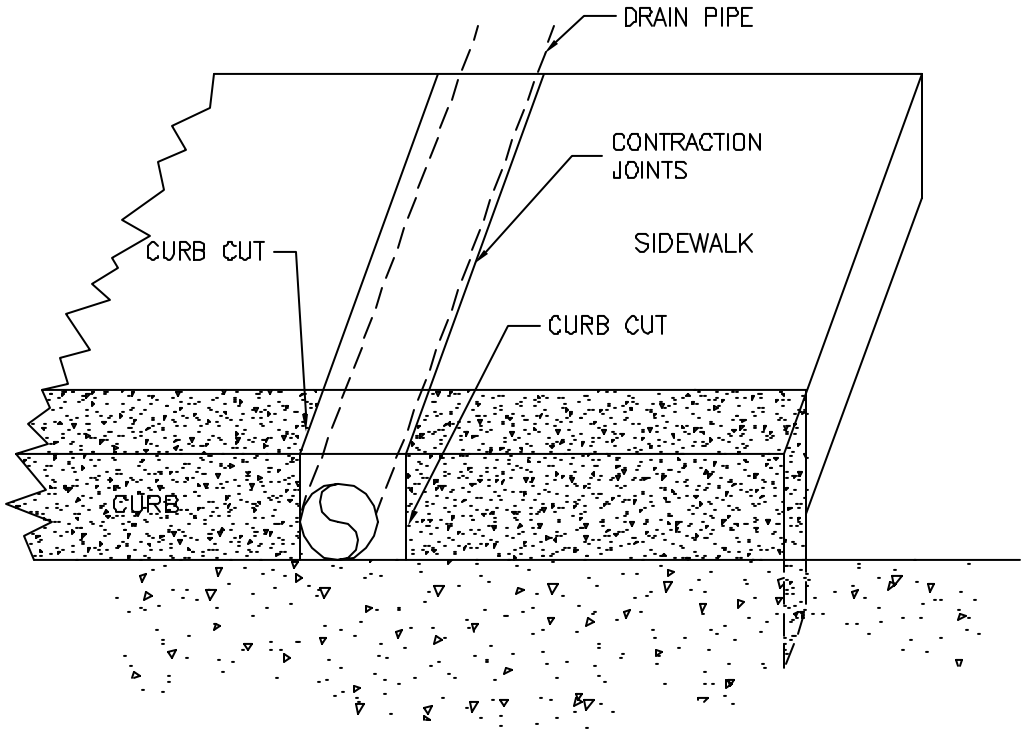
3. TYPE C CURB: THE ENTIRE CURB SHALL BE REMOVED TO FULL DEPTH AND REPOURED; OR , THE CURB SHALL BE BROKEN OUT FROM A POINT 2" BELOW THE ADJACENT ASPHALT DOWNWARD AND AWAY FROM THE STREET AT NO LESS THAN A 45° ANGLE AND REPOURED. PROVIDE 10" OF CONCRETE BELOW THE ASPHALT IN THE CURB AREA.

## F. DRAIN LINES

WEEP HOLES FOR DRAINS ARE TO EXIT IN A FULL HEIGHT CURB SECTION OUTSIDE THE CURB TRANSITION AREA OF DRIVEWAY. THE DRAIN LINES IN THE SIDEWALK ARE TO BE LOCATED UNDER OR ADJACENT TO A CONTRACTION JOINT. DRAIN LINES ARE TO CROSS SIDEWALKS AT 90° (PERPENDICULAR) TO THE SIDEWALK, NOT ASKEW.

WHERE CURB CUTS ARE MADE FOR CONSTRUCTION OF A DRIVEWAY APPROACH, ONE DRAIN LINE IS ALLOWABLE IN THE CURB TRANSITION AREA IF THE LINE IS PLACE DIRECTLY ADJACENT TO THE CURB CUT (HIGHEST POINT IN THE TRANSITION).

ALL DRAIN LINES ARE TO BE PLACED DOWN AT THE FLOW LINE OF THE GUTTER.




NOTE:

DRAIN PIPE IS TO BE PLACED ADJACENT TO ONE OF THE CURB CUTS. A CONTRACTION JOINT IS TO BE SCORED ALONG BOTH CUTS. THE PIPE IS TO BE DOWN TO THE FLOW LINE OF THE GUTTER.

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Sheet 11H of

# STANDARD DRAWING CURB REMOVAL AND DRAIN LINES

| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 8-1-98 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. LJR | Hor: NONE Vert: NONE |

## G. DEEP SCORING, SHINING & EXPANSION JOINTS

DEEP SCORED CONTRACTION JOINTS ARE TO BE MADE EVERY 5 FEET OF SIDEWALK AND EVERY 15 FEET OF CURB. WHERE THE CURB IS CUT TO ALLOW FOR A DRAIN LINE, THE DEEP SCORE IS TO BE MADE AT BOTH CURB EDGES, NOT OVER THE PIPE. SEE NOTE E ABOVE.

DEEP SCORED CONTRACTION JOINTS ARE TO BE FORMED TO A DEPTH OF 1/3 OF THE THICKNESS OF CONCRETE AND A WIDTH OF ABOUT 1/8 INCH.

AFTER BROOMING, TOOL ROUND & SHINE THE OUTER EDGE OF THE SIDEWALK (NOT THE CONTRACTION JOINTS) & THE OUTER EDGE OF THE DRIVEWAY IN THE PLANTER STRIP.

EXPANSION JOINTS USING 1/2" X 3 1/2" PRE-MOLDED JOINT FILLER MATERIAL ARE REQUIRED:

A. ALONG THE SIDEWALK AT THE DRIVEWAY (A PROPERTY LINE SIDEWALK WILL REQUIRE EXPANSION JOINTS ON BOTH SIDES OF THE SIDEWALK);

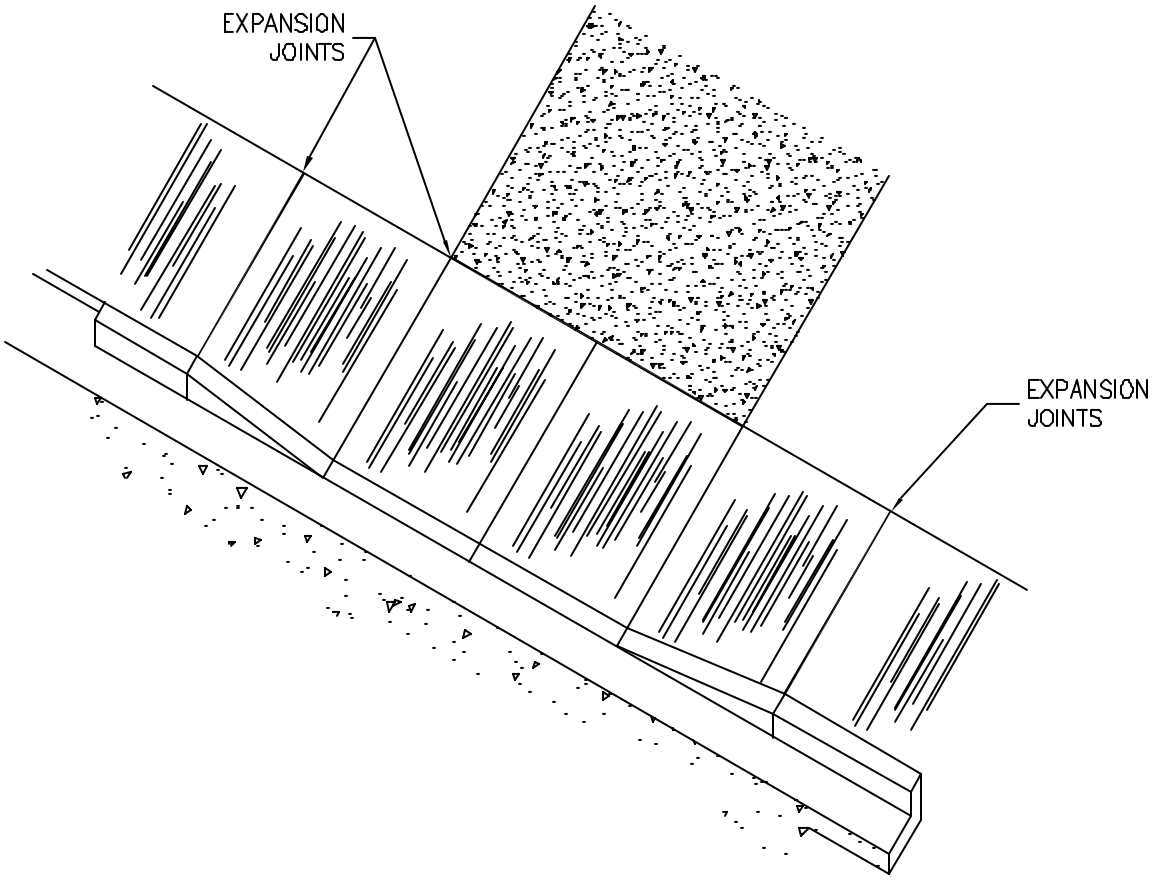
B. ALONG THE SIDEWALK WHERE IT INTERSECTS ANOTHER SIDEWALK;

C. ON THE EDGES OF UTILITY VAULTS OR OTHER STRUCTURES EXPOSED TO THE SIDEWALK;

D. IN THE SIDEWALK TO ISOLATE A WHEELCHAIR RAMP (SEE SHEET 5);

E. ON CURB-SIDE SIDEWALKS PLACED AT 90 DEGREES ACROSS THE SIDEWALK AT THE BEGINNING (TOP) OF THE CURB TRANSITION; AND

F. IN SIDEWALKS WITH THE LONG RUNS. NO RUNNING PIECE OF SIDEWALK SHALL BE MORE THAN 40' WITHOUT AN EXPANSION JOINT.




## H. CONCRETE SPECIFICATIONS

A MINIMUM OF 3,000 PSI CONCRETE SHALL BE USED FOR ALL CURBS, DRIVEWAY APPROACHES AND SIDEWALKS. CONCRETE SHALL BE AIR ENTRAINED, TOTAL AIR CONTENT (PERCENT BE VOLUME OF CONCRETE) SHALL BE NOT LESS THAN 5 PERCENT OR MORE THAN 7 PERCENT.

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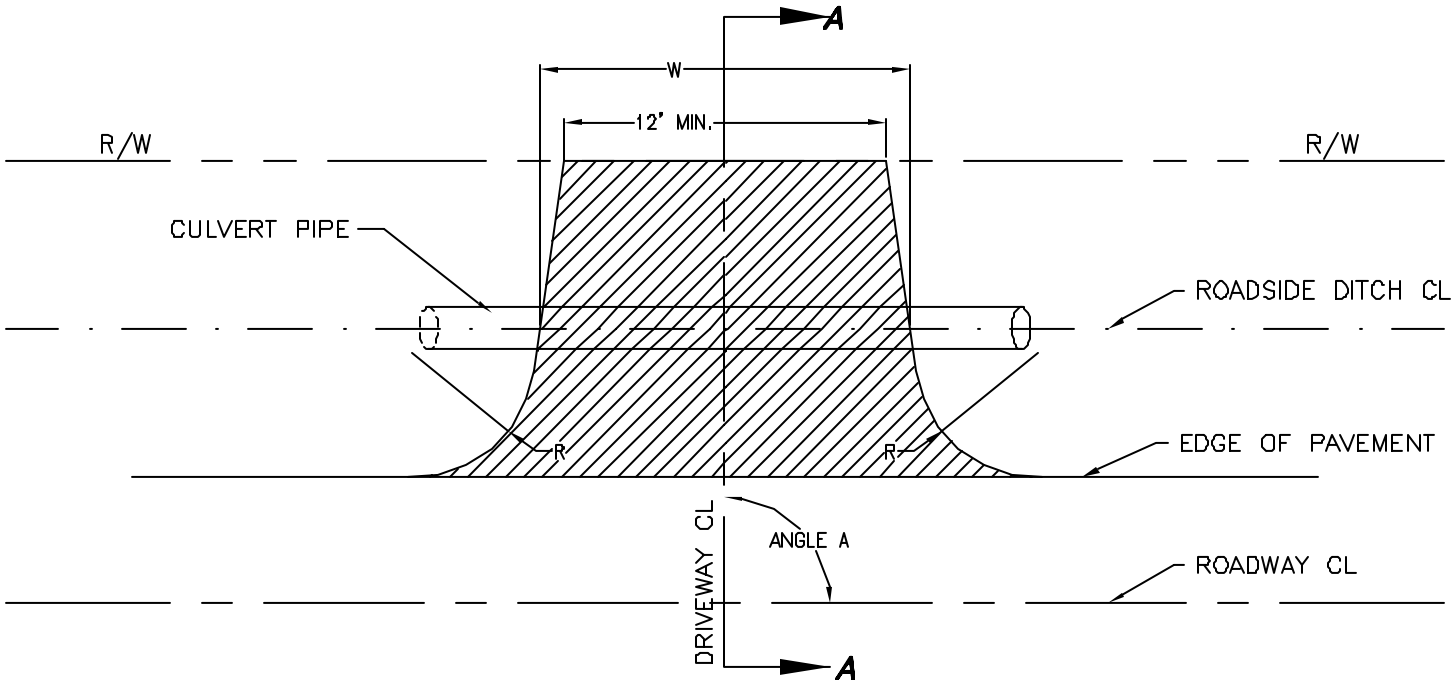
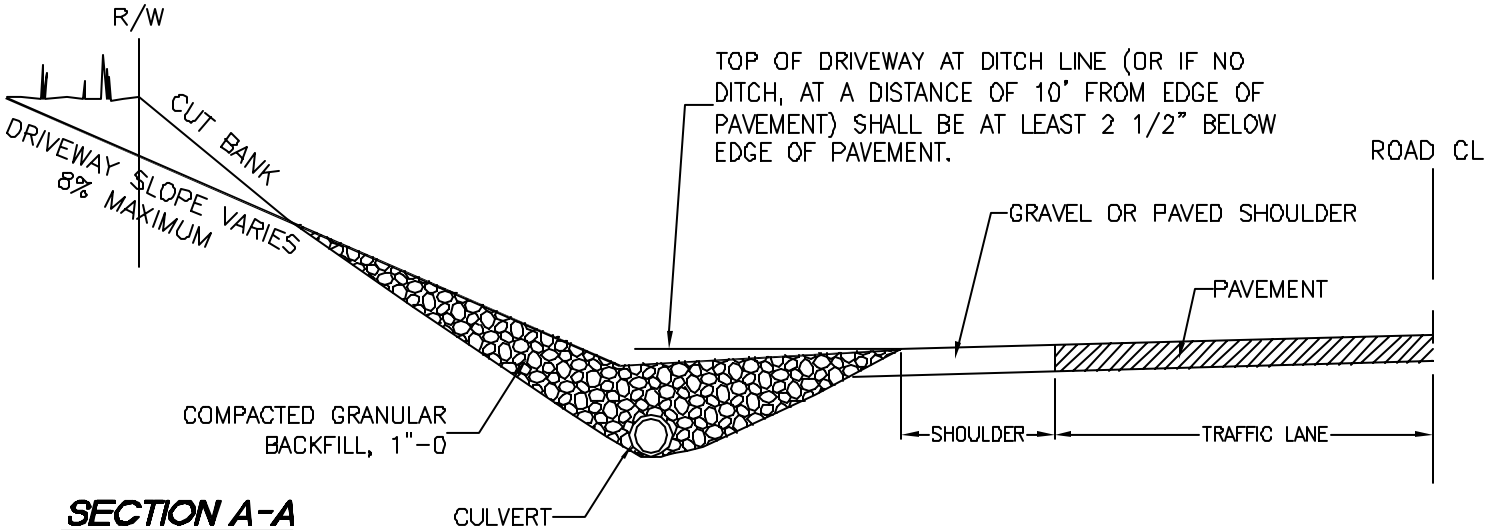
Sheet 11 of 11

