

APPENDIX B. STORMWATER ORDINANCE 04-01-B

Purpose: To set standards and guild lines for future proposed storm water projects; to develop acceptable QA/QC for all storm water projects to insure and maintain work quality and functionality.

Definitions: Storm water system—Any man made utility or natural resource utilized exclusively for the retention, detention and or transmission of storm water (for the purpose of drainage). This would include but not limited to underground or aboveground utilities such as; pipes, catch basins, curbs, gutters, wash-ways, coffer dams, lift stations or manholes. Natural resources to be utilized for the retention, detention or transmission of storm water would include but not limited to streams, ditches, swales, ponds, lakes and rivers.

Scope: This ordinance shall pertain and be in full effect for all new projects and or repairs to existing infrastructure where that project and or repair adds to, alters or exposes the existing storm water system to any change, modification or disruption of functionality.

Content: Whereas the Town of Hebron may be subject to any modification to the existing storm water system (as defined) by retrofitting, repair, and or new construction project by any contractor, the Town of Hebron shall mandate a complete engineering review by a state certified PE approved by the Hebron Storm Water Management Board prior to authorization to proceed. Further, storm water drainage plans for a specific area or improvement shall conform to the master drainage plan as revised this date. In the case of a subdivision, the conceptual storm drainage plan shall be reviewed and approved by a state certified PE as directed by the Hebron Storm Water Management Board before the planning commission grants primary plat approval. All projects will abide by the following specs:

I. Culverts:

- The locations and culverts shall be determined at the time of construction plans are prepared for the entire sub-division or project. In no case shall culverts be less than 12 inches in diameter.
- Pipe end sections or concrete headwalls shall be used at the ends of all driveway culverts. See Standard Plans G-01 and G-02.

II. Storm Drainage

- Projects directing surface water directly into a regulated drain shall receive approval from the county drainage board.
- Storm drainage and surface water installations, including roof downspouts, foundation footing drains and or sump pumps, shall not be connected to or allowed to empty in the sanitary sewer system.
- All storm sewer located beneath roadways shall be class III reinforced concrete pipe.
- All storm sewer shall be bedded and backfilled in accordance with manufacturer's recommendations.
- All pipe beneath and within five feet of a roadway shall be bedded and backfilled in B Borrow for Structure Backfill in accordance with Indiana Department of Transportation (INDOT) specifications, latest edition. Additionally, pipe located below a line extending at a slope of 2:1 toward the right-of-way from the five foot limit shall also be backfilled in B Borrow for structure backfill.
- All storm sewers shall be constructed of one of the following materials:

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1. Reinforced Concrete Sewer Pipe/Standard: ASTM C-76/Joint: ASTM C443
2. Reinforced Concrete Elliptical Pipe/Standard: ASTM C-507
3. PVC SDR35/Standard: ASTM D-3034/Joint: ASTM D-3212
4. High Density Poly — Ethylene/Standard: ASTM D-1248/Joint: ASTM D-3212

III. Drainage Design Criteria

Quality of Runoff

The estimated storm water runoff, or design discharge for drainage areas less than ten acres in size or smaller may be determined by the Rational Method.

The estimated storm water runoff. Or design discharge for drainage of areas larger than ten acres in size shall be determined in accordance with the Soil Conservation Service Technical Release number 55 (SCS TR-55)

- Rational Method

The equation is $Q=CIA$

Where Q = Rate of runoff or discharge, in CFS.

C = Weighted runoff coefficient, expressing the ratio of rate of runoff to rate of rainfall

I = Average intensity of rainfall (for a selected storm frequency and duration equal to the time of concentration) in inches per hour.

A = Drainage area tributary to a point under design in acres.

Runoff Coefficient

The runoff coefficients for the defined surfaces and uses shall be as follows:

Character of Surface	Urban Runoff Coefficients
Pavement:	
Asphalt and Concrete	0.90
Brick	0.80
Roofs	0.80
Lawns (Sandy)	
Flat (0—2%)	0.07
Rolling (2—7%)	0.12
Steep (greater than 7%)	0.17
Steep, greater than 7 percent	
Lawns (Clay)	
Flat (0—2%)	0.16
Rolling (2-7%)	0.21
Steep (greater than 7%)	0.30
Woodland (Sandy)	
Flat (0—5% Slope)	0.10
Rolling (5—10% Slope)	0.25
Steep (greater than 10%)	0.30

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Woodland (Clay)	
Flat	0.30
Rolling	0.35
Steep	0.50
Pasture (Sandy)	
Flat	0.10
Rolling	0.16
Steep	0.22
Pasture (Clay)	
Flat	0.30
Rolling	0.36
Steep	0.42
Cultivated (Sandy)	
Flat	0.30
Rolling	0.40
Steep	0.52
Cultivated (Clay)	
Flat	0.50
Rolling	0.60
Steep	0.72

The coefficients of this tabulation are applicable to storms of 5 to 10 year frequencies.
Coefficients for less frequent higher intensity storms shall be modified as follows:

Return Period (Yrs)	Multiply "C" by
25	1.1
50	1.2
100	1.25

In areas for which development plans have not been prepared, the following runoff coefficients for various zoning classifications shall be:

Runoff Coefficients "C" by Lane Use and Typical Inlet Times (1)

Land Use	Runoff Coefficients			Inlet Times (Minutes)
	Flat	Rolling	Steep	
Commercial (CBD)	0.75	0.83	0.91	5
Commercial (neighborhood)	0.54	0.60	0.66	
Industrial	0.63	0.70	0.77	5-10
Garden apartments	0.54	0.60	0.66	5-10
Churches	0.54	0.60	0.66	5-10
Schools	0.31	0.35	0.39	10-15

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Semi detached residential	0.45	0.50	0.55	10-15
Detached residential	0.40	0.45	0.50	10-15
Quarter acre lots	0.36	0.46	0.44	10-15
Half acre lots	0.31	0.35	0.39	10-15
Parkland	0.18	0.20	0.22	To Be Computed

1. Flat terrain 0-2% slopes.
2. Rolling terrain 2-7% slopes.
3. Steep terrain greater than 7% slopes.
4. Interpolation, extrapolation and adjustment for local conditions shall be based on engineering experience and judgment.
5. The coefficients of this tabulation are applicable to storms of 5 to 10 year frequencies. Coefficients for less frequent higher intensity storms shall be modified as follows:

Return Period	Multiply "C" by
25	1.1
50	1.2
100	1.25

Intensity of Rainfall (Rational Method Only)

The design rainfall intensity is dependent upon the frequency of recurrence of the expected storm and the time of concentration. These values are shown on the Intensity Duration Frequency (IDF) curve shown on Standard Plan G-18.

Soil Conservation Service Method TR-55

1. SCS Runoff Equation: $Q = (P - I_a)^2 / [(P - I_a) + S]$

Where:

Q = Runoff (in.)

P = Rainfall (in)

S = Potential maximum retention after runoff begins (in)

I_a = Initial Abstraction (in.)

2. SCS Curve Number $S = 1000 / (CN - 10)$

Where:

CN—Curve Number

The following values are to be used for Curve Number in SCS runoff calculations:

Cover Description	Curve Numbers for hydrological soil groups
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Cover type and condition	A	B	C	D
Open space				
Poor condition (Grass<50%)	68	79	86	89
Fair Condition	49	69	79	84
Good condition (Grass>75%)	39	61	74	80
Paved parking lots, roofs, IE...	98	98	98	98
Streets, curbed	98	98	98	98
Streets, Ditched	83	89	92	93
Undeveloped areas by Zoning				
Commercial	89	92	94	95
Industrial	81	88	91	93
Cultivated Land				
With Conservation Treatment:	72	81	88	91
Without Conservation Treatment:	62	71	78	81
Pasture or Range Land				
Poor Condition	68	79	86	89
Good Condition	39	61	74	80
Meadow				
Good Condition	30	58	71	78
Wood or Forest Land				
Thin stand, poor cover, no mulch	45	66	77	83
Good Cover	25	55	70	77
Residential by average lot	A	B	C	D
⅛ acre	77	85	90	92
¼ acre	61	75	83	87
⅓ acre	57	72	81	86
½ acre	54	70	80	85
1 acre	51	68	79	84
2 acre	46	65	77	82

Minimum Design Standards—Street Drainage

Maximum spacing of collection points

Storm water runoff shall not be carried in streets for a distance of more than 400 feet. The storm water management board may require additional collection points, if deemed necessary. Inlets, curb turnouts or other types of runoff collection methods shall be so located as to intercept the flow within the distance specified. (See Standard Plan G-03)

Minimum Design Frequency of Recurrence

Maximum overflow provided: For streets where an overflow is provided so water depth at the gutter line does not exceed six inches prior to overflowing, the collection system shall be designed to carry at least that storm water runoff that can be expected from a storm having a frequency of two years.

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Minimum overflow provided: For streets where there is no overflow or bypass provided as outlined above, the collection system shall be designed to carry at least that storm water runoff which can be expected from a storm having a frequency of ten years. In no case shall water be allowed to become more than 18 inches deep at the gutter line in any street prior to overflow.

Miscellaneous Drain Design Standards

Drainage Structures: A catch basin or other approved type of debris retainer shall be located so as to intercept debris collected by the drainage system. Such debris retainer shall have a minimum sump depth below the sewer invert of three feet. (See Standard Plans G-04 thru G-06)

Minimum velocities: The minimum velocities used in designing storm sewers shall be three feet per second when flowing full.

Manning's "n"

The following values for Manning's "n" shall be used for calculating flow capacity:

Material	Manning's "n"
Ditch, maintained	0.030
Ditch, not maintained	0.05—0.1
Concrete pipe	0.013
PVC	0.011
HDPE	0.010

Miscellaneous Drain Designs Standards Cont.

Casting, Lids and Inlets: The acceptable castings, lids and inlets are shown in Standard Plan G-07.

Under drains: The use of under drains to reduce the accumulations of sub-surface water shall be required at all depressed areas. Such under drains shall meet the requirements of Standard Plan G-08 and G-09 based on a storm with a ten year recurrence interval or the downstream capacity, whichever is more restrictive.

Retention/detention basins: Retention/Detention Basins shall be designed and constructed as required by the storm water management board to control the rate of runoff from a given area. Retention/detention basins shall be designed to control the runoff for a minimum storm recurrence frequency of 100 years. The design shall have a Soil Conservation Service Technical Release number 55 Type II distribution.