# SIDEWALK / RAMP FINISHING AND EXPANSION JOINT DETAILS

| | | | |
|---|---|---|---|
| Des. TJ | Eng: | Date: 8-1-98 | Revised: 10-98 |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. LJR | Hor: NONE Vert: NONE |

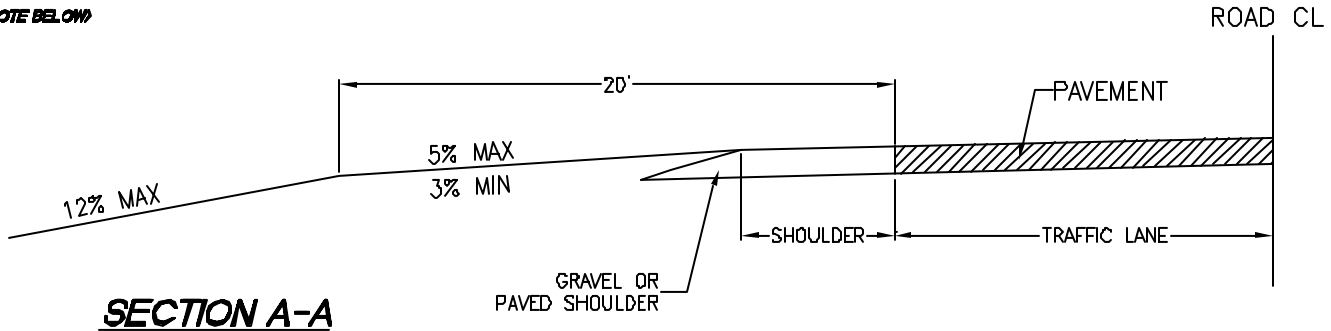



## SECTION A-A

***WHEN SLOPING TO THE ROAD***

***(SEE NOTE BELOW)***




## SECTION A-A

***WHEN SLOPING FROM THE ROAD***

NOTE:

DRIVEWAY SHALL BE CROWNED (ABOUT 3" HIGHER IN THE MIDDLE TO SHED WATER TO THE SIDES) AND SHALL HAVE SIDE DITCHES. STEEPER DRIVEWAYS MAY REQUIRE ASPHALT PAVING & SLOTTED DRAINS ACROSS THE DRIVEWAY TO PICK UP DRAINAGE BEFORE IT FLOWS TO THE ROAD.

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Page 11J

# DRIVEWAY ACCESS TO NON-CURBED (TURNPIKE) STREET

| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 11-22-83 | Revised: 3-98 LJR |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HDT | Hor: NONE Vert: NONE |

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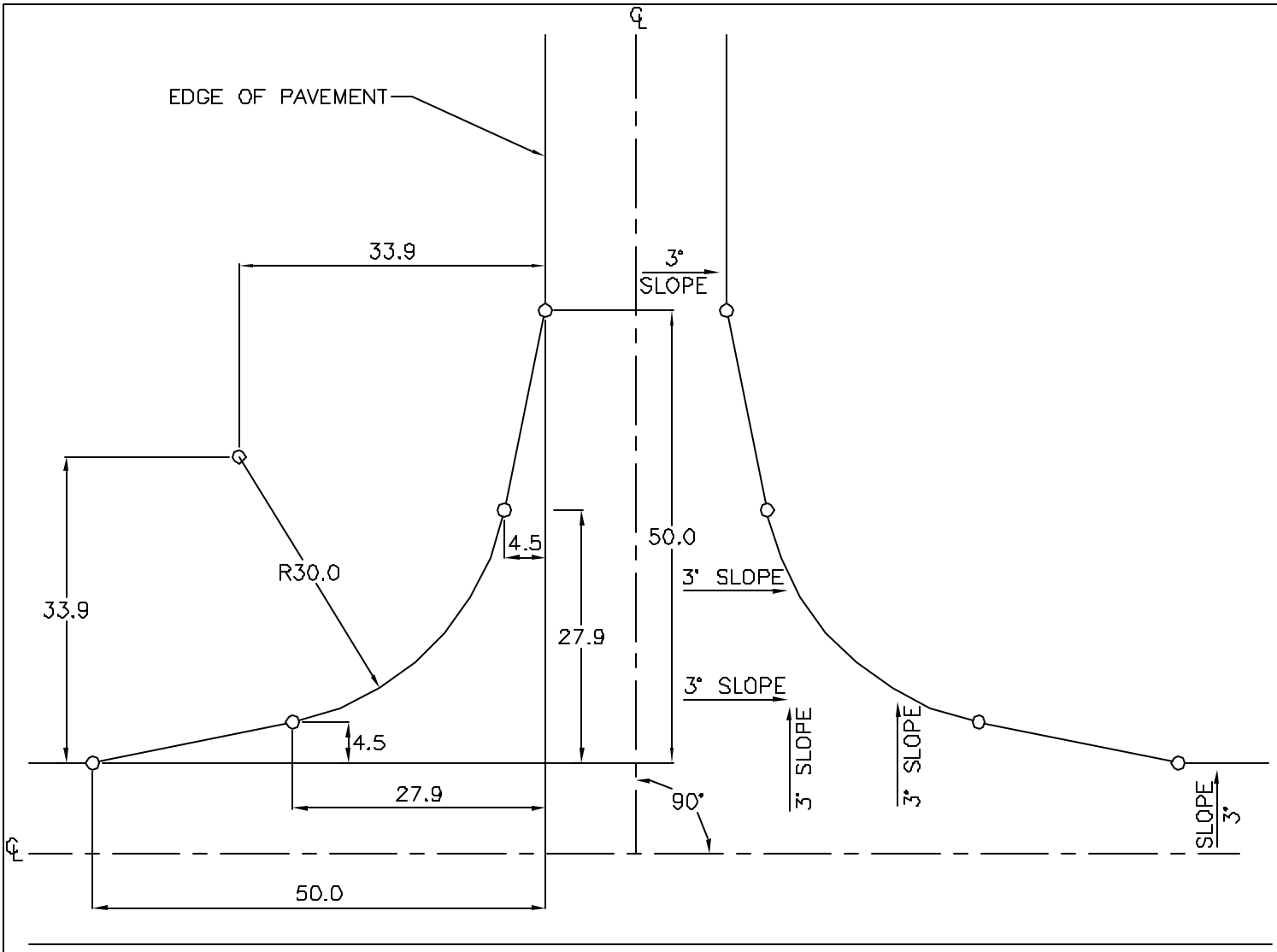


## NOTES:

1. DIMENSIONS GIVEN ARE FOR A 90° ANGLE OF INTERSECTION. FOR ANGLES DEVIATING BY MORE THAN 5°, SEE STANDARD DRAWING NUMBER 13.
2. SURFACING AND BASE COURSE OF THE INTERSECTION, INCLUDING THE FLARE AREA, SHALL CONFORM TO SECTION IV OF THE ENGINEERING STANDARDS.

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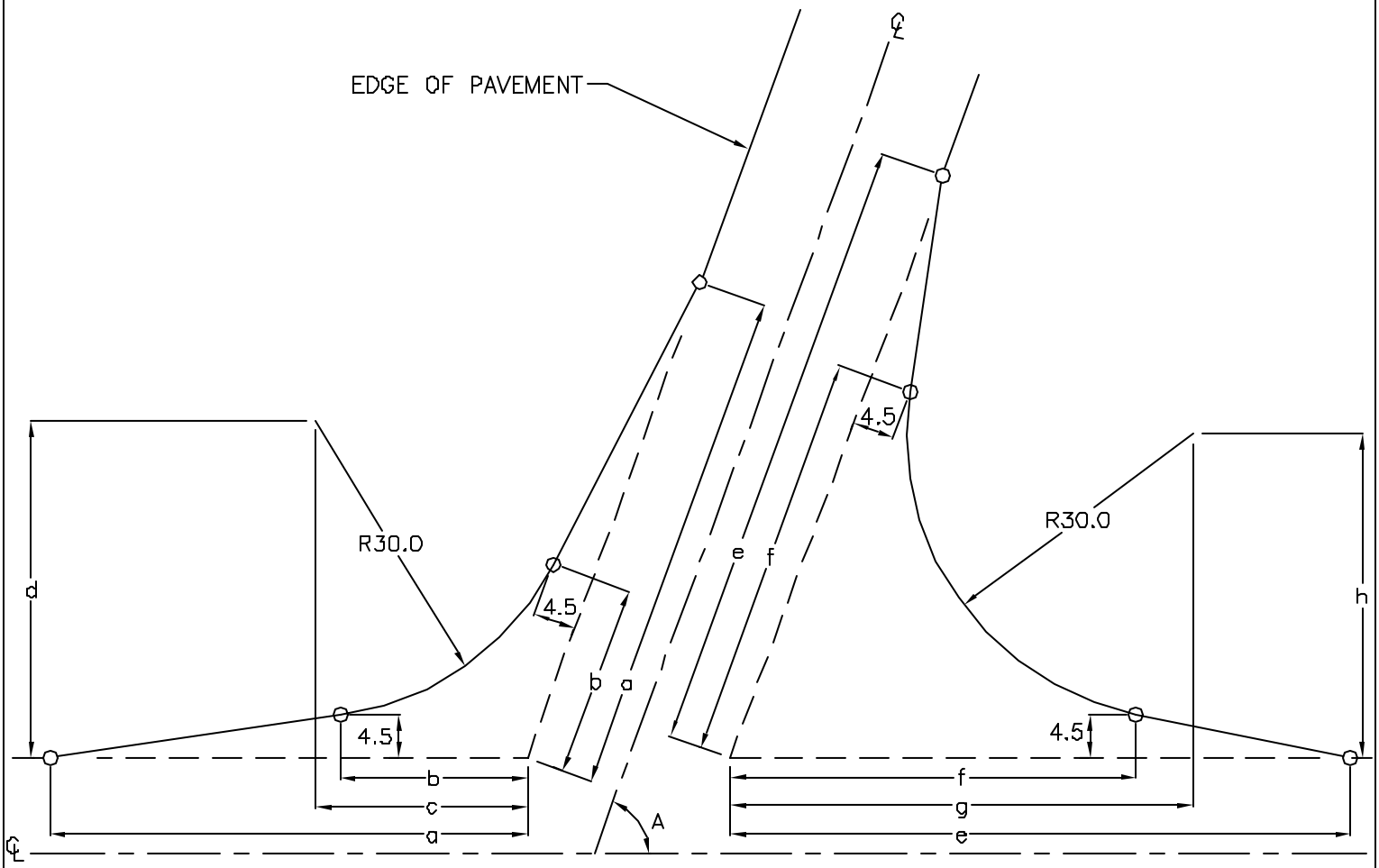
Page 12

# 90° ARTERIAL INTERSECTIONS AND MAJOR COMMERCIAL-INDUSTRIAL DRIVEWAYS

| Des. | Eng: | Date: 11-22-83 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |




NOTES:

1. SURFACING AND BASE COURSE OF THE INTERSECTION, INCLUDING THE FLARE AREA, SHALL CONFORM TO SECTION IV OF THE ENGINEERING STANDARDS.

| ANGLE A | a | b | c | d | e | f | g | h |
|---|---|---|---|---|---|---|---|---|
| 60° | 50.0 | 15.9 | 19.8 | 34.2 | 74.0 | 52.5 | 58.7 | 33.9 |
| 70° | 50.0 | 19.5 | 23.9 | 34.2 | 65.0 | 42.8 | 48.5 | 34.0 |
| 80° | 50.0 | 23.6 | 28.6 | 34.1 | 57.0 | 34.5 | 40.4 | 33.9 |
| 90° | 50.0 | 27.9 | 33.9 | 33.9 | =a | =b | =c | =d |
| 100° | 57.0 | 34.5 | 40.4 | 33.9 | 50.0 | 23.6 | 28.6 | 34.1 |
| 110° | 65.0 | 42.8 | 48.5 | 34.0 | 50.0 | 19.6 | 23.9 | 34.2 |
| 120° | 74.0 | 58.7 | 58.7 | 33.9 | 50.0 | 15.9 | 19.8 | 34.2 |

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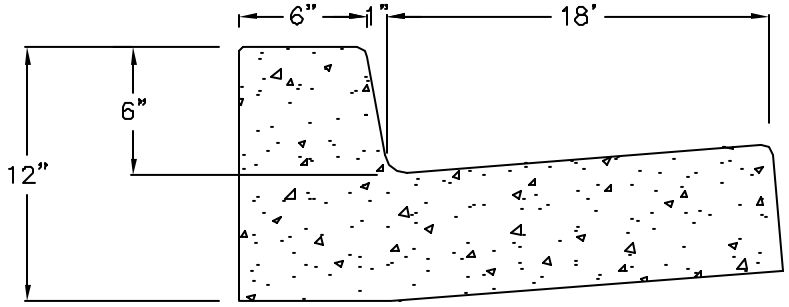
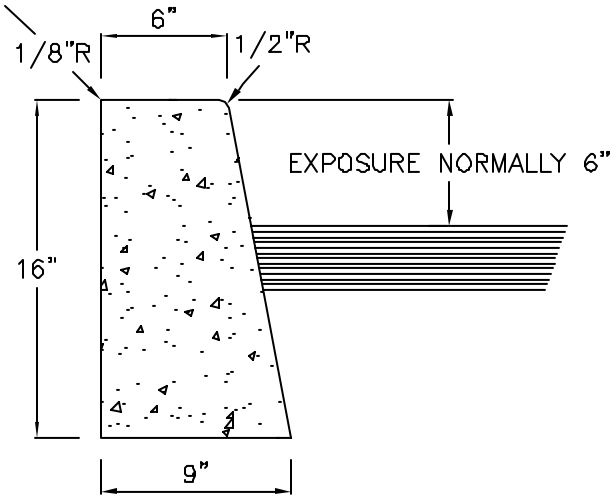
Sheet 13 of

# ARTERIAL INTERSECTIONS AND MAJOR COMMERCIAL-INDUSTRIAL DRIVEWAYS-VARIOUS ANGLES

| Des. | Eng: | Date: 11-23-83 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HDT | Hor: NONE Vert: NONE |




## TYPE "A" CURB AND GUTTER




## TYPE "C" CURB

NOTES:

1. CURBS AND GUTTERS SHOWN MAY BE USED WITH EITHER A.C. OR P.C.C. PAVEMENTS.
2. TRANSITIONS FROM ONE TYPE CURB TO ANOTHER WILL BE DETAILED ON PROJECT PLANS AS NECESSARY.
3. "TEE-BAR" CONTRACTION JOINT TO BE INSTALLED EVERY 15' OF CURB.
4. 3300 P.S.I. CONCRETE TO BE USED FOR ALL CURBS.

| CURB QUANTITIES CU. YD. PER LIN. FT. | |
|---|---|
| TYPE | TYPE |
| A | 0.04942 |
| C | 0.03085 |

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Sheet 14 of

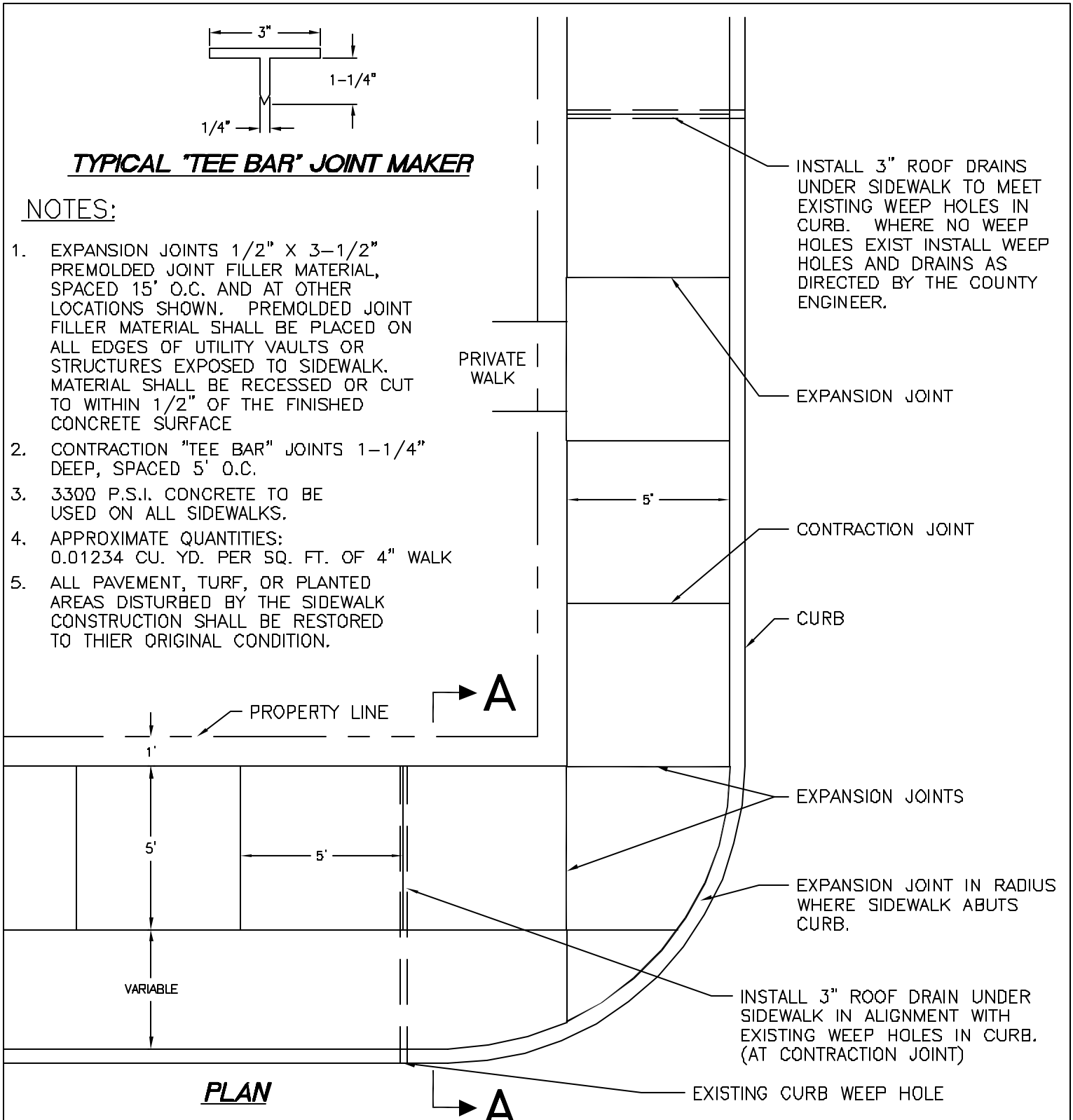
# STANDARD P.C.C. CURB AND GUTTER SECTIONS

| Des. | Eng: | Date: 11-23-83 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HOT | Hor: NONE Vert: NONE |

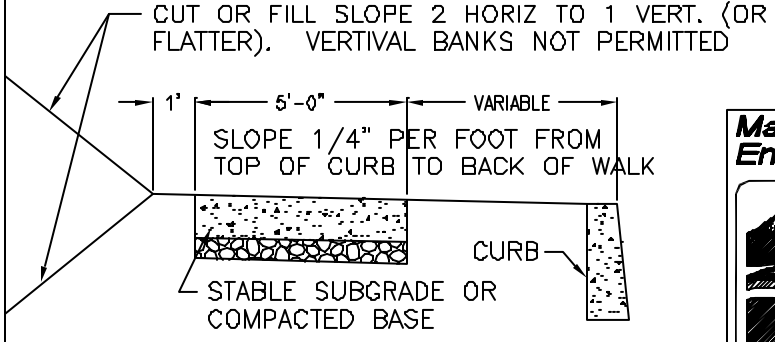
## TYPICAL "TEE BAR" JOINT MAKER

NOTES:

1. EXPANSION JOINTS 1/2" X 3-1/2" PREMOLDED JOINT FILLER MATERIAL, SPACED 15' O.C. AND AT OTHER LOCATIONS SHOWN. PREMOLDED JOINT FILLER MATERIAL SHALL BE PLACED ON ALL EDGES OF UTILITY VAULTS OR STRUCTURES EXPOSED TO SIDEWALK. MATERIAL SHALL BE RECESSED OR CUT TO WITHIN 1/2" OF THE FINISHED CONCRETE SURFACE
2. CONTRACTION "TEE BAR" JOINTS 1-1/4" DEEP, SPACED 5' O.C.
3. 3300 P.S.I. CONCRETE TO BE USED ON ALL SIDEWALKS.
4. APPROXIMATE QUANTITIES: 0.01234 CU. YD. PER SQ. FT. OF 4" WALK
5. ALL PAVEMENT, TURF, OR PLANTED AREAS DISTURBED BY THE SIDEWALK CONSTRUCTION SHALL BE RESTORED TO THIER ORIGINAL CONDITION.




## PLAN




## SECTION A-A

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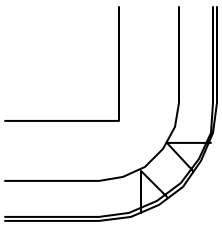
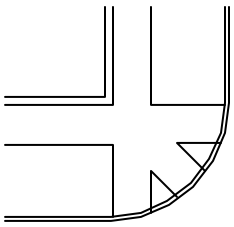
Sheet 15 of

# STANDARD SIDEWALK DETAILS

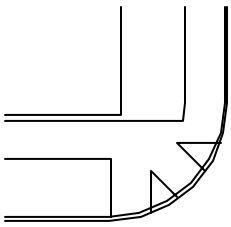
| Des. | Eng: | Date: 11-26-03 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HDT | Hor: NONE Vert: NONE |



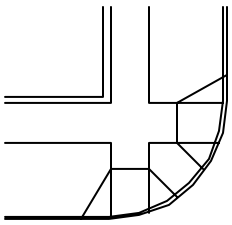
CENTER RAMP
CURB-LINE WALKS



CENTER RAMP
PROPERTY-LINE WALKS



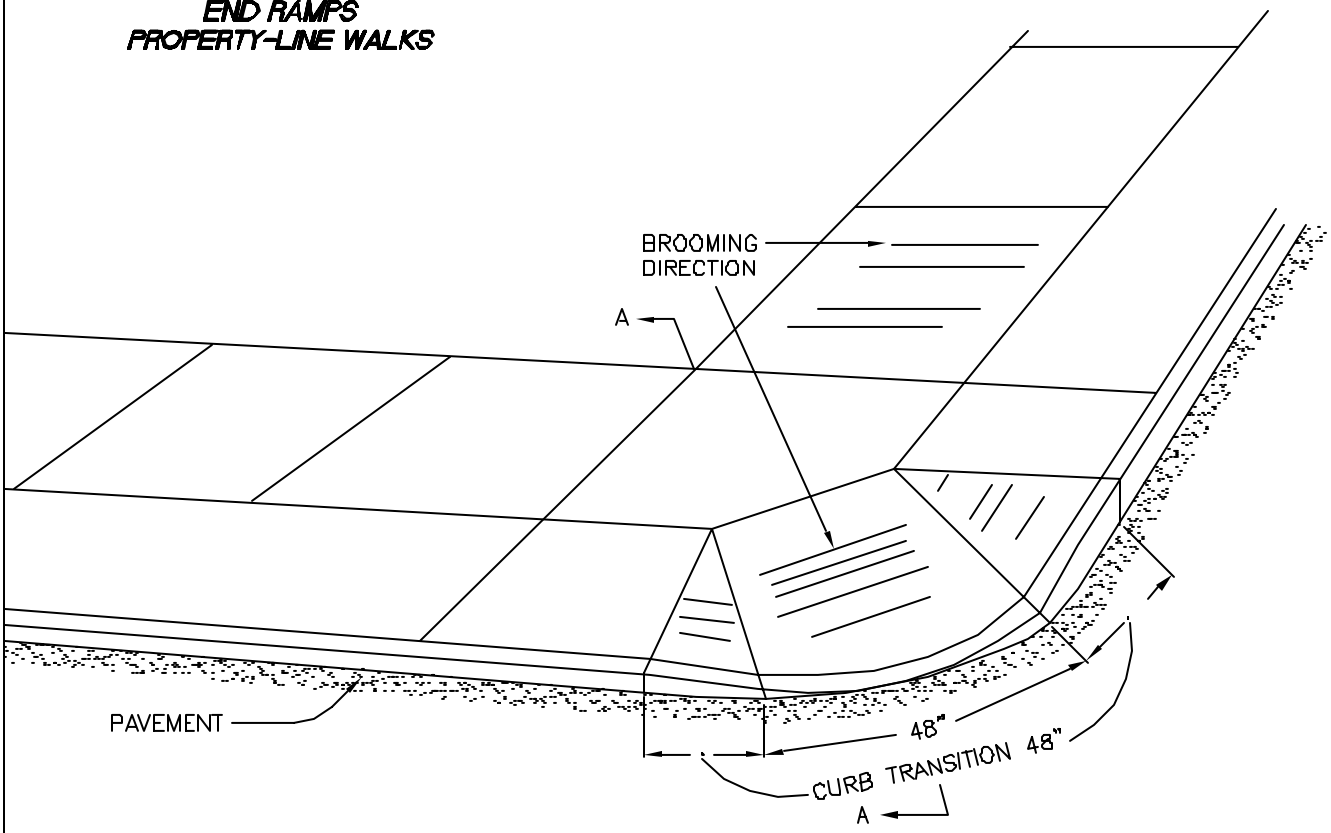
CENTER RAMP, CURB-LINE
AND PROPERTY-LINE WALKS



END RAMPS
PROPERTY-LINE WALKS

# TYPICAL RAMP LOCATIONS

NO SCALE

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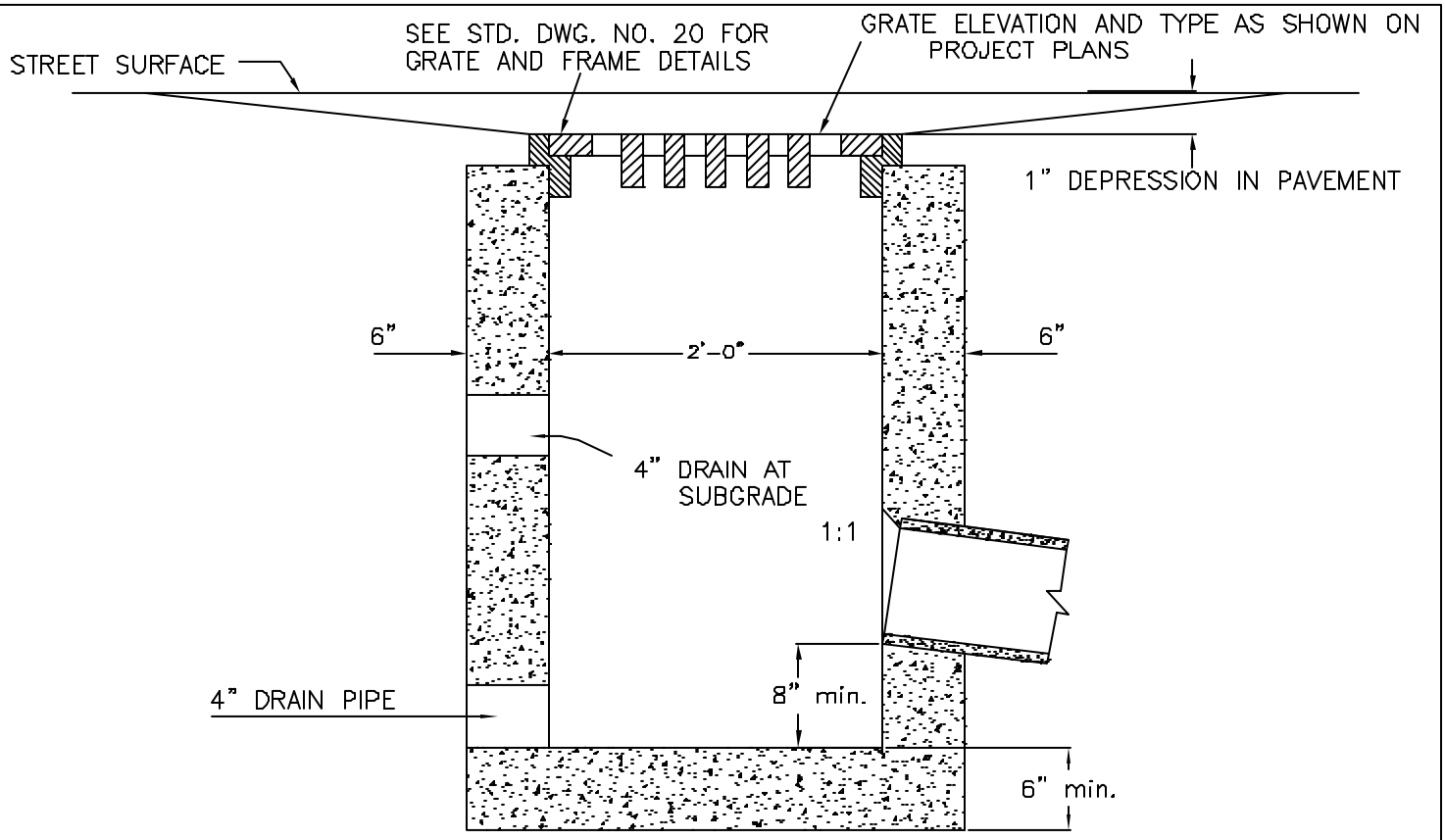
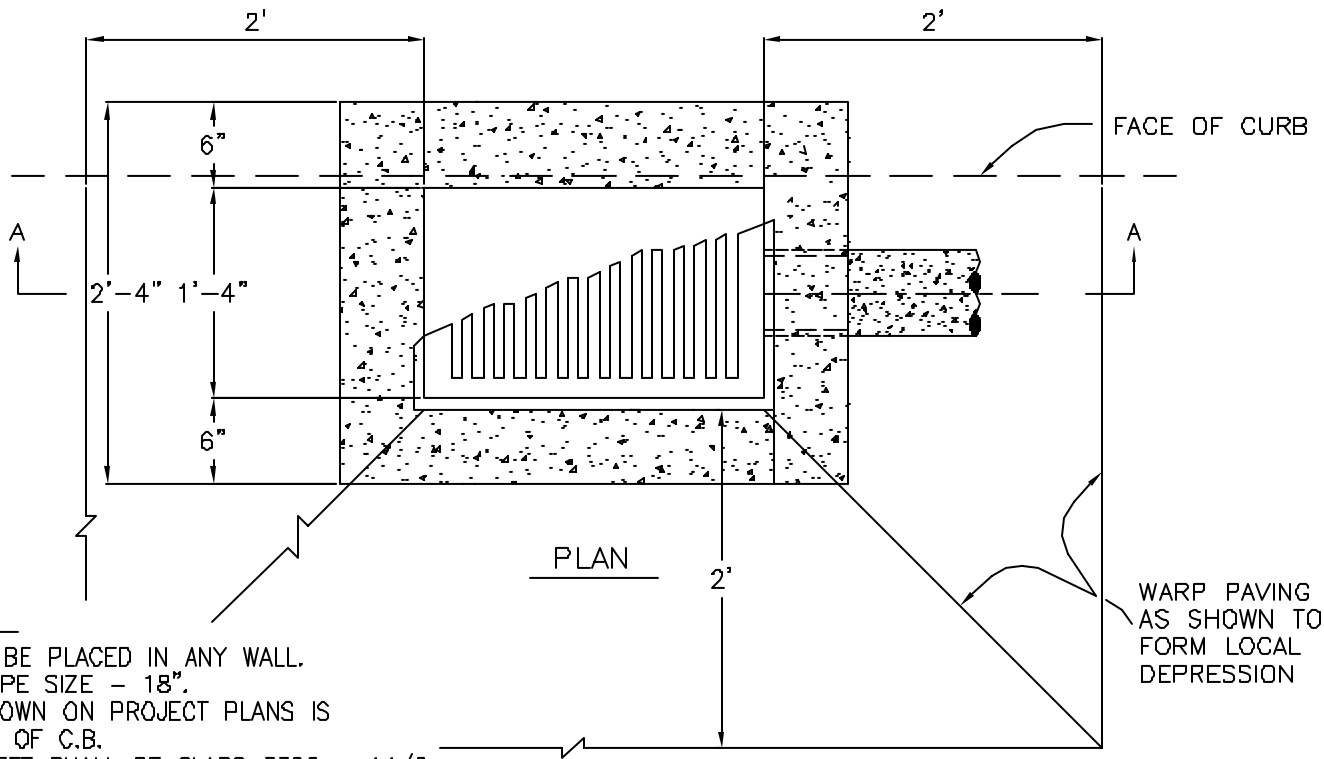
SHEET 16 of 41