The outlet from the retention/detention basin shall be designed to carry no more than the storm water runoff rate from the given area in its natural unimproved condition based on a storm with a ten-year recurrence interval. The outlet discharge from post-development conditions shall be designed not to exceed the downstream flows from pre-development conditions a basin discharge shall not exceed the two-year predevelopment rate or the downstream capacity, whichever is more restrictive. See Standard Plan G-10 for stand pipe detail.

Note: All Retention/Detention Basins must discharge to a defined water course.

Where retention/detention basins discharge into low capacity or sensitive drainage courses (As determined by a state-certified PE) a basin discharge shall not exceed the two-year pre-development rate.

All owner's/developer's engineer shall certify and warrant to the storm water management board, the planning commission, and public works that the water elevation of the retention/detention basin at peak storage, carried horizontally, shall not create objectionable flooding upstream or downstream from the retention/detention basin. The engineer shall submit any substantiating materials requested by the storm water management board for engineering review at the owner's/developer's expense. The owner/developer shall provide a means for emergency overflow in case of failure of the outlet structure. This emergency overflow shall meet the approval of the storm water management board.

Drainage structure schedule: Storm drainage plans shall include a structure schedule indicating structure number, referenced to the plan and profile, function, style (IE: flat top or standard cone), pipe sizes for inlet and outlet pipes, invert elevations of pipes, castings brand and type, grate or lid type, location and any necessary remarks. Such drainage schedule shall meet the requirements of Standard Plan G-11 or approved equal.

Minimum Design Standards—Lot Drainage

Minimum Lot Grades

1. Primary Lot: The primary lot is that portion of the lot between the rear face of the residence or building and the frontage road.

The minimum grades permissible in the primary lot are as follows:

- A. Surface Grades — 2% recommended, 1% minimum
- B. Lot Line Swale Grades — 2% recommended, 1% minimum
- C. Cross Lot Swale Grades — 1% recommended, 0.5% minimum

Minimum Design Standards—Lot Drainage Cont.

2. Secondary Lot: The secondary lot is that portion of the lot between the rear face of the residence or building and the rear property line.

The minimum grades permissible in the secondary lot are as follows:

- A. Surface Grades — 1.5% recommended, 1.0% minimum
- B. Lot Line Swale Grades — 1% recommended, 0.5% minimum
- C. Cross Lot Swale Grades — 1% recommended, 0.5% minimum
- D. Surface Grades over Septic Fields — 2% recommended, 1% minimum

Common swales: A common swale is one that serves as a drainage course carrying the runoff from two or more lots or properties (Side lot line swales may be excepted from this requirement.)

The minimum top width for a common swale shall be ten feet and the minimum depth shall be nine inches. (See Standard Plan G-12)

All common swales shall be seeded or sod and protected with an easement dedicated to the proper authority for swale's maintenance and or repair.

Minimum design frequency of recurrence and runoff coefficients: The minimum design frequencies for lot drainage shall correspond to those used for the drainage design on the streets

serving those lots. The finish grade of the ground surrounding the residence or the building on the lot shall be no less than 18 inches above the top of curb on the street side of the building and 18 inches above the flow line of a major drainage swale on the swale side of the house or building. For the purpose of this ordinance, the flow line of any major drainage swale shall be considered to be a minimum of 12 inches above the bottom of the swale.

Typical Lot Grading Configurations: Typical lot grading shall be as shown on Standard Plan G-13 thru G-16.

Pipe Laying and Backfill

Pipe laying and backfill shall be performed in accordance with appropriate ASTM methods for selected pipe type. All storm sewer pipe shall be bedded in approved material as shown on Standard Plan H-01. No backfill shall be placed until the work has been inspected.

- A. The minimum diameter for all main line storm pipe shall be no less than twelve (12) inches.
- B. The minimum diameter for all service laterals shall be no less than four (4) inches. Residential laterals can be converted to two (2) inch schedule 40 PVC within four (4) feet of the foundation wall by way of a reducing mission coupling.
- C. All storm water laterals will have tracer wire installed for later location. The tracer wire will be clearly visible at the cleanout to be installed within four (4) feet of the foundation wall.
- D. No building service lateral shall be laid parallel to or within three (3) feet of any bearing wall which thereby might be weakened.
- E. All joints shall be connected as specified under the appropriate ASTM code.
- F. All joints shall be made gas tight and water tight. Solvent weld joints will not be excepted.

Testing

All manufactured material used in the project shall meet all testing requirements of the applicable ASTM code.

Certification of compliance for said materials does not preclude further testing.

Testing Cont.: The standard tests required pertain to main line installation only:

- 1. A deflection test for flexible pipe shall be performed using a rigid ball or mandrel with a diameter of no less than 95% of the base inside diameter of the pipe to be tested. The test should not be performed with the aid of a mechanical pulling device.
- 2. An air test shall be provided and conform to one of the following methods:
 - a. ASTM F1417-92, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure, for plastic pipe.
 - b. ASTM C924-89, Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method for concrete pipe.
- 3. All main line lines shall have television inspection prior to final acceptance.

Infiltration and exfiltration tests shall be the responsibility of the contractor. In the event of failure the contractor shall be fully responsible for correction of the problem and retesting.

Storm Sewer Abandonment

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Abandonment of all lines will be done in the presence of the town inspector. The abandonment shall be done in such a way as to keep soil, construction debris and other foreign matter out of the storm sewer system. As much of the abandoned sewer connection shall be removed as possible. The town inspector shall approve in the field the amount of abandoned sewer connection to be removed. The remaining abandoned sewer shall be plugged with a permanent water tight plug.

Fees

The following fees shall be paid by all contractors operating within the town limits of the Town of Hebron:

- Contractors registration fee: All contractors must pay a \$100.00 annual registration fee. Contractors must also provide a certificate of insurance and a \$5,000.00 bond. Contractor also warrants all documentation is current and in full effect.
- Sewer inspection permit of \$25.00 is required for all repairs, modifications and or new installations.
- All plans for proposed projects must pass a engineering review by a state certified PE approved by the storm water management board. The cost of this review will be communicated to the property owner, contractor, and or developer submitting the plans for review.

Connection Fees:

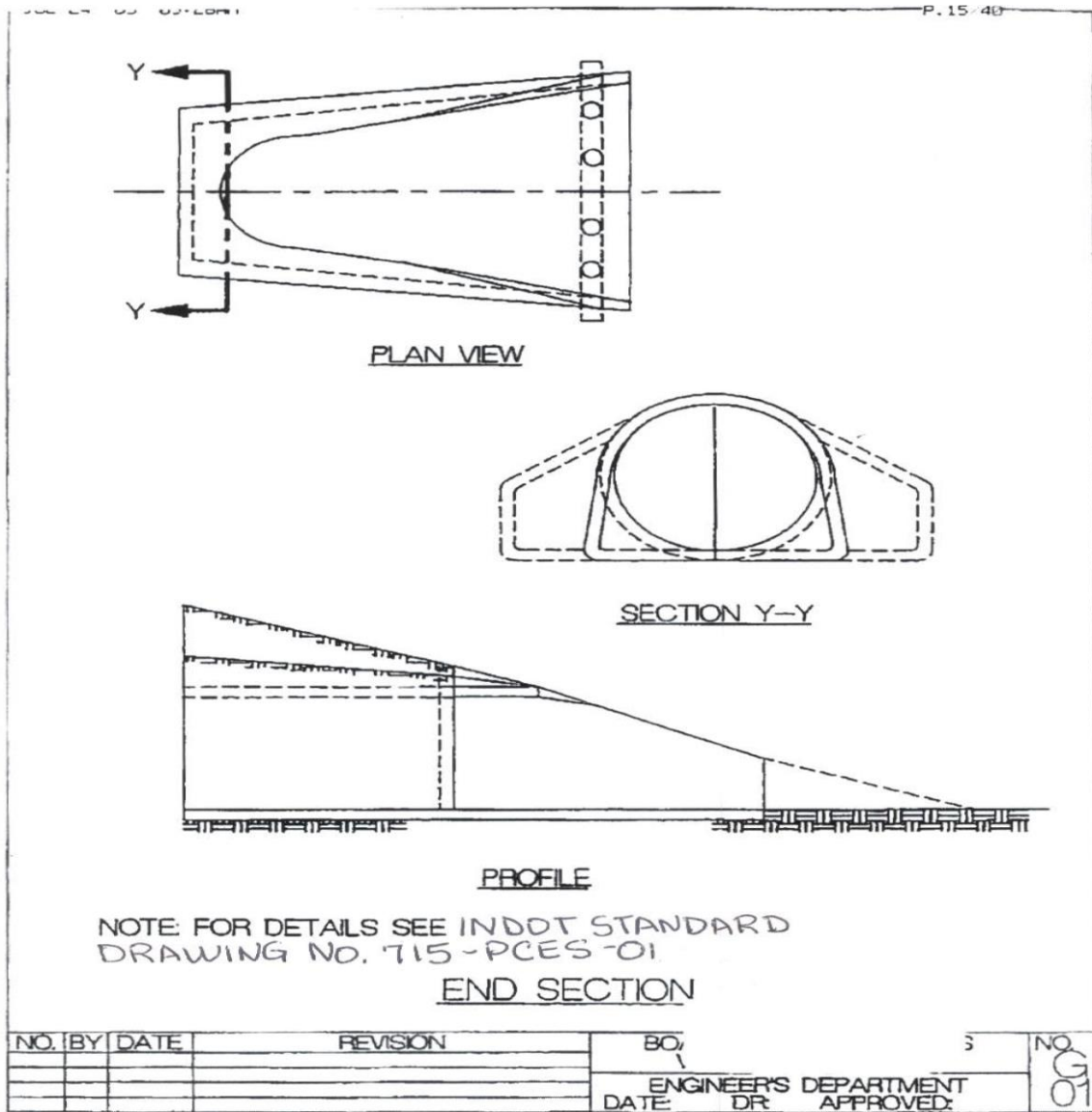
- Residential taps—\$35.00
- Commercial taps—\$55.00
- Industrial taps—\$75.00

Note: For all industrial connections to the storm water system, property owners shall submit a water quality report to validate proper water quality for all discharges into either the system or another regulated water course.

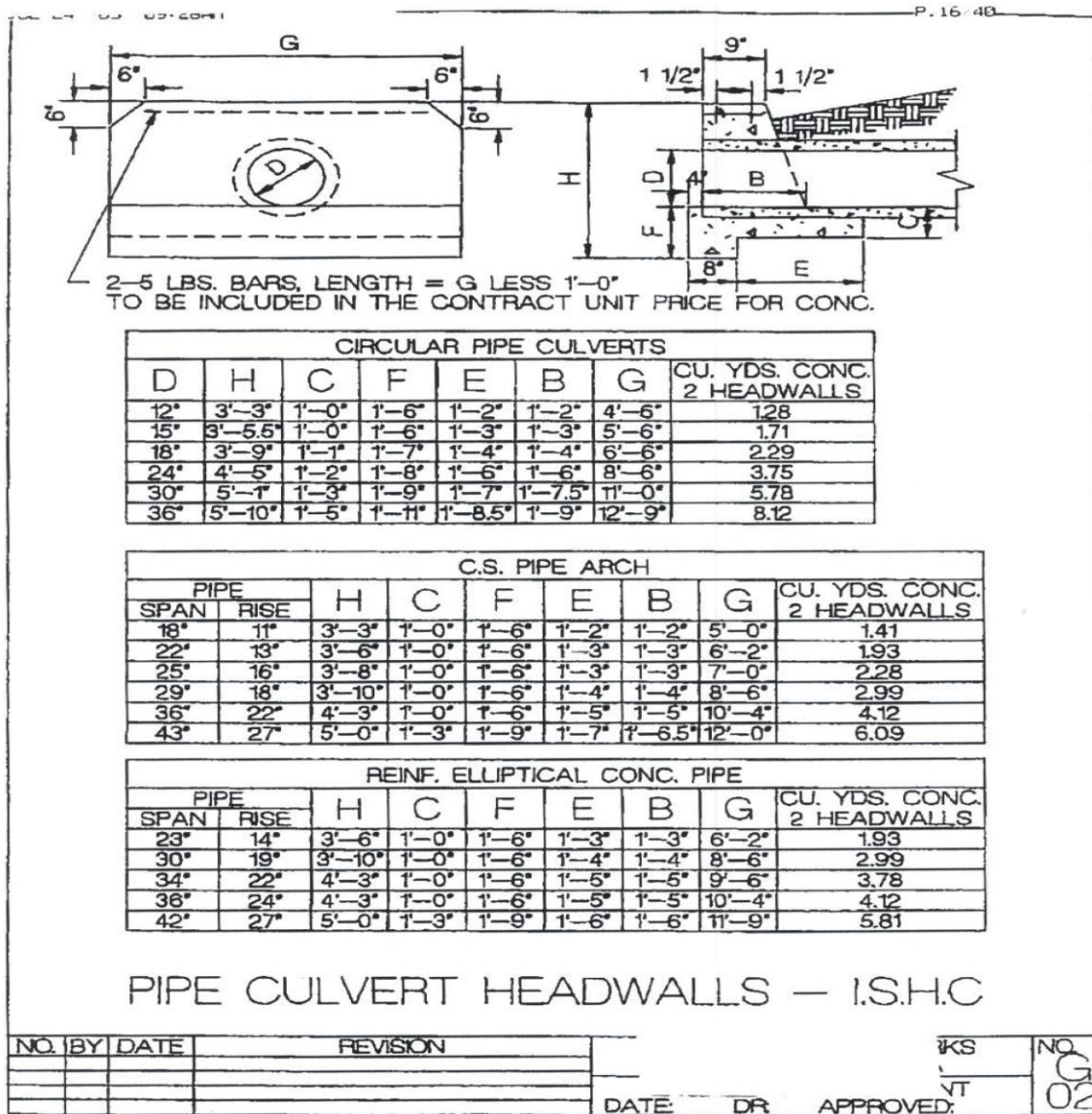
(Ord. No. 2004-01-A, 1-13-2004; Ord. No. 2004-01-B, 1-13-2004)

STANDARD PLANS

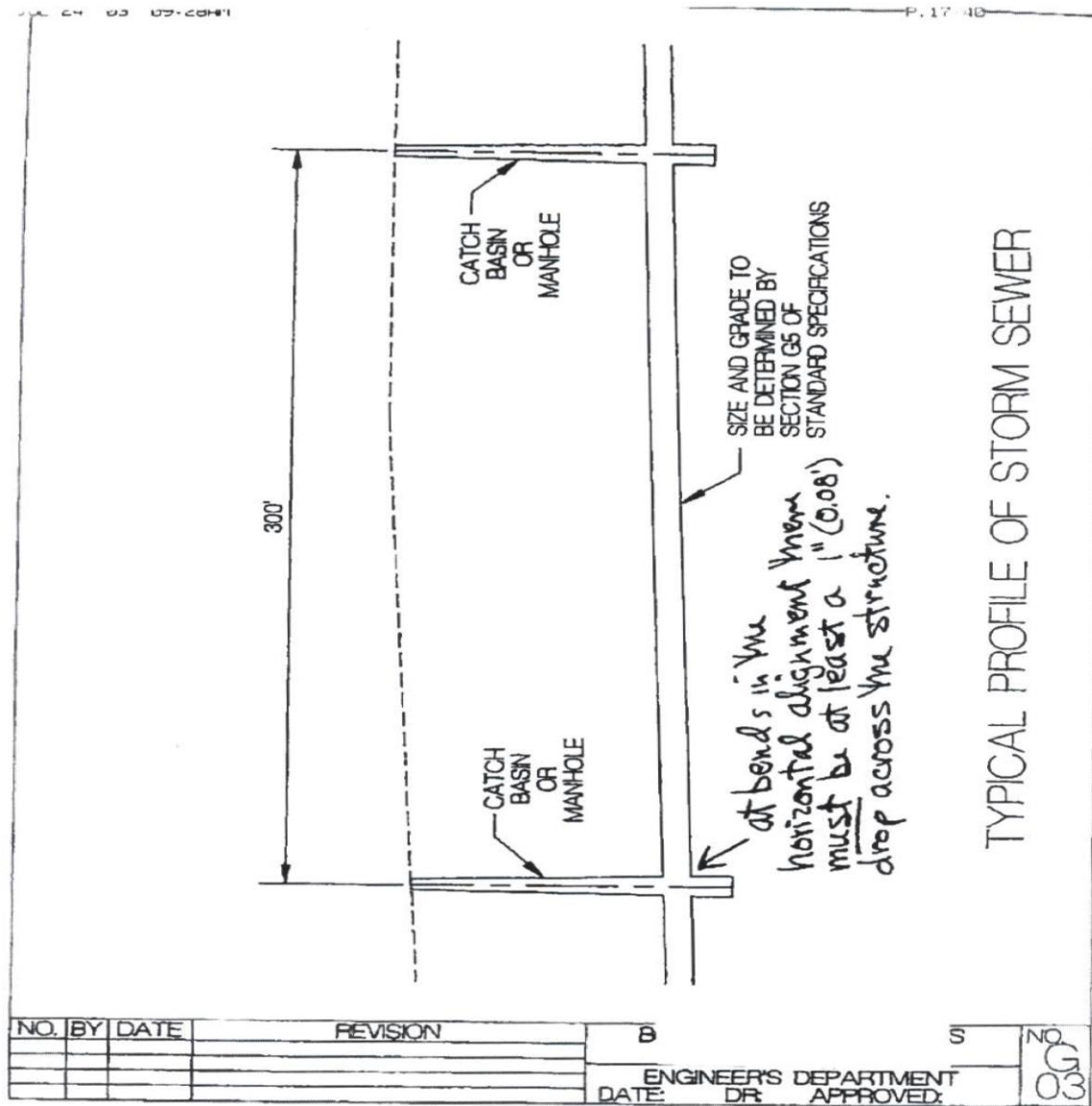
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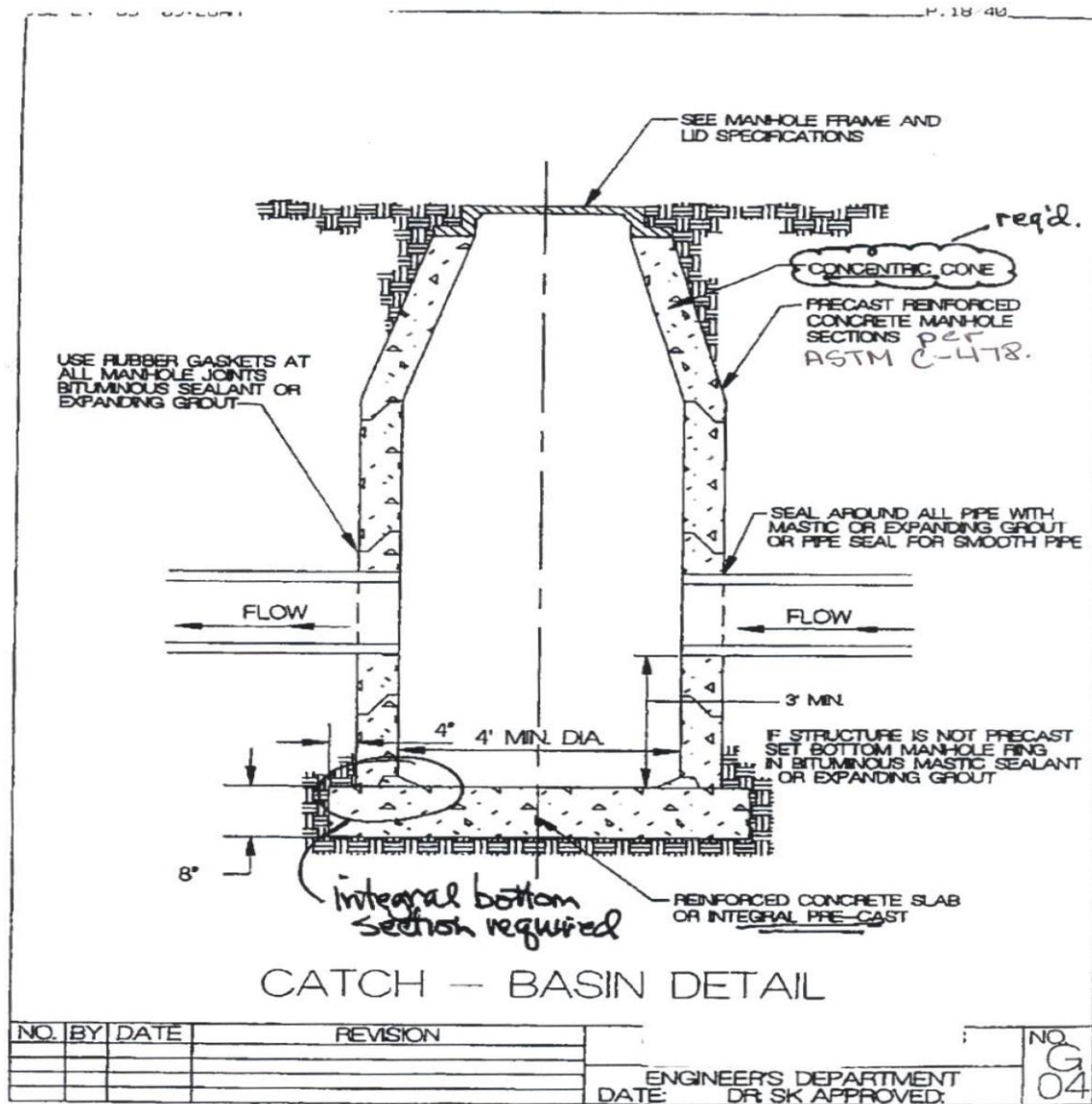
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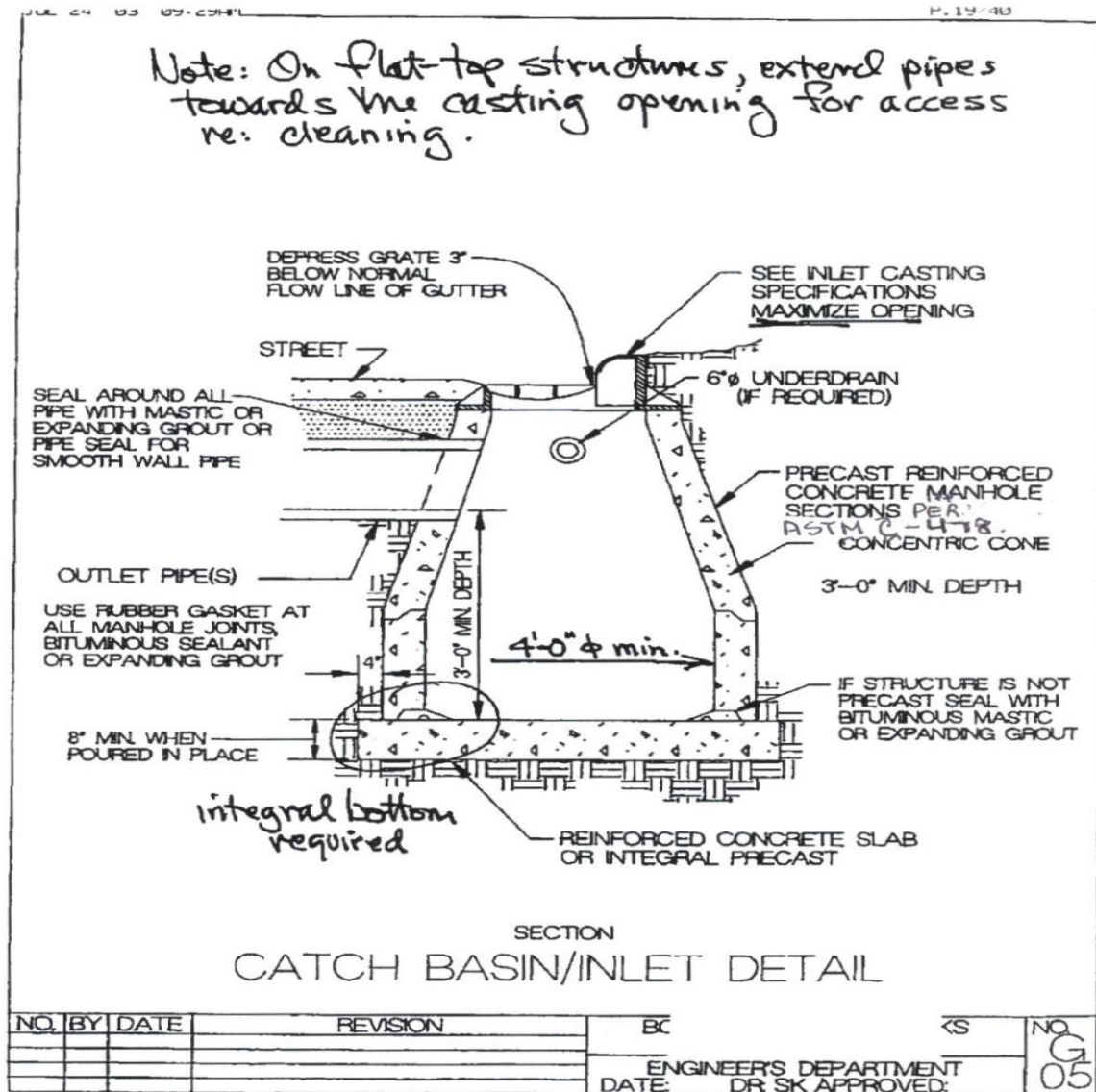