# TYPICAL
# BICYCLE AND WHEELCHAIR RAMPS

| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 11-25-93 | Revised: |
| Reviewed By: | Survey: | Datum: | SCALES |
| Appd. | Inspec: | Drwn. HGT | Hor: NONE Vert: NONE |




SECTION A–A




PLAN

NOTES

1. PIPES CAN BE PLACED IN ANY WALL. MAXIMUM PIPE SIZE – 18".
2. STATION SHOWN ON PROJECT PLANS IS CENTERLINE OF C.B.
3. ALL CONCRETE SHALL BE CLASS 3300 – 11/2 PER SECTION 504 OF THE STANDARD SPECIFICATIONS OF THE OREGON STATE HIGHWAY DIVISION.
4. DRAINS SHALL BE 4" CONCRETE DRAIN TILE.
5. TO CONSRUCT CLEANOUT, REPLACE GRATE WITH 1'-3 1\2" X 1'-11 1/2" STEEL PLATE 3/4" THICK. DRILL ONE 1" DIA. LIFT HOLE NEAR ONE END PLATE.
6. FOR LOCATION, PIPE SIZE, AND ELEVATION, SEE PROJECT PLANS.

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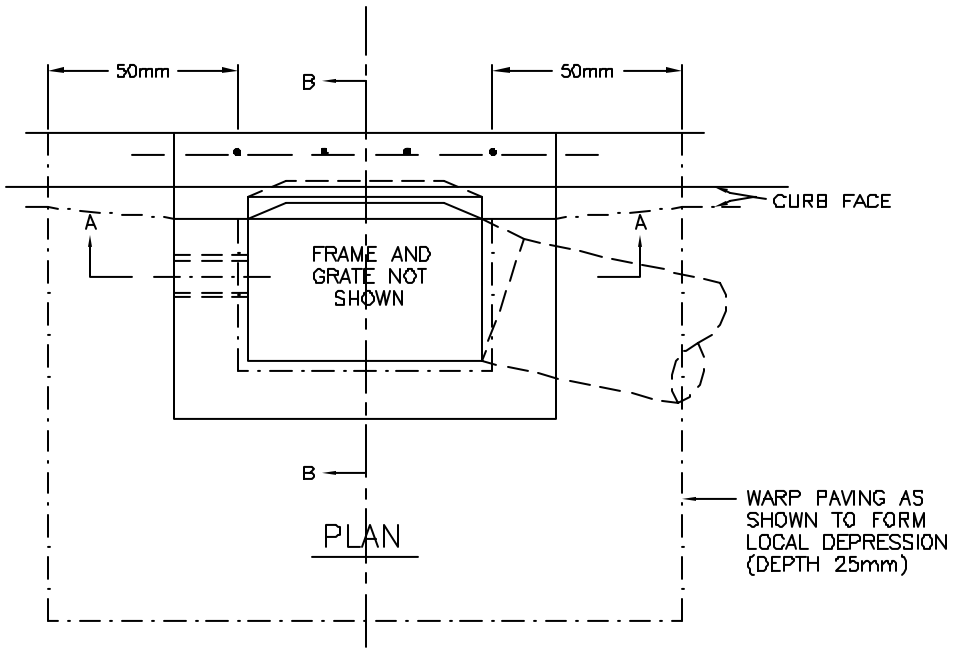
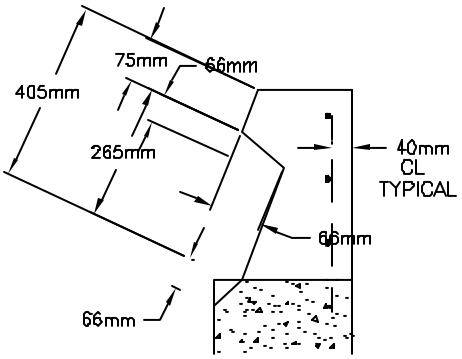
Sheet 17 of

# STANDARD CATCH BASIN DETAILS
# TYPE "I" CATCH BASIN AND JUNCTION BOXES

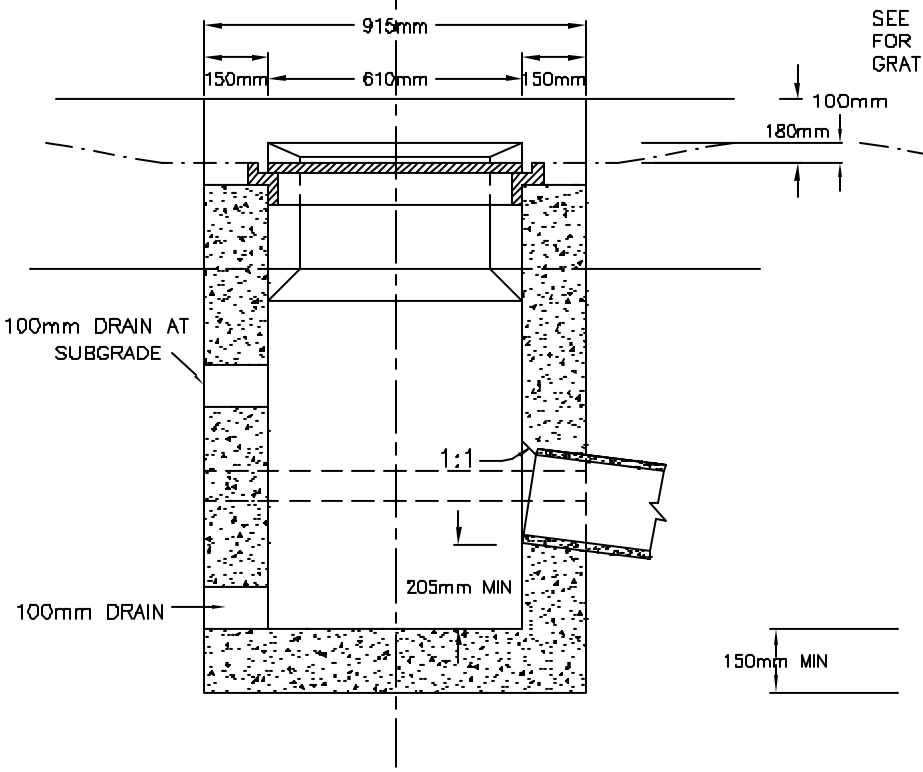
| Des. | Eng: | Date: 11-26-83 | Revised: 5-22-84 |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. HDT | Hor: NONE Vert: NONE |



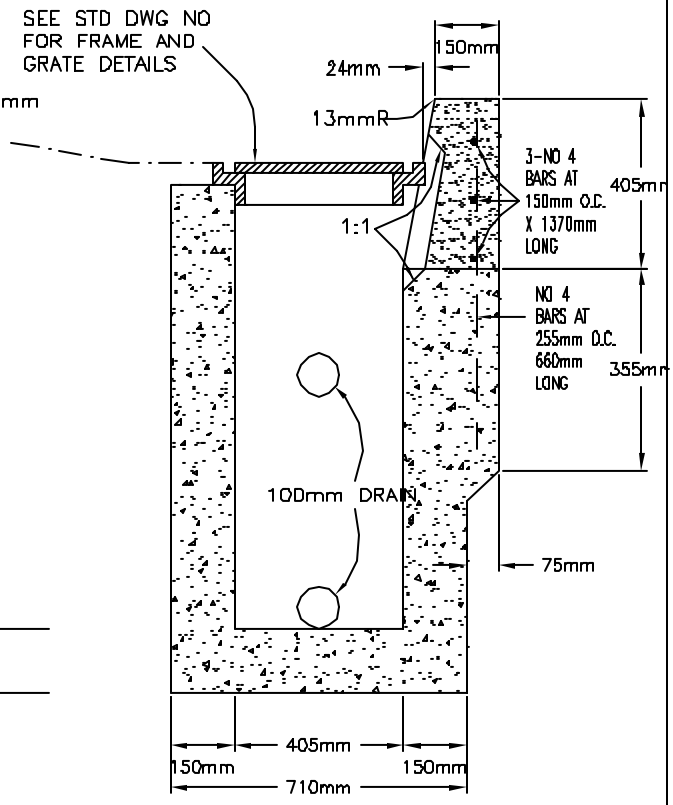

PLAN




CURB OPENING DETAIL




SECTION A–A




SECTION B–B

NOTES:

1. SEE STD. DWG. 17.
2. DRAINS SHALL BE 100mm CONCRETE DRAIN TILE.
3. FOR LOCATION, PIPE SIZE, AND ELEVATION, SEE PROJECT PLANS.
4. PIPES CAN BE PLACED IN ANY WALL. MAXIMUM PIPE SIZE 455mm.
5. STATION SHOWN ON PROJECT PLAN IS TO CENTERLINE OF CATCH BASIN.

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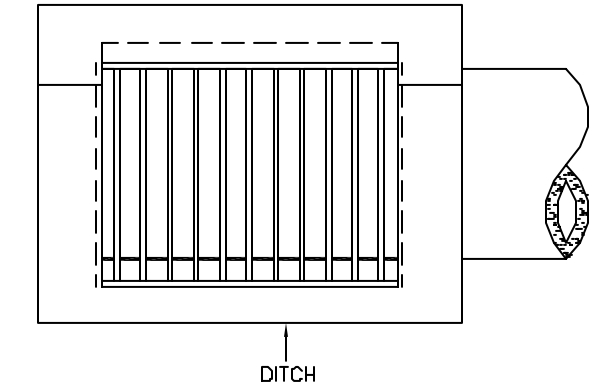
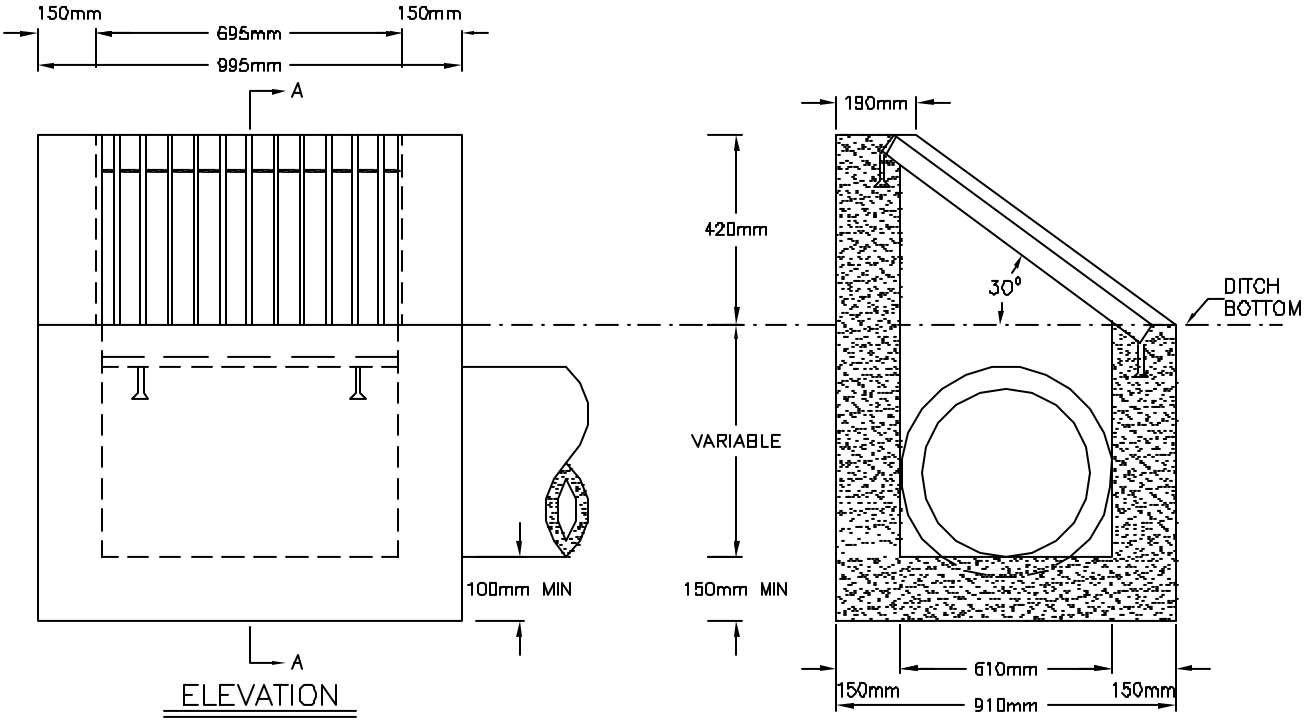
Sheet 18 of