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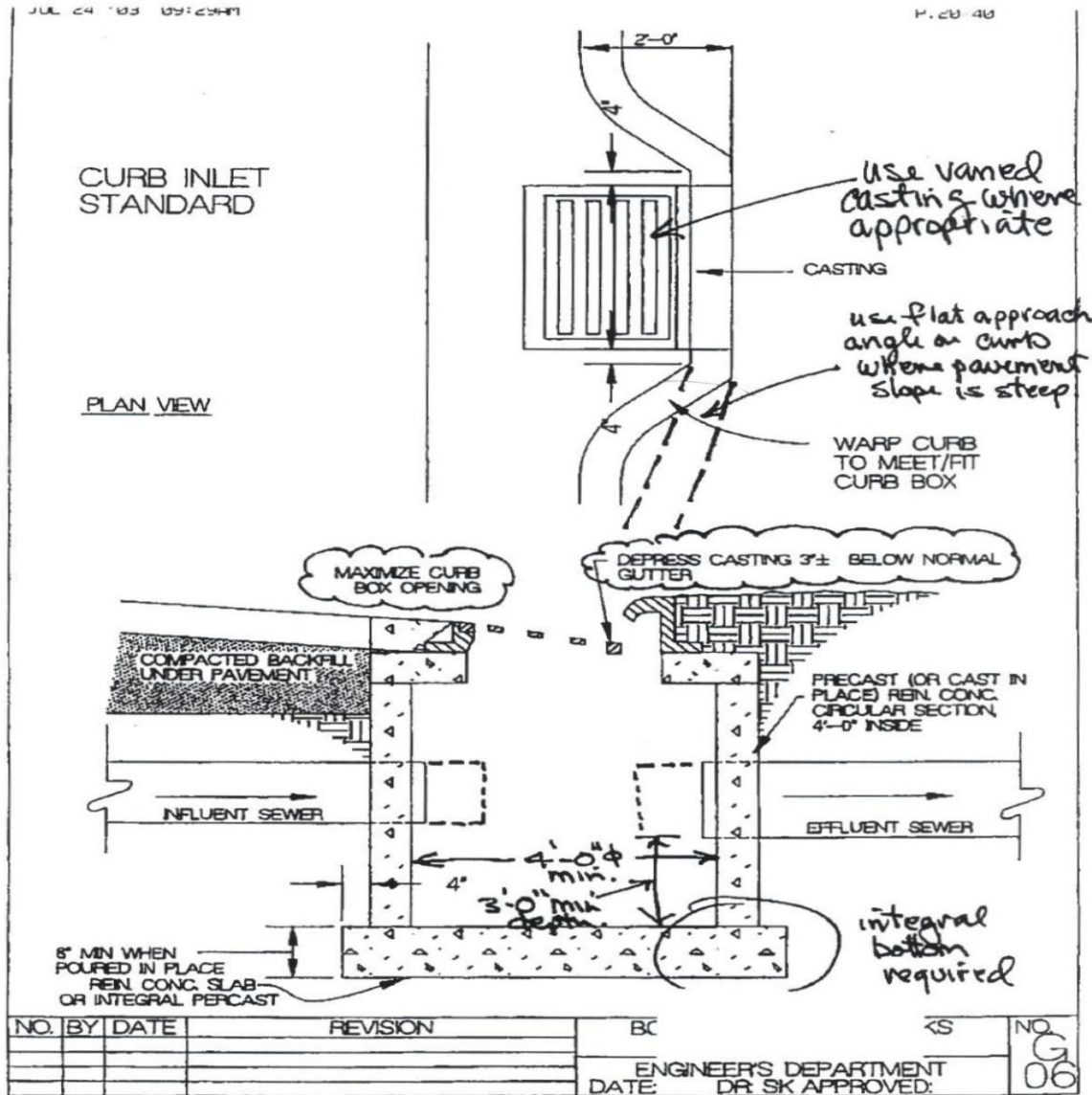


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USE	NEENAH FOUNDRY	EAST JORDAN	REMARKS
CURB, INLET FRAME, GRATE, CURB BOX	R-3275 R-3246 R-3295-A R-3295-B	7000 7030 7031 7032	<i>preferred</i> DOUBLE UNIT FRAME TRIPLE UNIT FRAME
CATCH BASIN FRAME AND LID	R-3303 R-3305 R-3308	7500 7460	
INLET FRAME AND GRATE	R-3472 R-2510-A R-2563	5340	BEEHIVE GRATE BEEHIVE GRATE
MANHOLE FRAME	R-1772-C R-1712-B R-1712		355# 22-3/4" 415# 22-3/4" 540# 22-3/4"
CATCH BASIN FRAME	R-2077-C R-2077-C R-2077-A R-2031 R-2014 R-2015	1022-3 1022-2 1022-1 1715 1920 1920	22-3/4" 22-3/4" 22-3/4" 22-3/4" 22-3/4" 22-3/4"
MANHOLE STEPS	R-1888	<i>not allowed</i>	