# STANDARD CATCH BASIN DETAILS TYPE 2 (SIDE INLET) CATCH BASIN

| Des. | Eng: | Date: 6-22-84 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |

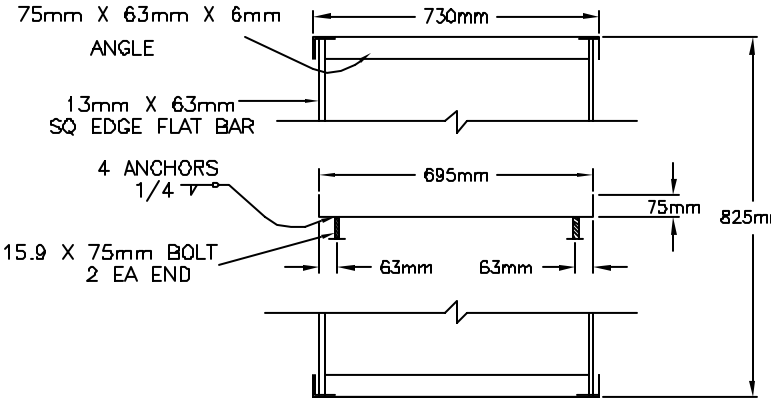



PLAN

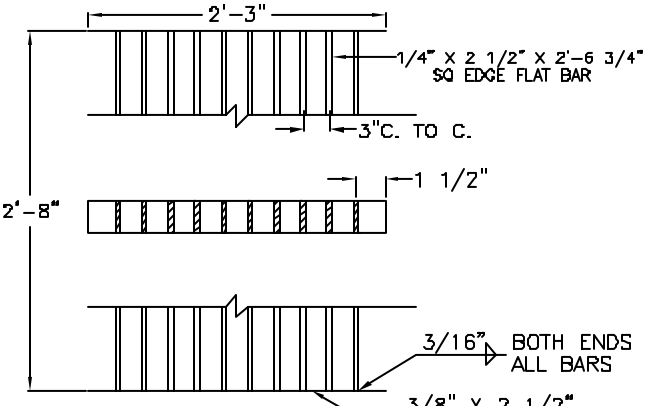



ELEVATION

SECTION A–A




FRAME




GRATE

NOTES

1. FOR LOCATION, PIPE SIZE, AND ELEVATION, SEE PROJECT PLANS.
2. SEE STD DWG 17.
3. CATCH BASIN MAY BE BUILT WITH OR WITHOUT A SUMP, AS DIRECTED BY THE ENGINEER.
4. FRAME AND GRATE MATERIAL SHALL BE STEEL (A.S.T.M. A–36) AND BE GALVANIZED IN ACCORDANCE WITH A.S.T.M A–123.

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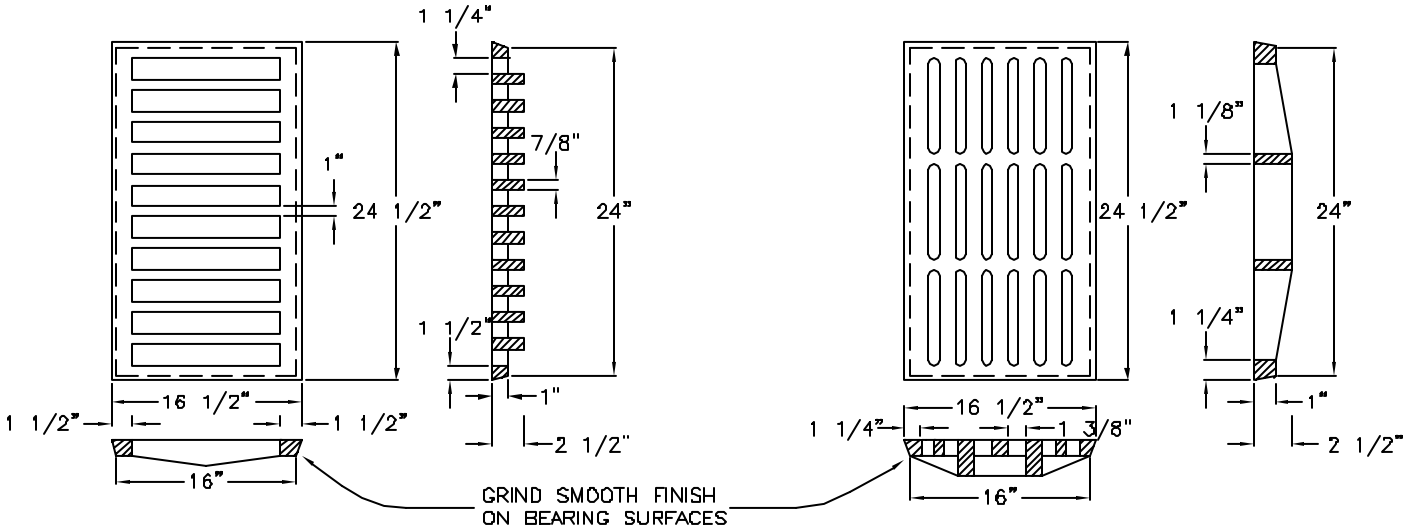
Sheet 19 of

# TYPE 3 CATCH BASIN, FRAME AND GRATE

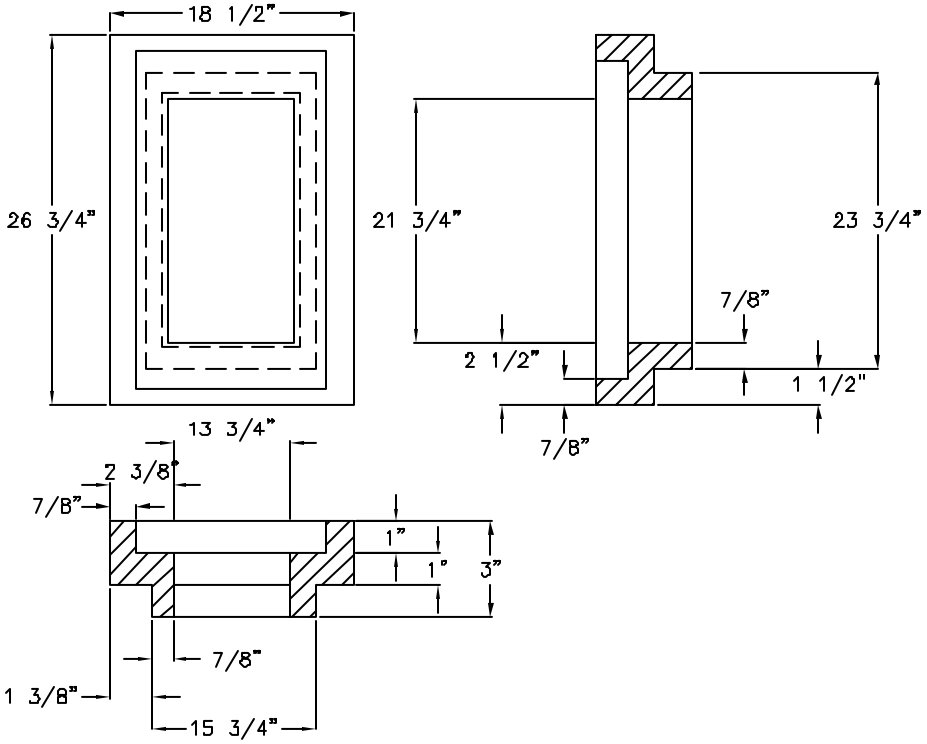
| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 6-23-84 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |




TYPE A GRATE
1-1/4" CLEAR SPACING

TYPE A GRATE
1-3/8" CLEAR SPACING

## CAST IRON / CAST STEEL GRATES




## CAST IRON / CAST STEEL GRATE FRAMES

NOTES

1. ALL CASTINGS SHALL CONFORM TO ASTM A-48 (AASHTO M105) FOR GRAY IRON CASTINGS, CLASS 30, OR (AASHTO M192), CLASS 70, FOR CAST STEEL.
2. ROUNDS, FILLETS, TAPERS AND OTHER MINOR MODIFICATIONS TO THE DIMENSIONS SHOWN FOR CASTINGS MAY BE MADE TO CONFORM TO COMMON SHOP PRACTICES.

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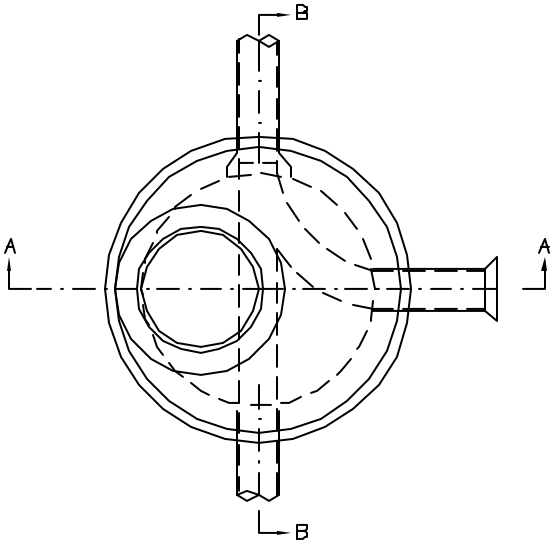
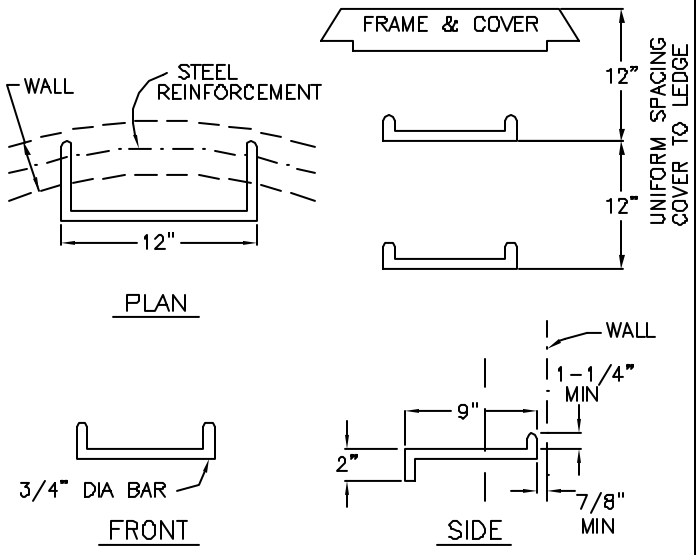
Sheet 20 of

# CATCH BASIN GRATES AND FRAMES TYPES A AND B

| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 6-24-84 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |

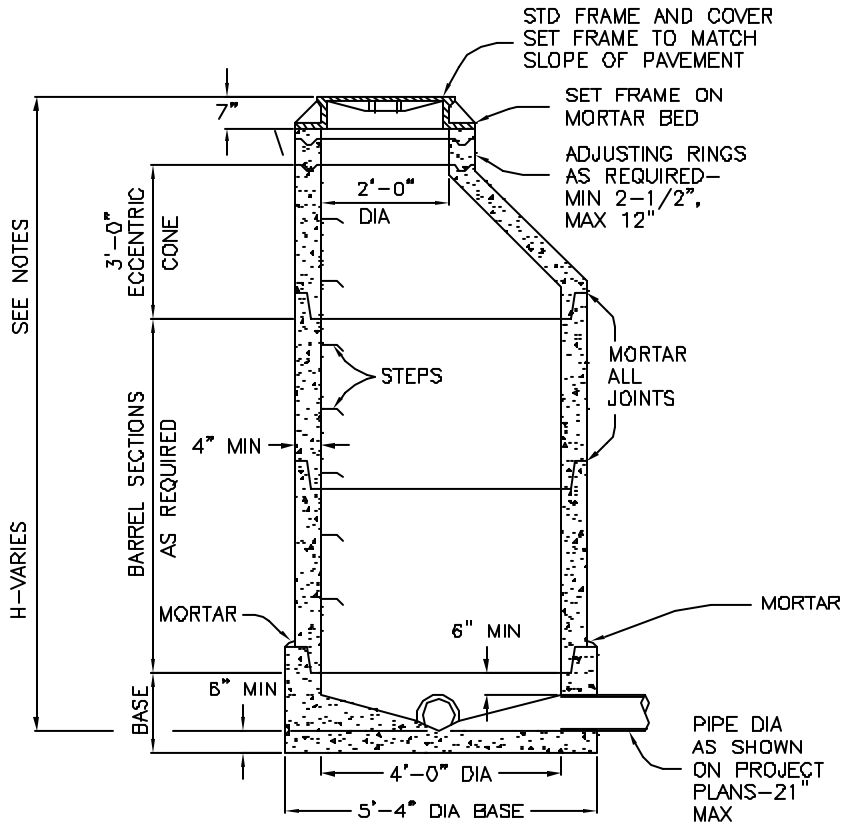



PLAN

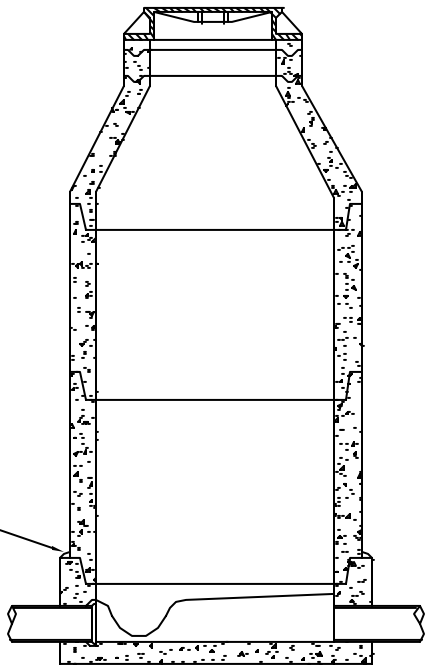



STEP DETAIL

(GALVANIZED)




SECTION A-A




SECTION B-B

NOTES

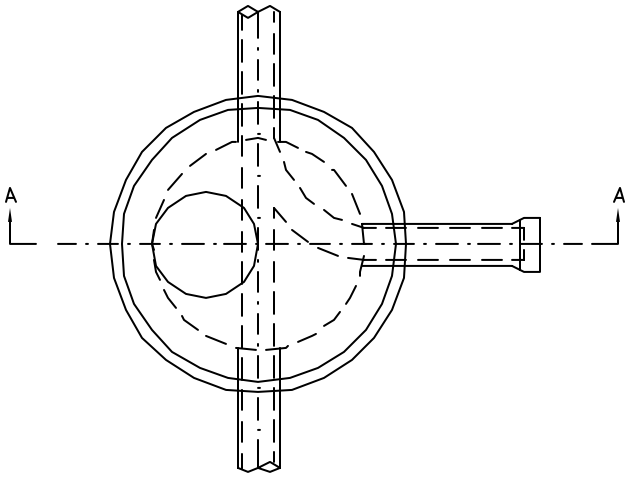
1. PRECAST BARREL, CONE, AND EXTENSION RINGS SHALL BE REINFORCED CONCRETE MANHOLE SECTIONS CONFORMING TO ASTM C 478, AASHTO M199.
2. FOR STANDARD MANHOLE FRAME AND COVER DETAILS SEE DWG 23.
3. FOR MANHOLE WITH "H" LESS THAN 4'-0" SEE PROJECT PLANS AND/OR DWG 21B.
4. INSIDE JOINTS SHALL NOT EXCEED 3/8" IN THICKNESS.
5. FORM CHANNELS IN MANHOLE BASE AS SHOWN.
6. FOR LOCATION, PIPE SIZE, AND ELEVATION, SEE PROJECT PLANS. MAXIMUM PIPE SIZE - 21".
7. PLYWOOD FORM MANHOLE BASE.
8. CONCRETE FOR BASE SHALL BE CLASS 3300 1-1/2" PER SECTION 504 OF THE STANDARD SPECIFICATIONS OF THE OREGON STATE HIGHWAY DIVISION.