CASTINGS, LIDS
AND INLETS

NO.	BY	DATE	REVISION

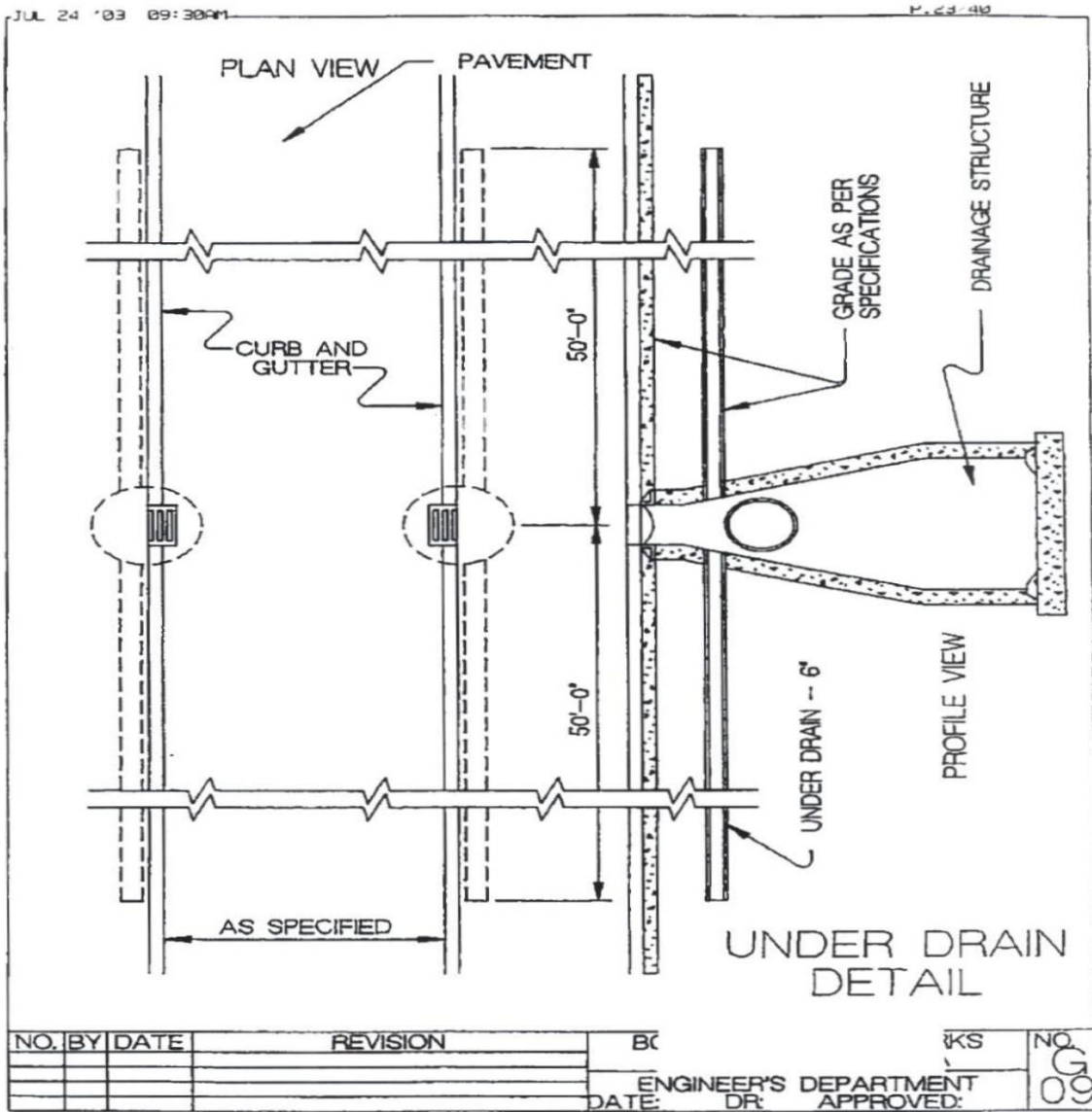
ENGINEER'S DEPARTMENT
 DATE: DR: APPROVED:

NO. 07

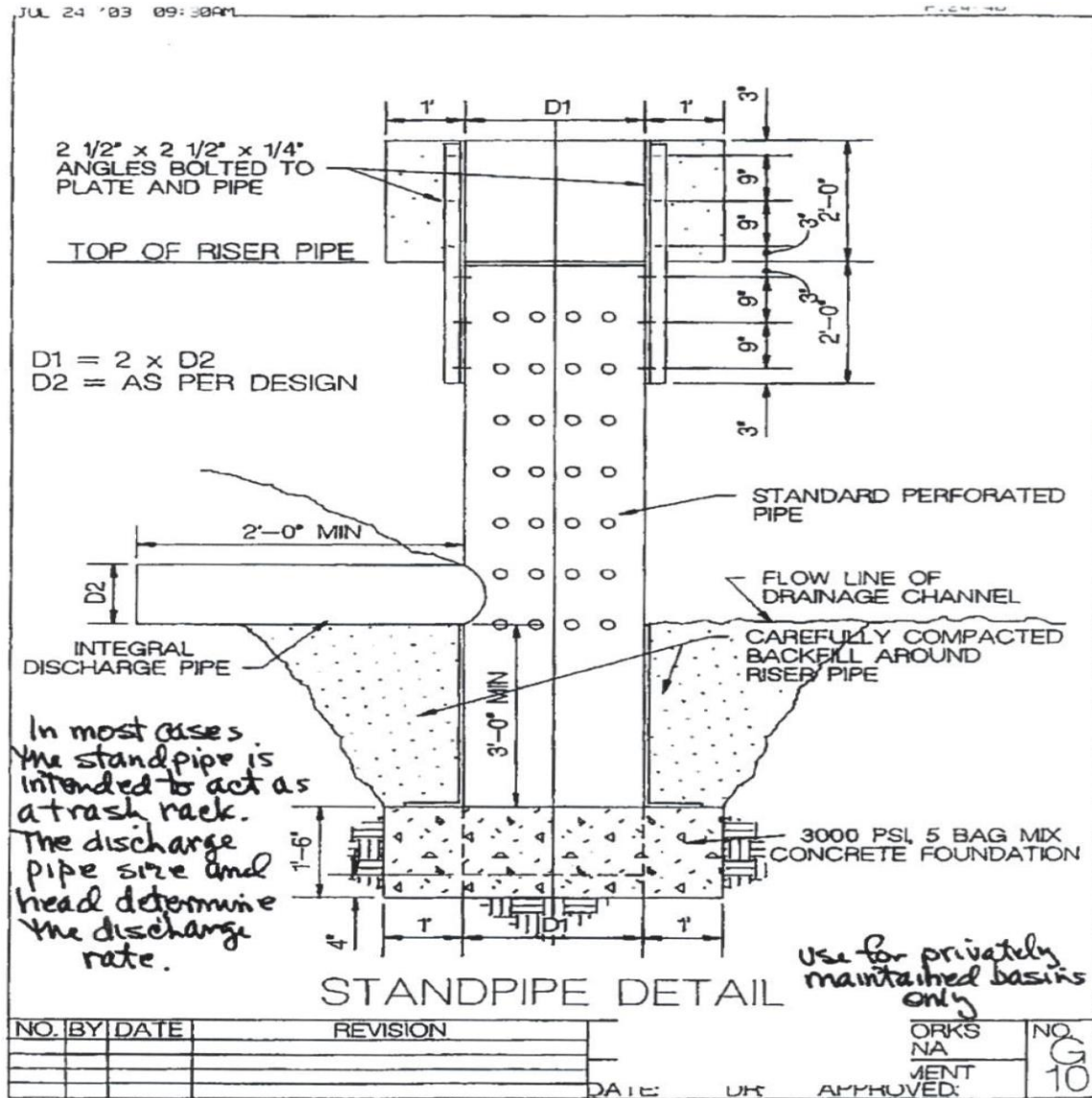
Any other construction casting considered must be of equal or superior quality and must first be approved by the City Engineer. No casting will be accepted unless it meets these specifications.