Marion County Dept. of Public Works
Engineering Tel. 588-5036 Salem, Oregon

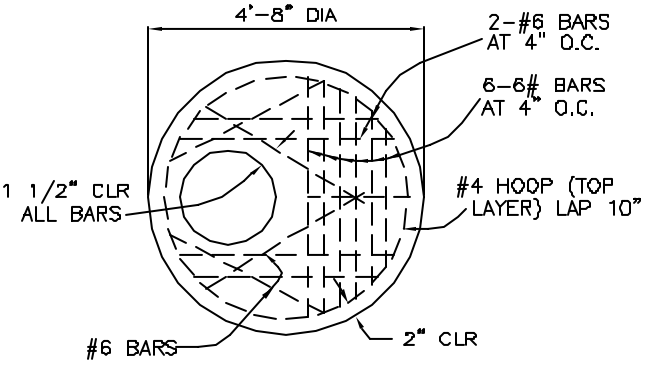
DRAWING NO. 21A OF

# STORM DRAIN STANDARD PRECAST MANHOLE

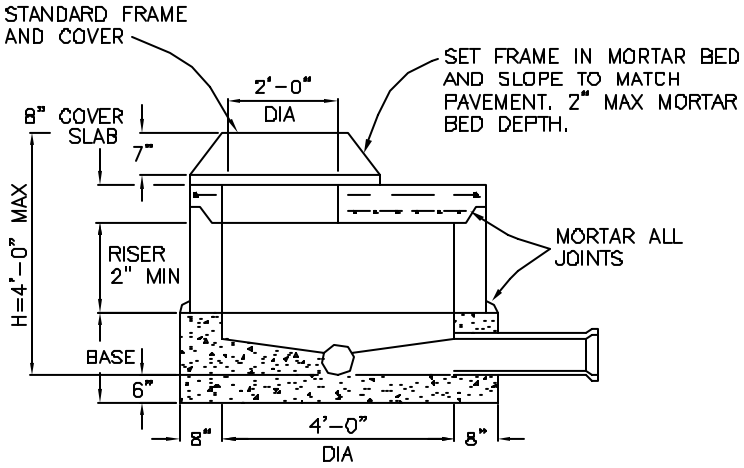
| Des. | Eng: | Date: 6/25/94 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |




PLAN
(FRAME AND COVER NOT SHOWN)




COVER SLAB REINFORCEMENT




SECTION A-A

## NOTES

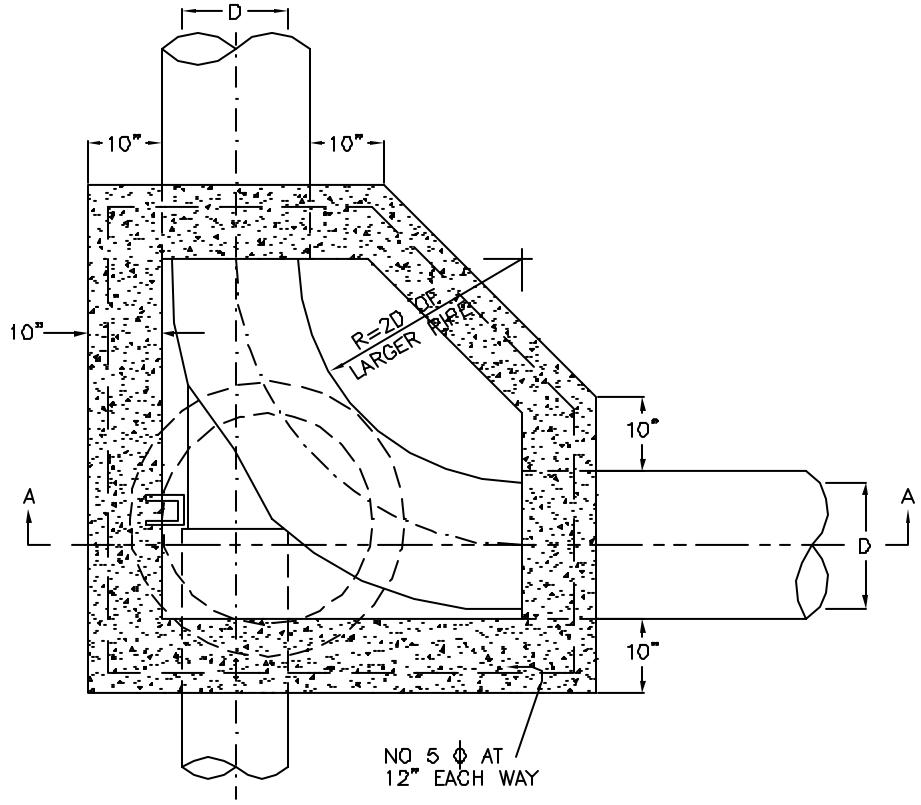
1. PRECAST BARREL SHALL BE REINFORCED CONCRETE MANHOLE SECTION CONFORMING TO ASTM C478, AASHTO M199.
2. FOR STANDARD MANHOLE FRAME AND COVER DETAILS, SEE STD DWG 23.
3. ALL CONCRETE SHALL BE CLASS 3300-1 1/2 PER SECTION 504 OF THE STANDARD SPECIFICATIONS OF THE OREGON STATE HIGHWAY DIVISION.
4. FORM CHANNELS IN MANHOLE AS SHOWN.
5. FOR LOCATION, PIPE SIZE AND ELEVATION, SEE PROJECT PLANS. MAXIMUM PIPE SIZE - 21".
6. PLYWOOD FORM MANHOLE BASE.

Marion County Dept. of Public Works
Engineering Tel. 588-5036 Salem, Oregon

Sheet 21B of

# STORM DRAIN
# SHALLOW PRECAST MANHOLE
# (H LESS THAN 4'-0")

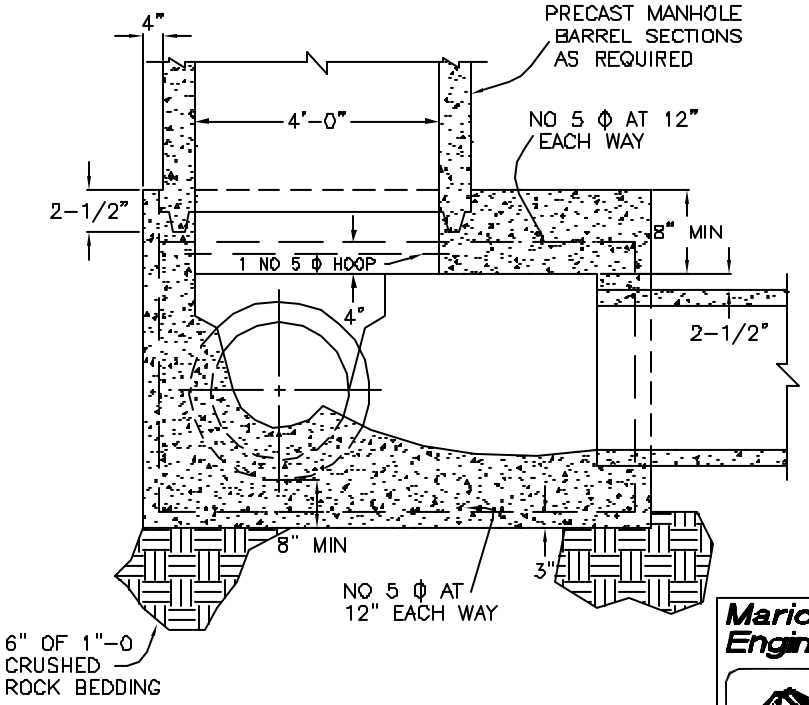
| Des. | Eng: | Date: 6-27-84 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |




SPECIAL BASE FOR MANHOLES
AT ANGLE POINT IN LINE

## NOTES

1. PRECAST MANHOLE BARREL SECTIONS, ECCENTRIC CONE AND STANDARD FRAME AND COVER SHALL CONFORM TO STD DWG 21A.
2. ALL CONCRETE SHALL BE CLASS 3300 −1 1/2 PER SECTION 504 OF THE STANDARD SPECIFICATIONS OF THE OREGON STATE HIGHWAY DIVISION.
3. FORM CHANNELS IN MANHOLE AS SHOWN TO CONFORM TO INSIDE DIAMETERS OF PIPES.
4. PLYWOOD FORM MANHOLE BASE.
5. FOR LOCATION, PIPE SIZE AND ELEVATION, SEE PROJECT PLANS.



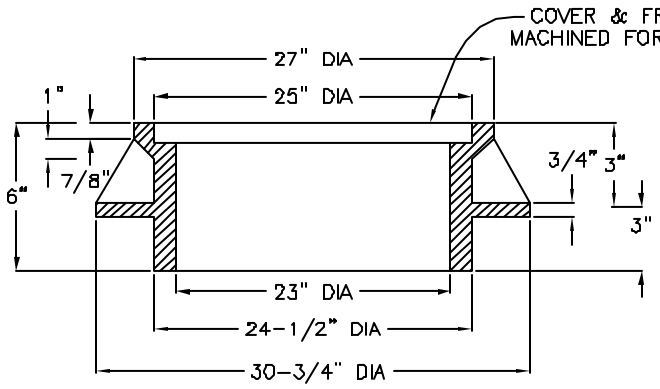

SECTION A−A

*Marion County Dept. of Public Works*
*Engineering* Tel. 588-5036 *Salem, Oregon*

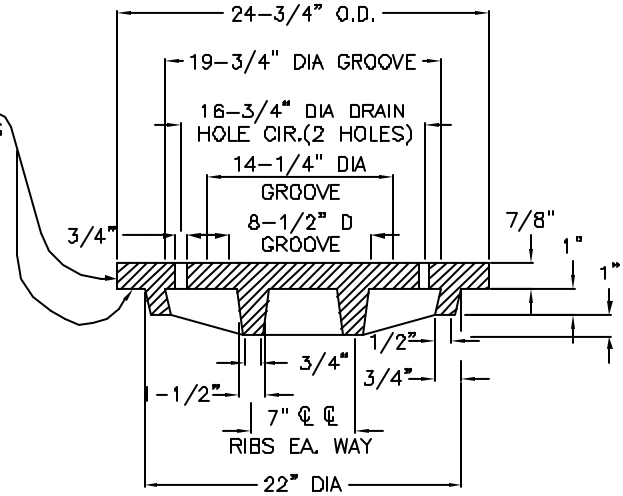
Sheet 22 of

# STORM DRAIN MANHOLE FOR PIPE 24" AND OVER

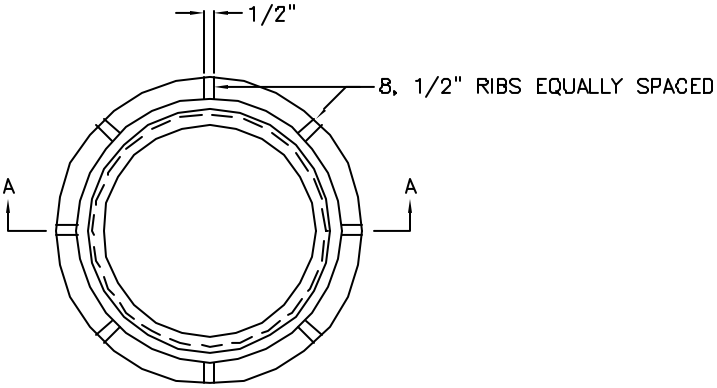
| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 6-28-84 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |



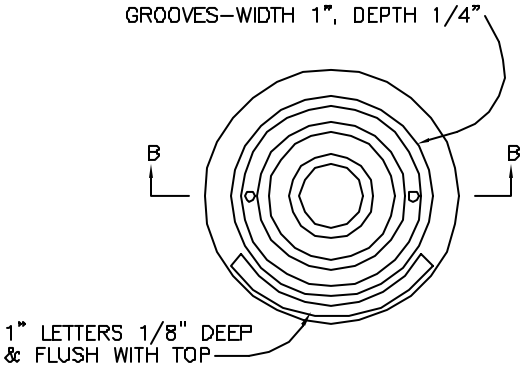

SECTION A–A



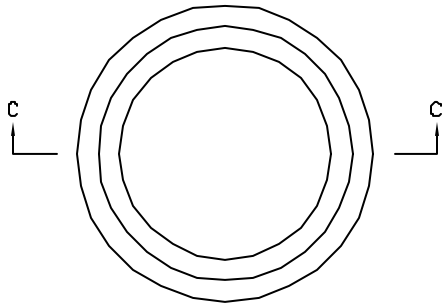

SECTION B–B



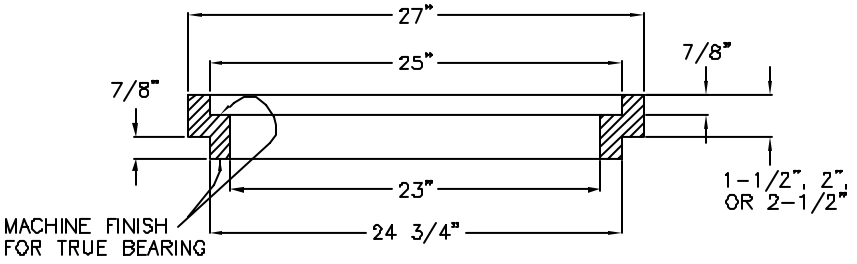

MANHOLE FRAME




MANHOLE COVER




ADAPTOR RING



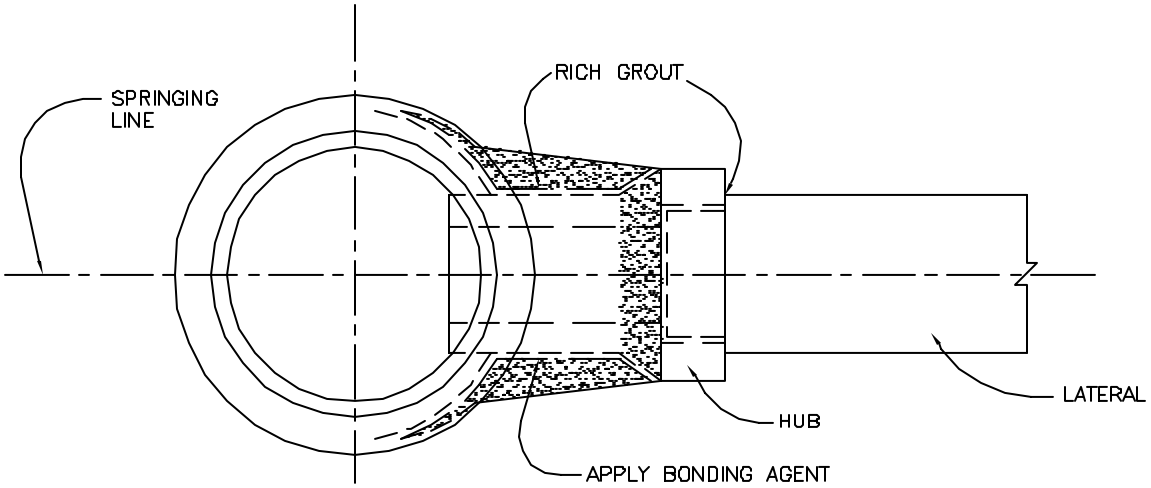

SECTION C–C

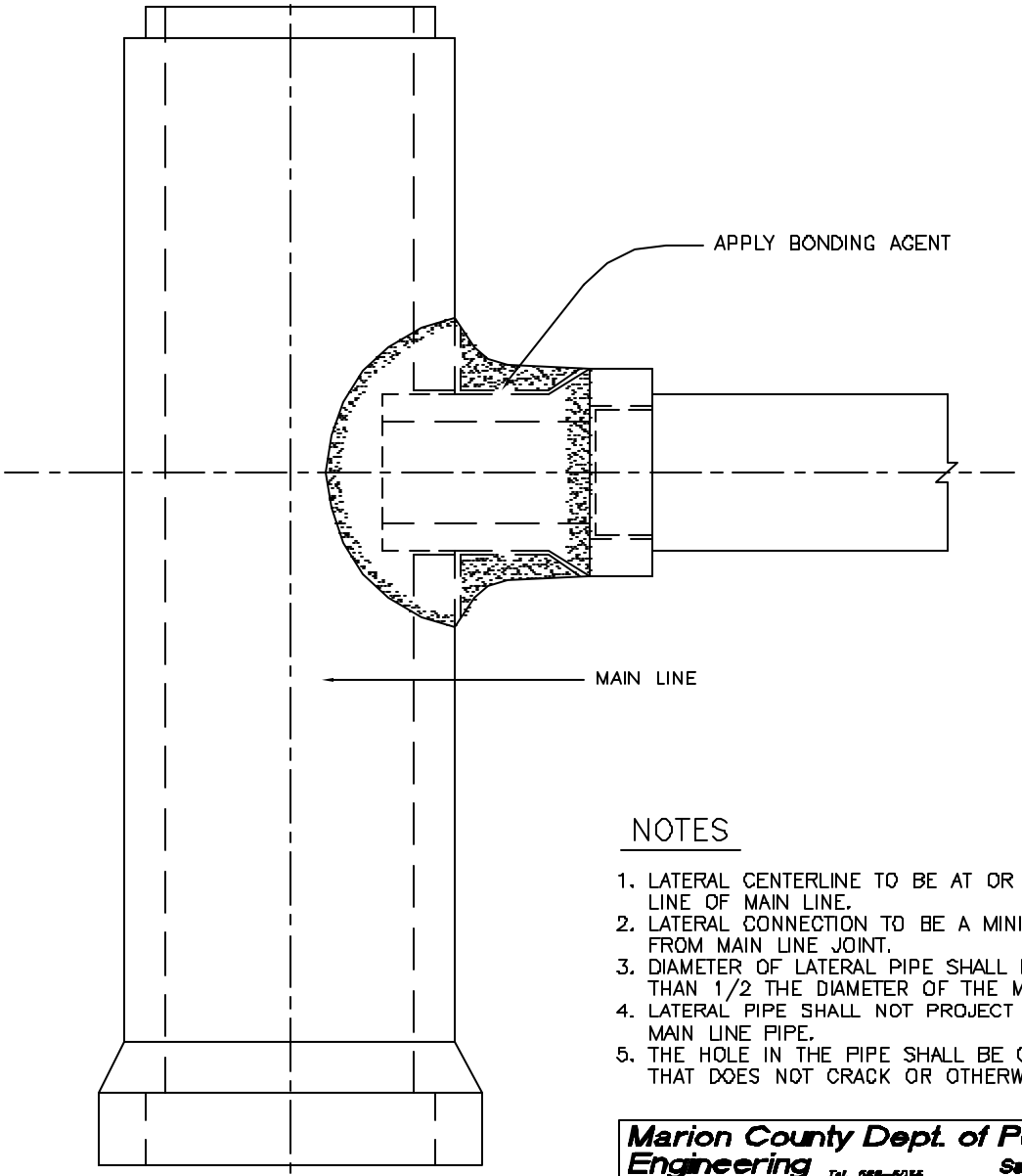
Marion County Dept. of Public Works
Engineering Tel. 588-5036 Salem, Oregon

Sheet 23 of

# STANDARD MANHOLE CASTING DETAILS

| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 6-30-84 | Revised: |
| Reviewed By--Surveyc | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |




## NOTES

1. LATERAL CENTERLINE TO BE AT OR ABOVE SPRINGING LINE OF MAIN LINE.
2. LATERAL CONNECTION TO BE A MINIMUM OF 1 1/2' FROM MAIN LINE JOINT.
3. DIAMETER OF LATERAL PIPE SHALL NOT BE GREATER THAN 1/2 THE DIAMETER OF THE MAIN LINE PIPE.
4. LATERAL PIPE SHALL NOT PROJECT INSIDE OF THE MAIN LINE PIPE.
5. THE HOLE IN THE PIPE SHALL BE CUT IN A MANNER THAT DOES NOT CRACK OR OTHERWISE DAMAGE THE PIPE.

Marion County Dept. of Public Works
Engineering Tel. 588-5036 Salem, Oregon

Sheet 24 of

# LATERAL CONNECTION TO STORM DRAIN PIPE

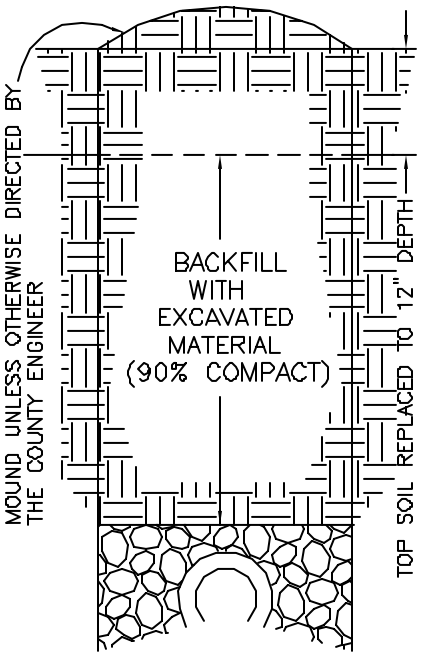
| | | | |
|---|---|---|---|
| Des. | Eng: | Date: 7-5-94 | Revised: |
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |

SURFACE TREATMENT

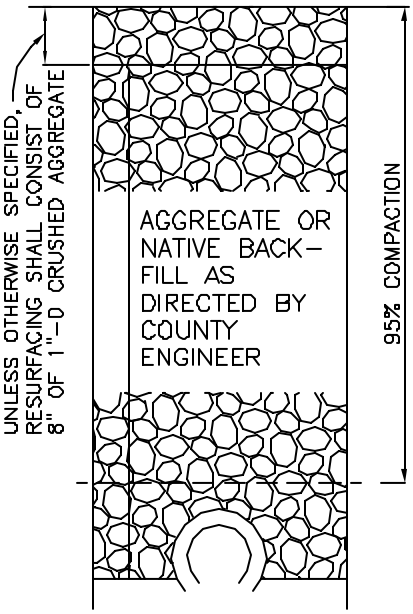
TRENCH BACKFILL

PIPE AND BEDDING ZONE

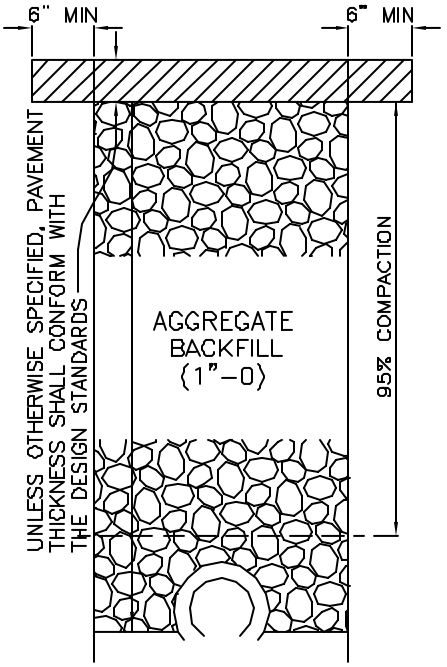
NATURAL OR OTHER THAN ROADWAY SURFACE (IN EASEMENT)

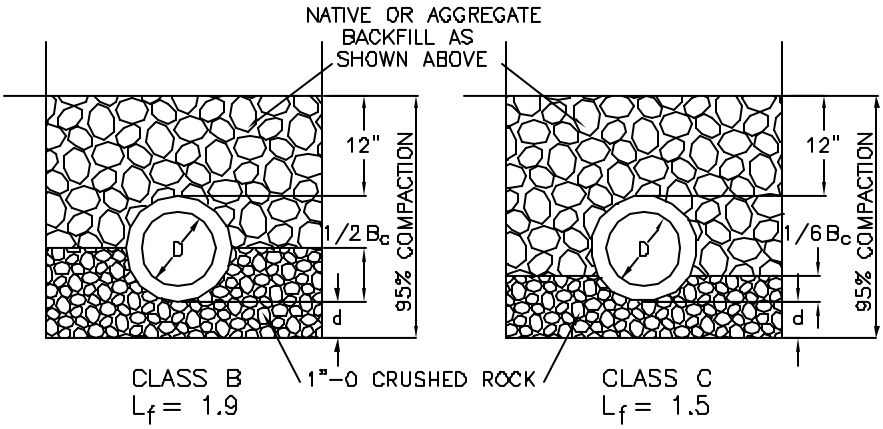



GRAVELLED OR DIRT ROAD SURFACE (COUNTY ROAD)




ASPHALT CONCRETE OR OILED GRAVEL SURFACE (COUNTY ROAD)




| DEPTH OF BEDDING MATERIAL BELOW PIPE | |
|---|---|
| D | D(MIN.)① |
| 27" AND SMALLER | 4" |
| 30" – 60" | 5" |
| 66" AND LARGER | 6" |

## LEGEND

$B_c$ = OUTSIDE DIAMETER

D = INSIDE DIAMETER

d = DEPTH OF BEDDING MATERIAL BELOW PIPE

$L_f$ = LOAD FACTOR

## NOTES

1. FOR ROCK OR OTHER INCOMPRESSIBLE MATERIALS, THE TRENCH SHALL BE OVEREXCAVATED A MINIMUM OF 6" AND REFILLED WITH AGGREGATE MATERIAL AS DIRECTED BY THE ENGINEER.
2. BEDDING AND BACKFILL MATERIALS IN THE PIPE ZONE SHALL BE COMPACTED AS SPECIFIED PRIOR TO BACKFILLING THE REMAINDER OF THE TRENCH.

Marion County Dept. of Public Works
Engineering Tel. 588-5036 Salem, Oregon

Standard No. 25

# PIPE BEDDING AND TRENCH BACKFALL

| Des. | Eng: | Date: 7-3-84 | Revised: |
|---|---|---|---|
| Reviewed By--Survey: | | Datum: NONE | SCALES |
| Appd. | Inspec: | Drwn. CDM | Hor: NONE Vert: NONE |

# STORM SEWER DESIGN SHEET

PROJECT | DESIGN FREQUENCY | DESIGNED BY | DATE | PAGE

| STA. | LENGTH (FT) | DRAINAGE BASIN | | TOTAL DRAINAGE AREA (ACRES) | RUNOFF COEFF. | AVERAGE RUNOFF COEFF. | TIME OF CONCEN. OF BASIN (MINUTES) | TOTAL TIME OF CONCEN. (MINUTES) | AVERAGE RAINFALL INTENSITY (INCHES/HR) | DESIGN DISCHARGE (C.F.S.) | INVERT SLOPE (%) | PIPE SIZE (INCHES) | CAPACITY FULL (C.F.S.) | VELOCITY FULL (C.F.S.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | INDEX NO. | AREA (ACRES) | | | | | | | | | | | |
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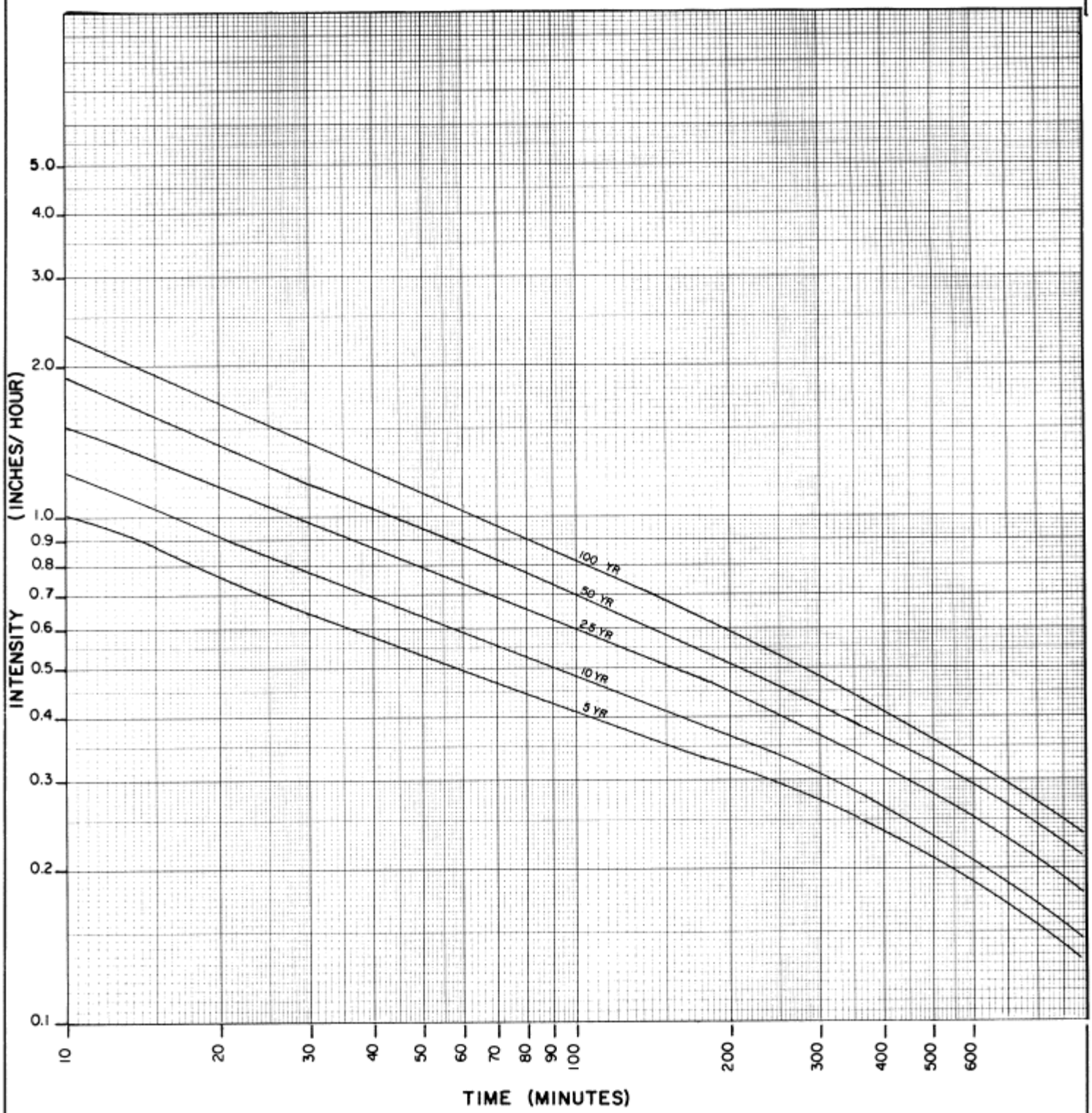
STORM SEWER DESIGN SHEET | DWG NO. 26 | 06-JUL-94 cdm