SECTION
UNDER DRAIN
use in all street low points

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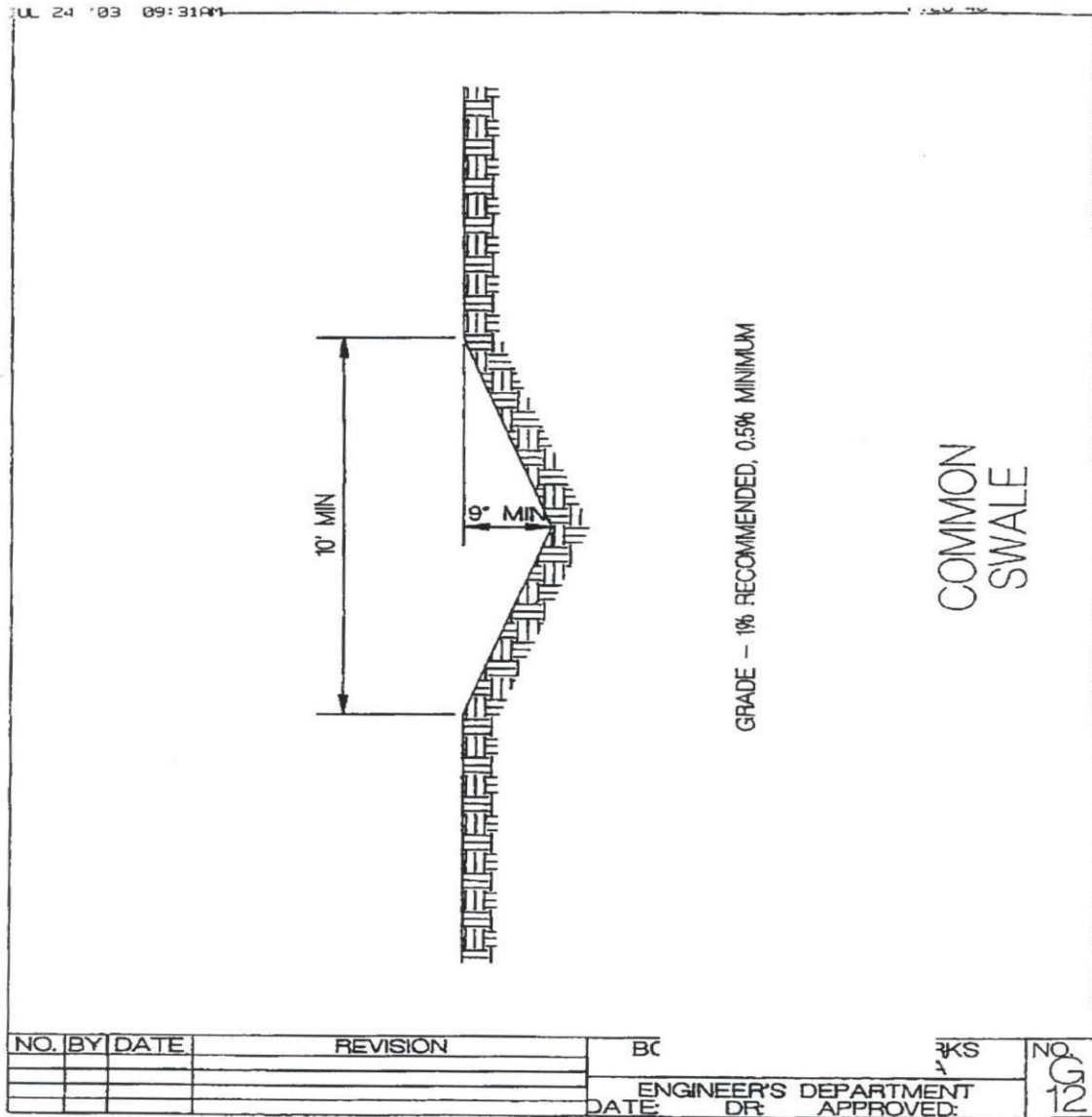
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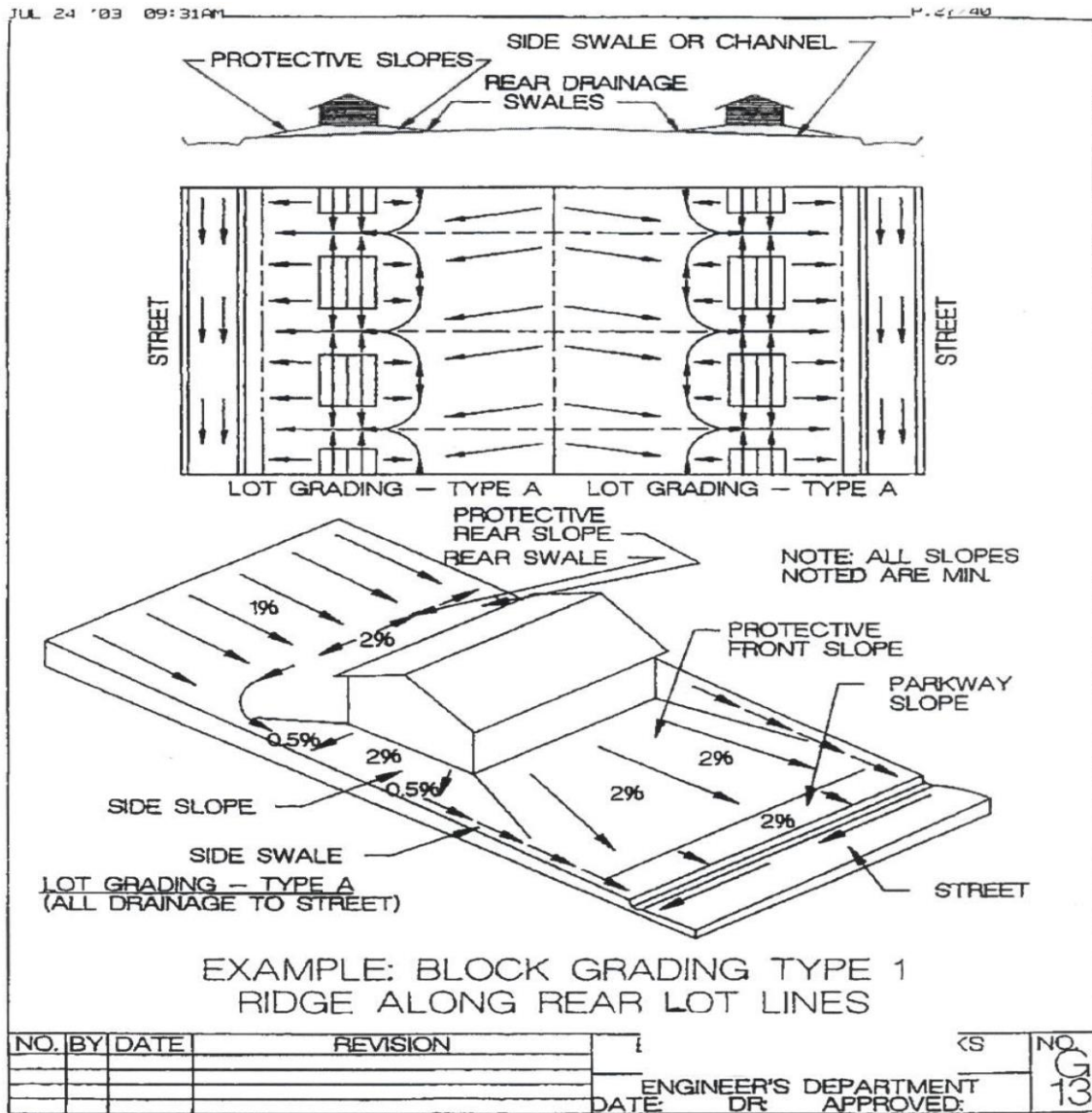
EXAMPLE DRAINAGE STRUCTURE SCHEDULE

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						11
				ENGINEER'S DEPARTMENT		
				DATE:	DR:	APPROVED:

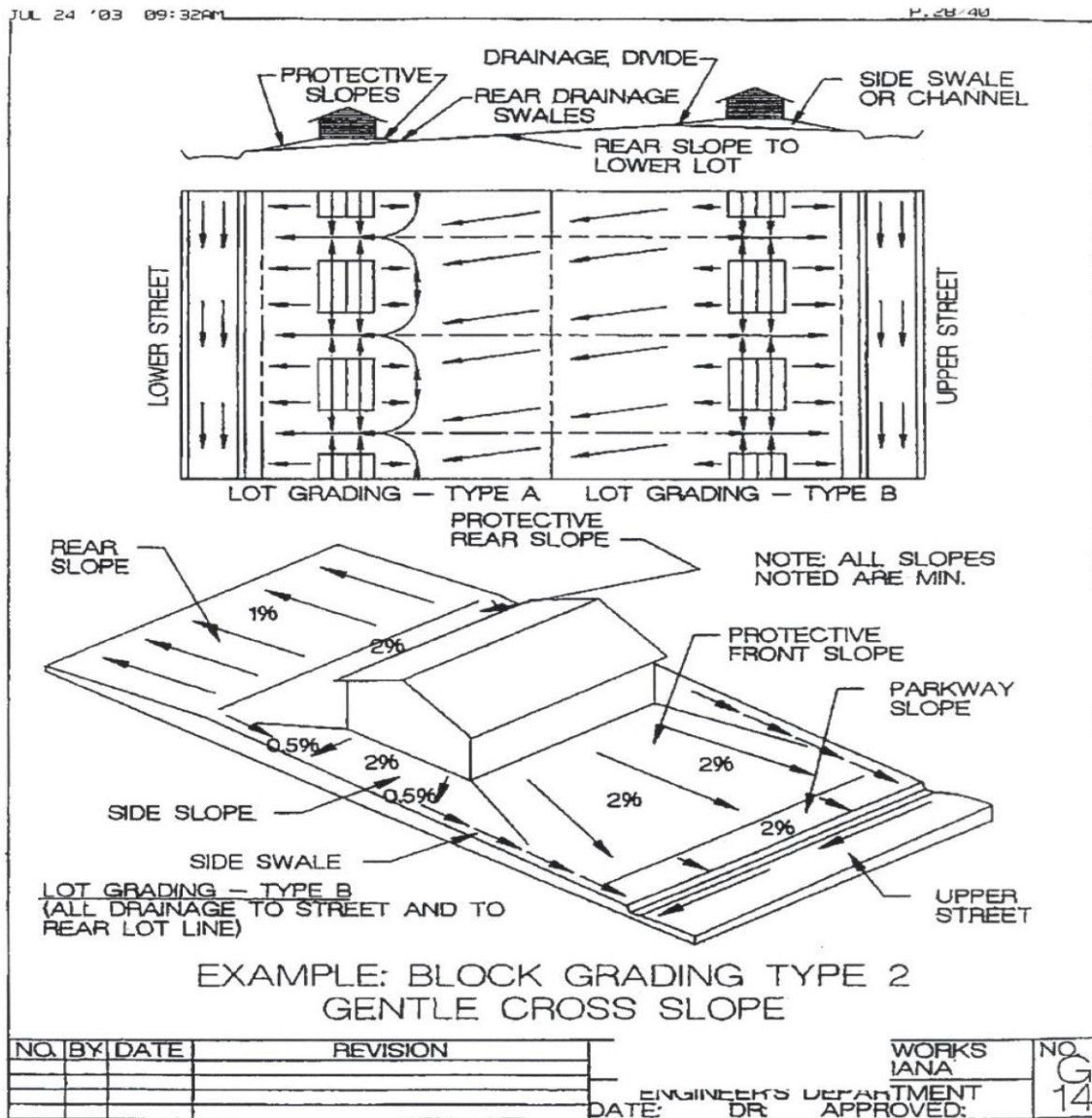
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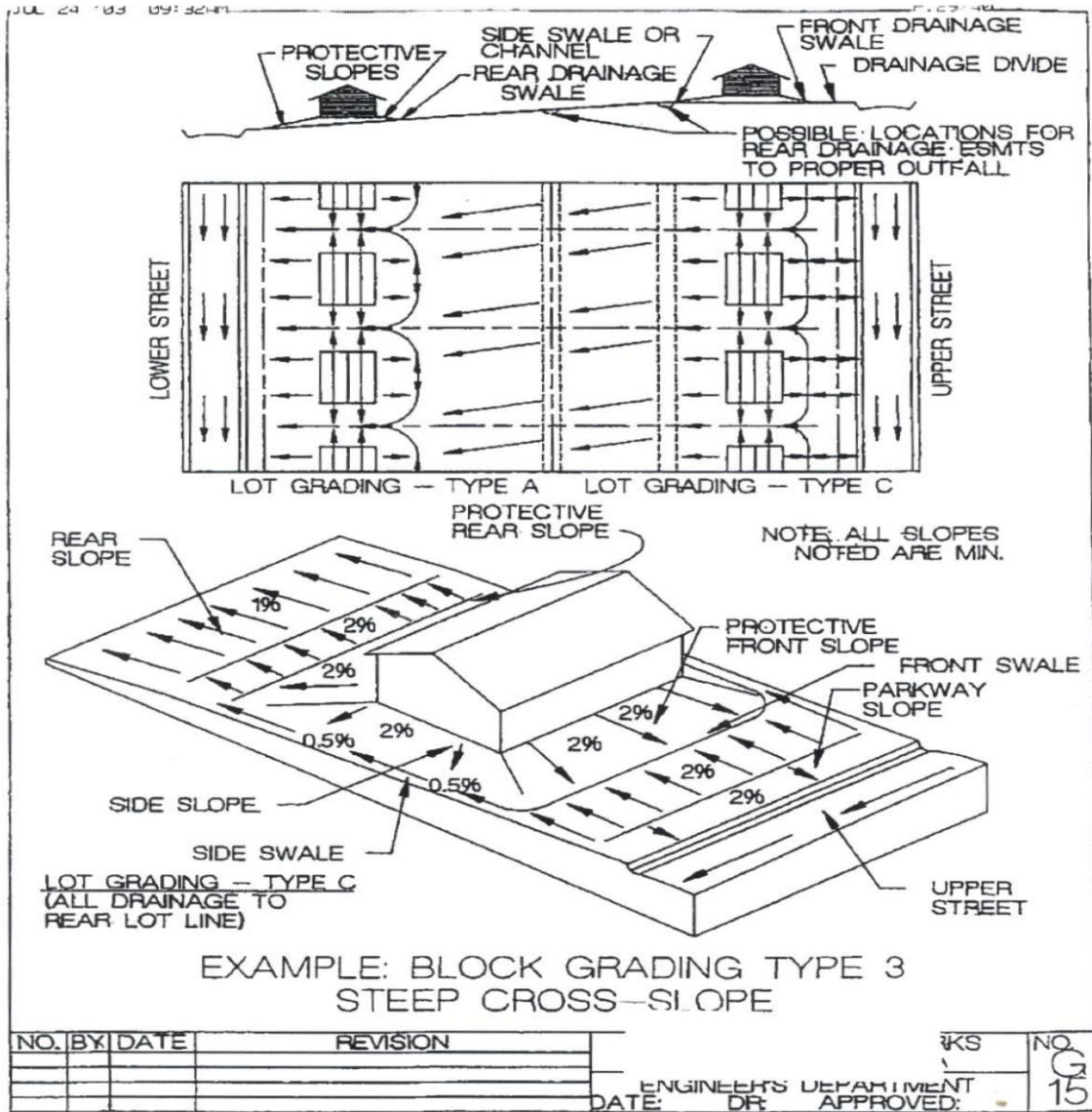
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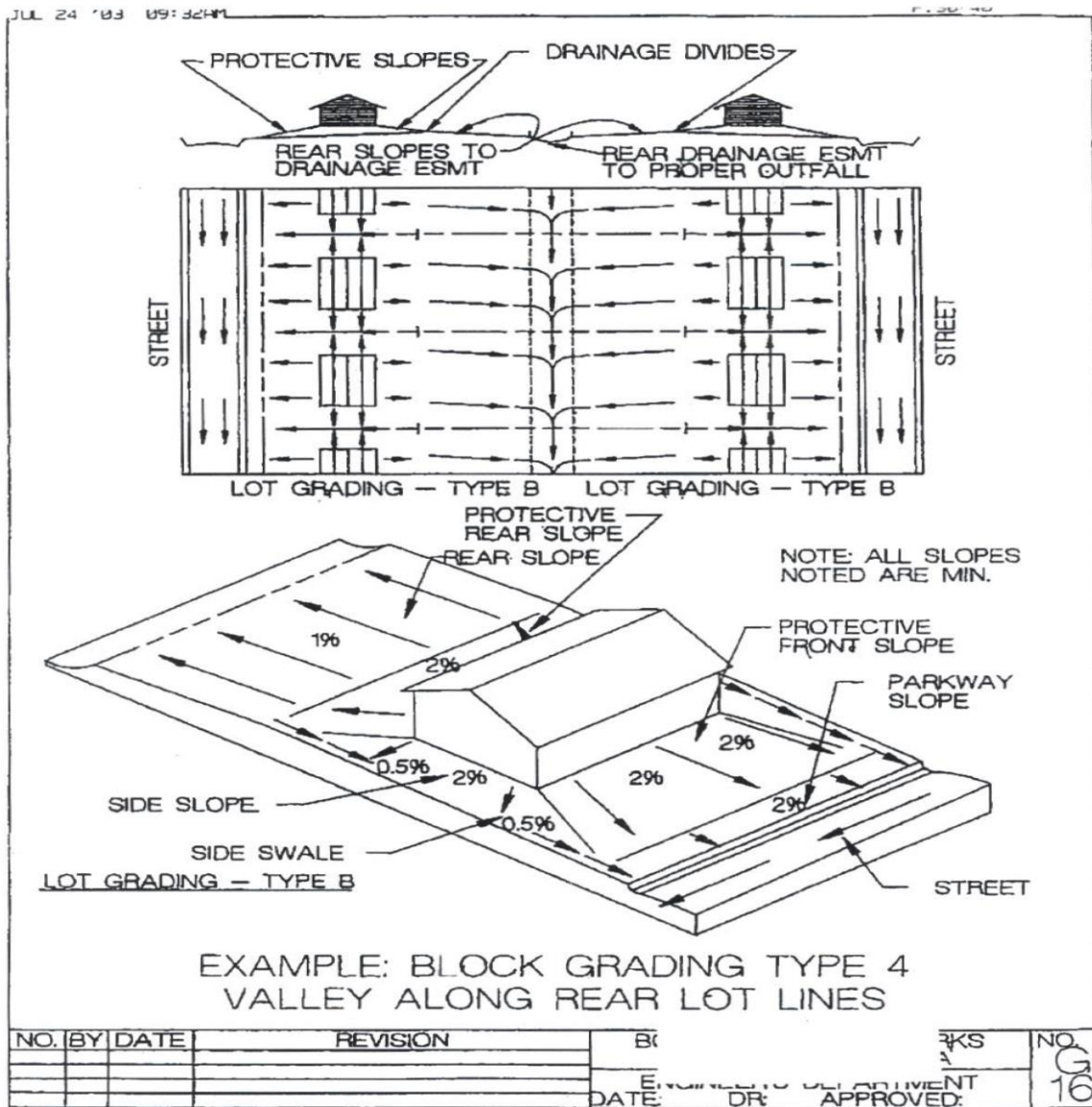
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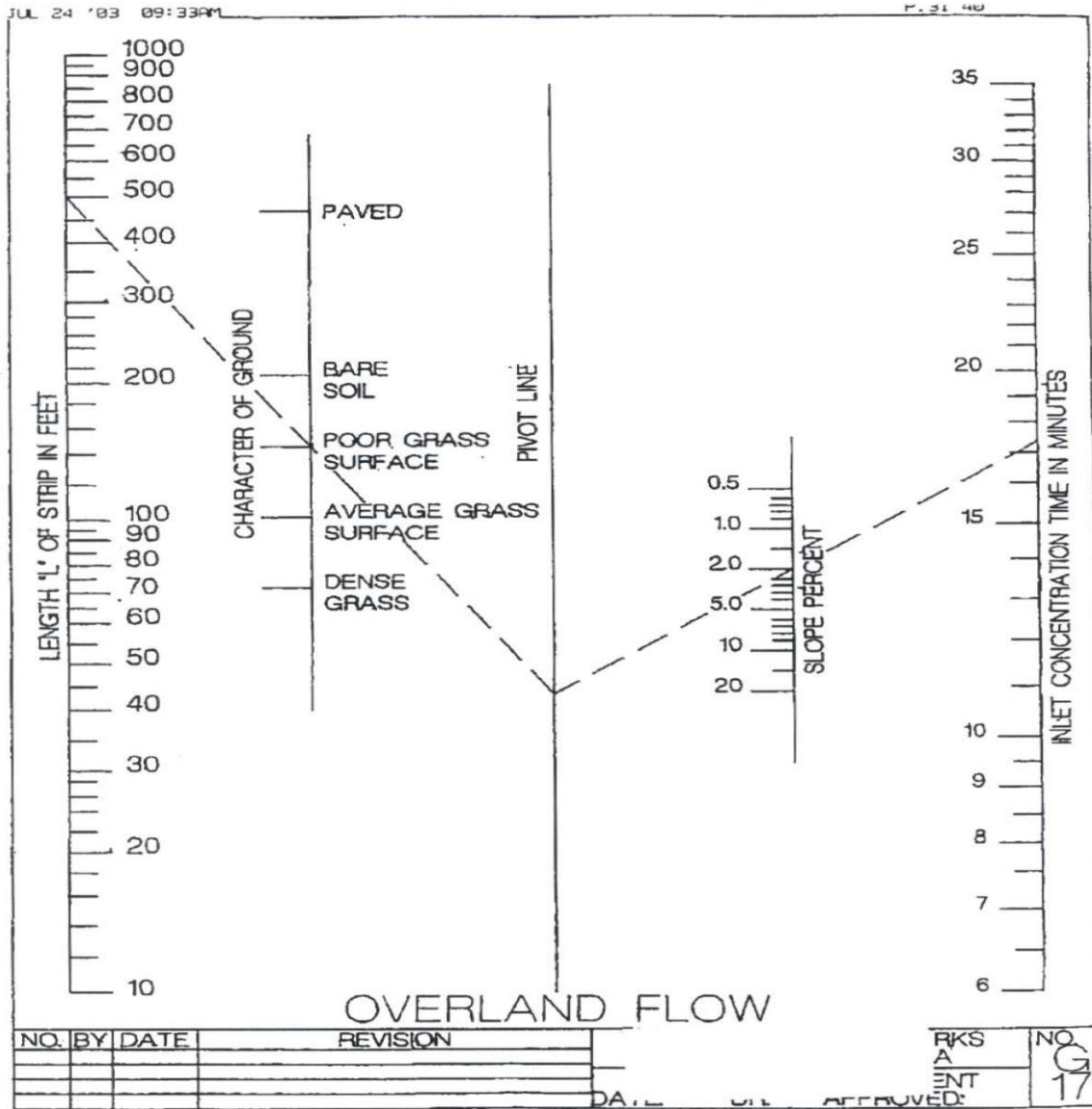