# RAINFALL INTENSITY-DURATION CURVES FOR MARION COUNTY




Source: U.S. Geological Survey
Water Resources Investigation
for Salem, Oregon

| MARION COUNTY, OREGON<br>DEPARTMENT OF PUBLIC WORKS | |
|---|---|
| RAINFALL INTENSITY-DURATION CURVES | |
| DATE: 1/18/83 | STD. DWG. NO. 27 |

# SOIL CONSERVATON SERVICE
# TR-55 LAG-Tc METHOD PEAK DISCHARGE COMPUTATION SHEET

PROJECT _____ WATERSHED CONDITION _____

BY _____ DATE _____

CHECKED BY _____ DATE _____

## INPUT

1. _____(IN) (24 HOUR) (___-YR FREQ.)
   RAINFALL (MAP EXHIBIT 2-3A)
2. _____
   RUNOFF CURVE NO. (EXHIBIT 2-2A)
3. _____ FT
   HYDRAULIC LENGTH
4. _____ %
   WATERSHED SLOPE
5. _____ %
   HYDR. LENGTH MODIFIED
6. _____ %
   IMPERVIOUS AREA
7. _____ SQ MI
   DRAINAGE AREA (DA)
8. _____ %
   PONDS, SWAMPS

FIGURE 10

FIGURE 3-3

FIGURE 3-4

TABLE E-2, E-3, OR E-4
(LOCATION DETERMINES TABLE)

## Tc FACTOR

1.67

CONSTANT

X

9. _____ HR
   BASIC LOG

X

10. _____
    HYDR. LENGTH ADJ.

X

11. _____
    IMP. AREA ADJ.

=

12. _____ HR

## Tc

FIG. 2

## PEAK FACTOR

13. _____ IN
    RUNOFF VOLUME

X

14. _____ CSM/IN
    BASIC PEAK DISCHARGE

X

15. _____ SQ. MI.
    DRAINAGE AREA

X

16. _____
    PONDS, SWAMPS ADJ.

=

## ADJUSTED PEAK DISCHARGE

17. _____ CFS

| PEAK DISCHARGE COMPUTATION SHEET | DWG NO. 28 | 7-6-94 cdm |
|---|---|---|

# DETERMINATION OF REQUIRED DETENTION STORAGE

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| TIME (MINUTES) | C x A (ACRES) | RAIN INTENSITY (INCHES/HR) | INFLOW RATE (C.F.S.) | INFLOW VOLUME (CU. FT.) | OUTFLOW RATE (C.F.S.) | OUTFLOW VOLUME (CU. FT.) | REQ. STORAGE (CU. FT.) |
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DETERMINATION OF REQUIRED DETENTION STORAGE

DWG NO. 29

5-7-84 cdm

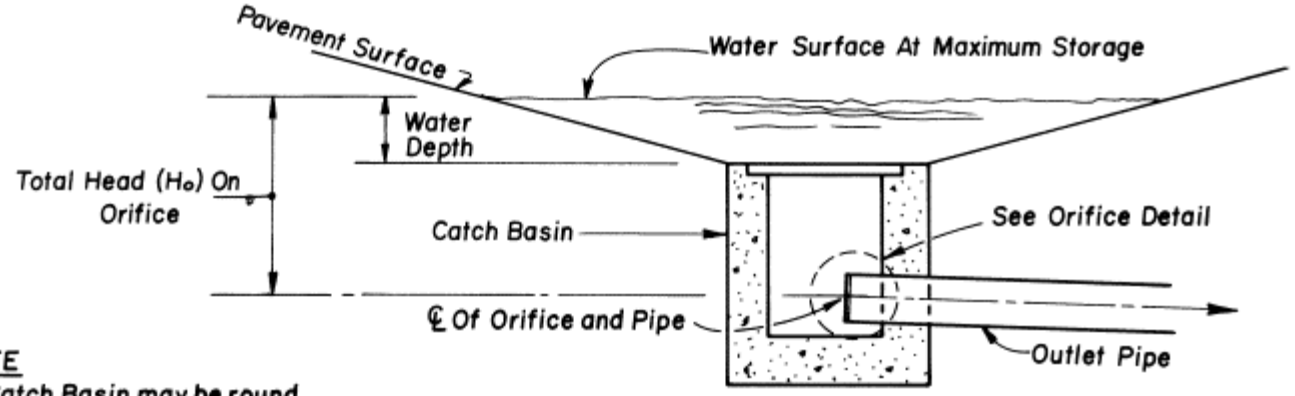
| Area of Developed Site (acres) ① | Allowable Outflow (cubic feet per second) | Orifice Diameter (inches) ② | Volume of Water to Be Stored (cubic feet) | Water Depth Over Inlet Grate (feet) ③ | Water Storage Area (square feet) ③ |
|---|---|---|---|---|---|
| 0.5 | 0.10 | 1-11/16 | 780 | 0.5 | 4,690 |
| 1.0 | 0.20 | 2-3/8 | 1,560 | " | 9,380 |
| 1.5 | 0.30 | 2-7/8 | 2,350 | " | 14,070 |
| 2.0 | 0.40 | 3-5/16 | 3,130 | " | 18,760 |
| 2.5 | 0.50 | 3-11/16 | 3,910 | " | 23,450 |
| 3.0 | 0.60 | 4 | 4,690 | " | 28,150 |
| 3.5 | 0.70 | 4-3/8 | 5,470 | " | 32,830 |
| 4.0 | 0.80 | 4-11/16 | 6,250 | " | 37,520 |
| 4.5 | 0.90 | 4-15/16 | 7,040 | " | 42,220 |
| 5.0 | 1.00 | 5-3/16 | 7,820 | " | 46,910 |

① For areas less than 0.5 acre, detention is not required. For areas greater than 5.0 acres, the detention system must be designed on a site-specific basis with an allowable outflow based on a 5-year storm with a runoff factor of 0.20 and storage for a 10-year storm with a runoff factor of 0.90.

② Orifice diameter ($D_o$) is based on the allowable flow ($Q_o$) and an assumed total head ($H_o$) on the orifice of 2.00 feet (see typical details). If the total head is different, the diameter must be determined from the graph on Sheet 2.

③ If site conditions necessitate the use of a different water storage area, the water depth must be calculated and an orifice diameter determined per Note 2 above. In most cases, the following formula can be used for calculating the depth:

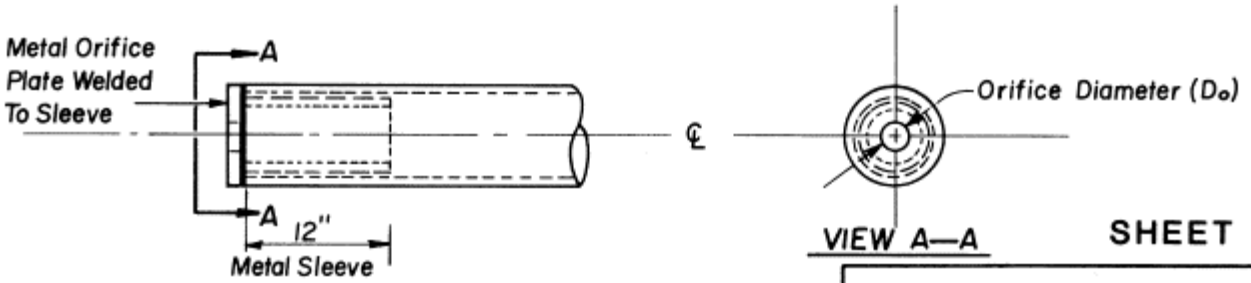
Water Depth = 3 x Volume of Stored Water ÷ Water Storage Area




NOTE
Catch Basin may be round, square, or rectangular.

## TYPICAL CATCH BASIN DETAIL

NO SCALE




## TYPICAL ORIFICE DETAIL

NO SCALE

SHEET 1 OF 2

MARION COUNTY, OREGON
DEPARTMENT OF PUBLIC WORKS

# STORM WATER DETENTION

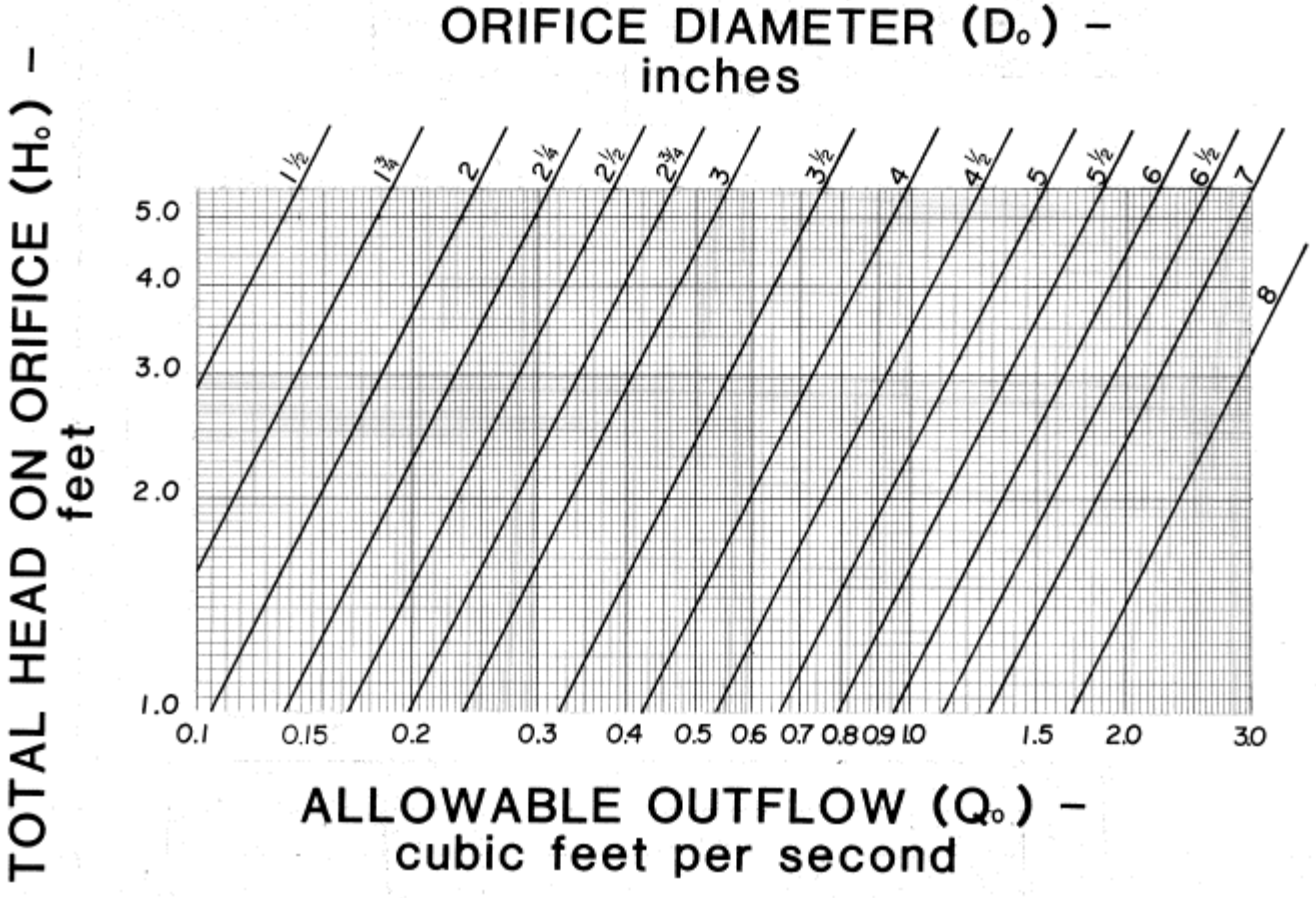
FOR SITES OF 5 ACRES OR LESS

REGISTERED PROFESSIONAL ENGINEER 6785 Richard L. Walton July 17, 1979 RICHARD L. WALTON

| REV. | DESCRIPTION | DATE | BY | APPVD. |
|---|---|---|---|---|
| | | | | |

DRAWN BY: MWS | DATE: 10/10/85

APPROVED BY: | DWG. NO.: 30




SHEET 2 OF 2

MARION COUNTY, OREGON
DEPARTMENT OF PUBLIC WORKS

# STORM WATER DETENTION

FOR SITES OF 5 ACRES OR LESS

REGISTERED PROFESSIONAL ENGINEER 6785 RICHARD L. WALTON July 17, 1979

| REV. | DESCRIPTION | DATE | BY | APPVD. |
|---|---|---|---|---|
| | | | | |

| | |
|---|---|
| DRAWN BY: MWS | DATE: 10/10/85 |
| APPROVED BY: | DWG. NO.: 30 |

# DRAFTING CONVENTIONS

## CONSTRUCTION SYMBOLS

| ITEM | EXISTING | CONSTRUCT |
|---|---|---|
| ROAD RIGHT-OF-WAY | | |
| CENTERLINE | | |
| EDGE OF PAVEMENT | | |
| EDGE OF GRAVEL | | |
| FACE OF CURB | | |
| SIDEWALK | | |
| SANITARY SEWER | 8" San. | 8" San. |
| MANHOLE | | |
| CLEAN OUT | | |
| WYE & TEE | | |
| STORM DRAIN | 10" S.D. | 10" S.D. |
| MANHOLE | | |
| CLEAN OUT | | |
| CATCH BASIN | | |
| LINE ENCASEMENT | | |

## UTILITIES SYMBOLS

| ITEM | SYMBOL | ITEM | SYMBOL |
|---|---|---|---|
| TELEPHONE | Tel. | TELEPHONE PEDESTAL | Tel. |
| CABLE T.V. | T.V. | UTILITY POLE | Elec. Tel. |
| ELECTRIC | P. | WITH LIGHT | |
| NATURAL GAS | G. | WITH ANCHOR | |
| WATER | W. | METER | |
| | | FIRE HYDRANT | |

## TOPOGRAPHIC SYMBOLS

| | | | EVER. | DECID. |
|---|---|---|---|---|
| CULVERT - size & flow | 8" | TREES - size & species | | |
| DITCH, SWALE | | SHRUBS | | |
| FENCE - GENERAL | | HEDGE | | |
| CHAIN LINK | | MAILBOX, BOXES | | |
| WOOD | | SIGN POST | | |
| BARRICADE | | HOUSE ADDRESS | 1984 | |
| RETAINING WALL | | | | |

| DRAFTING CONVENTIONS | DWG NO: 31 |
|---|---|