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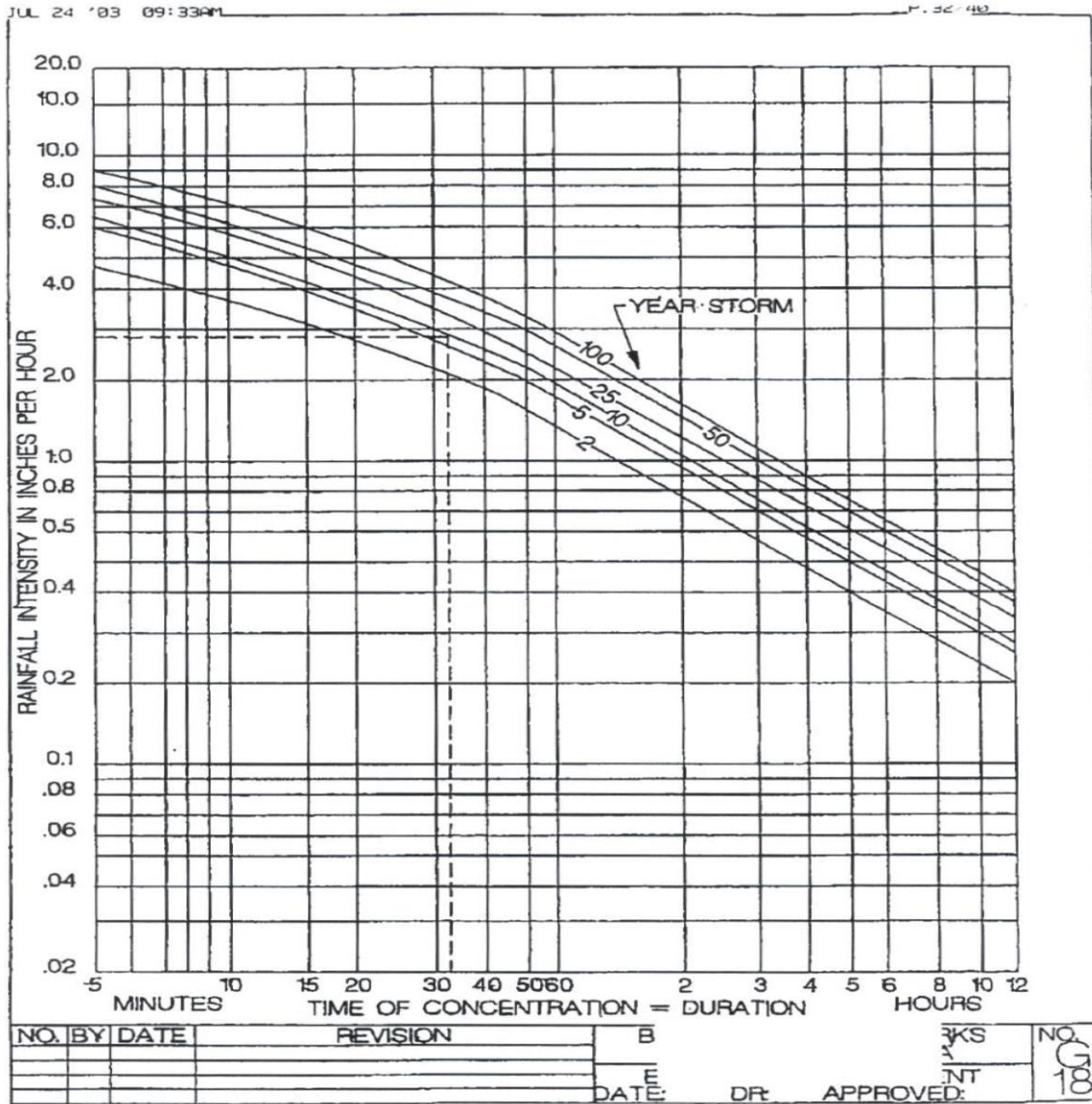
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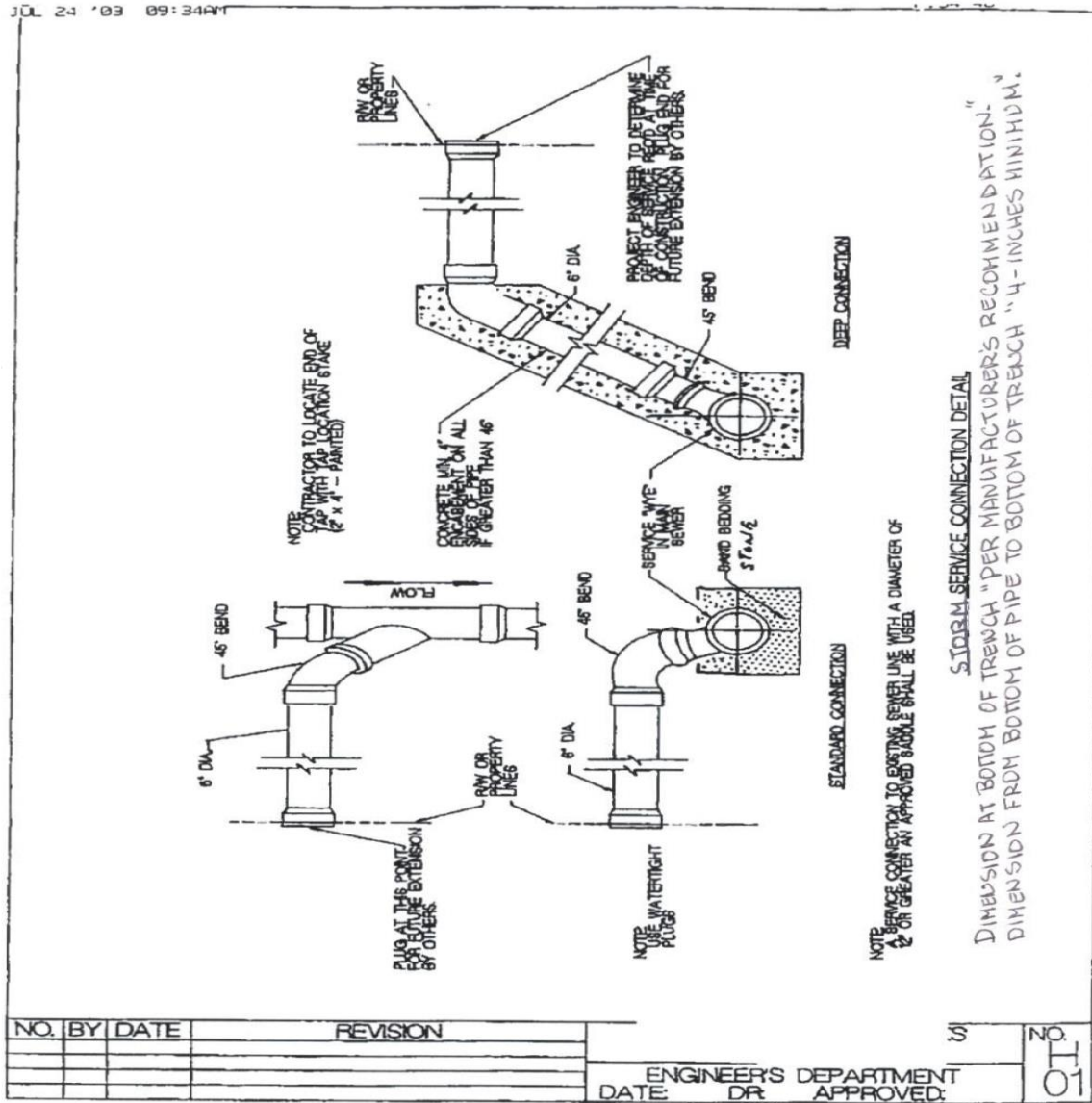
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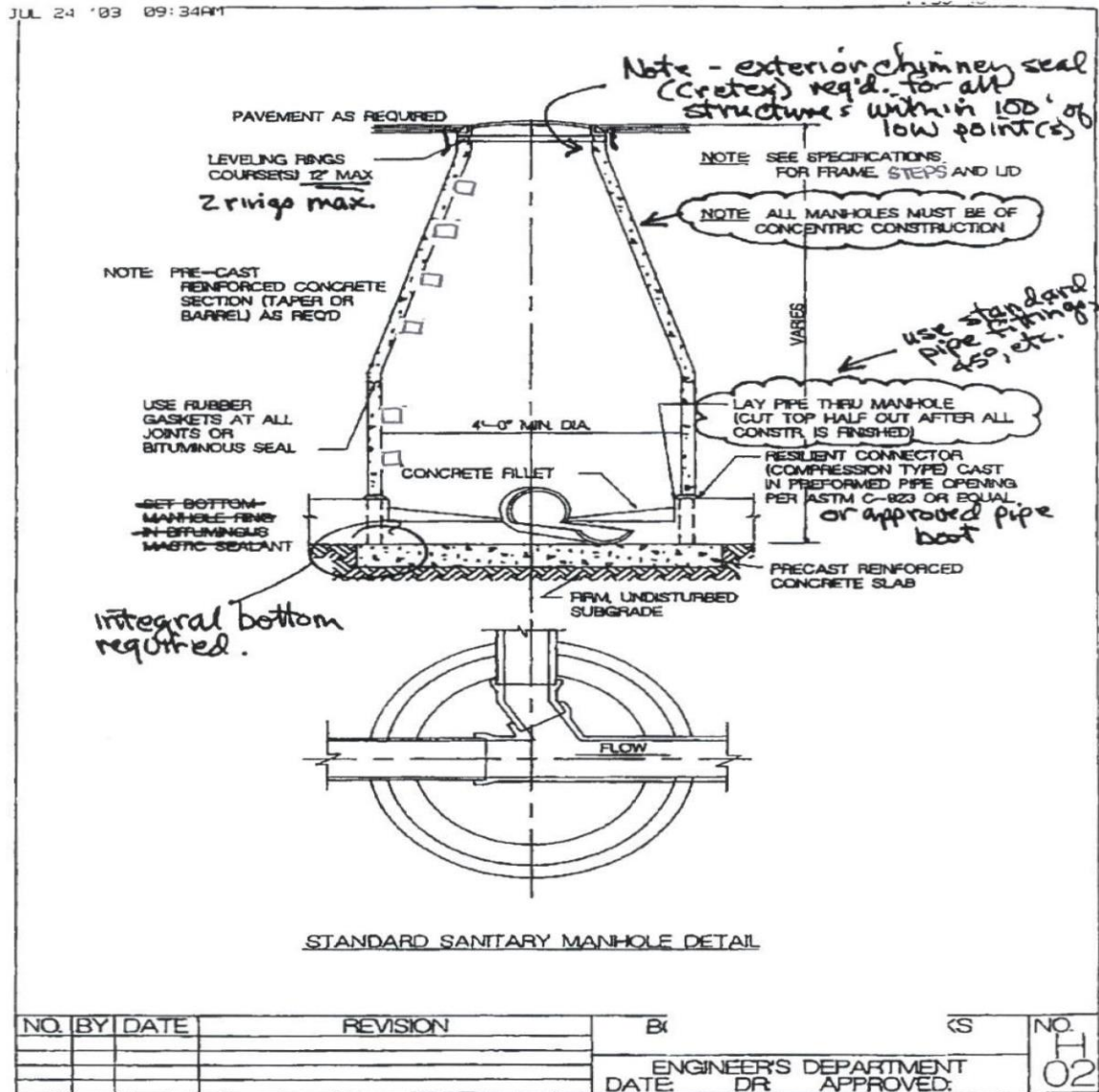
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