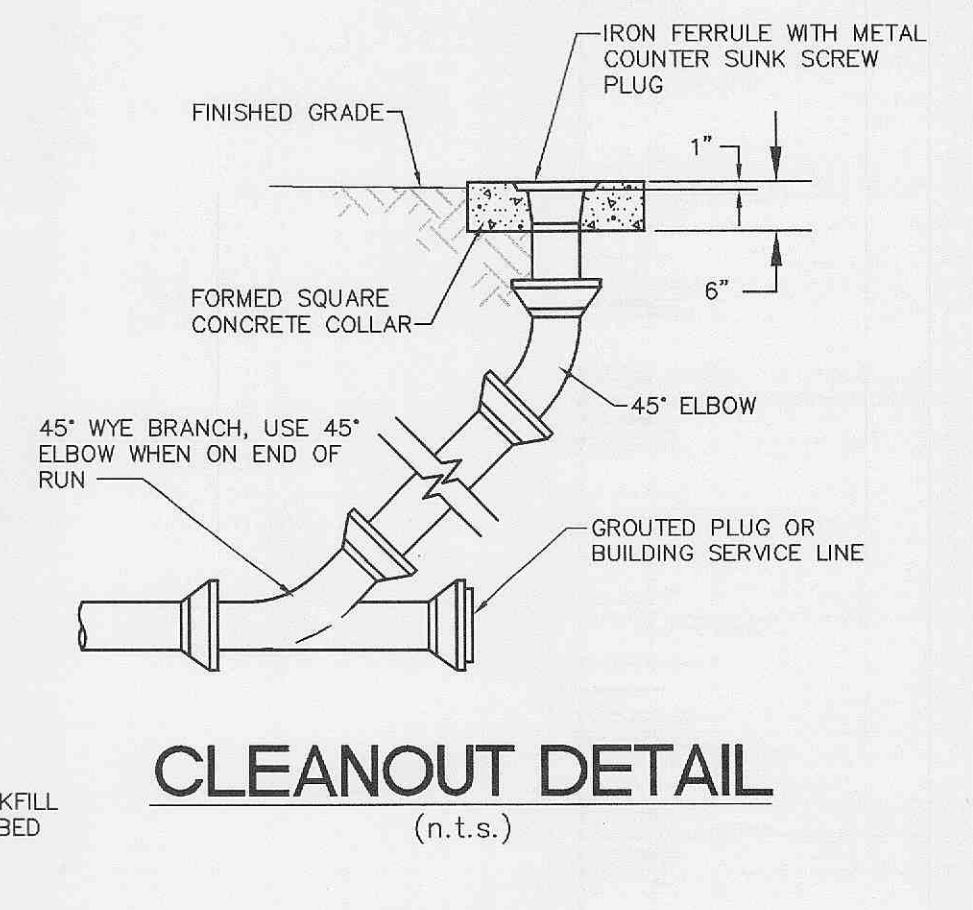
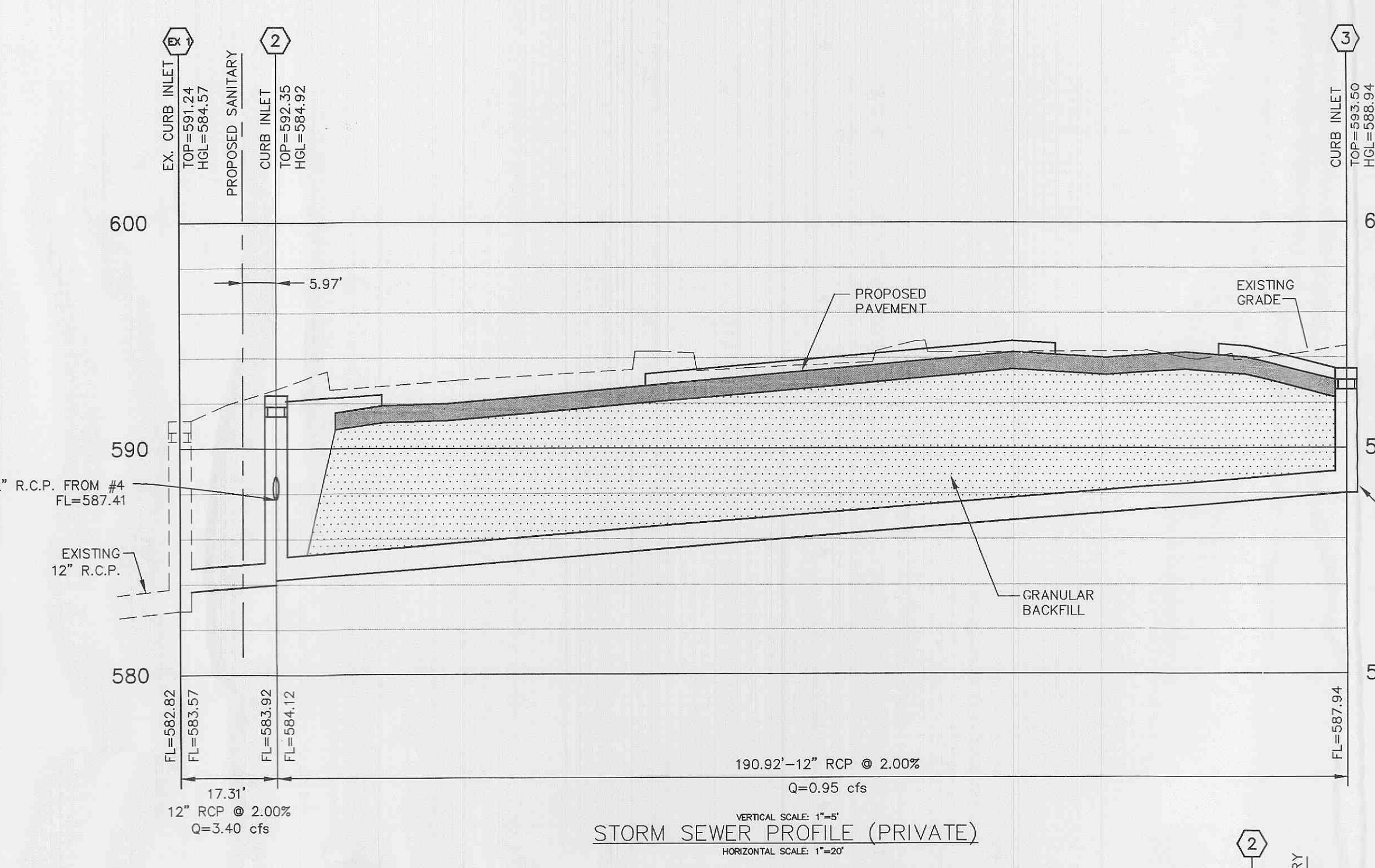


**FIRE HYDRANT NOTES**

- THE FIRE HYDRANT SHALL BE PROVIDED WITH A CONTROL VALVE IN THE HYDRANT CONNECTION SUCH THAT THE HYDRANT CAN BE REMOVED FROM SERVICE WITHOUT SHUTTING OFF WATER SUPPLY TO OTHER FIRE HYDRANTS.
- THE FIRE HYDRANT SHALL HAVE NOT LESS THAN TWO 2-1/2" INCH OUTLETS AND ONE 4-1/2" INCH OUTLET. A 5-1/2" INCH VALVE, A 6" INCH BARREL AND SHALL BE OF THE BREAKAWAY DESIGN, TROST FREE WITH CHAIN, LEFT HAND OPEN DESIGN AND HAVE NATIONAL STANDARD THREADS.



**HYDRAULIC CALCULATION SHEET (SEE DRAINAGE AREA MAP SHEET C90 FOR P.I. AND Q (INFLOW) FOR EACH STRUCTURE)**

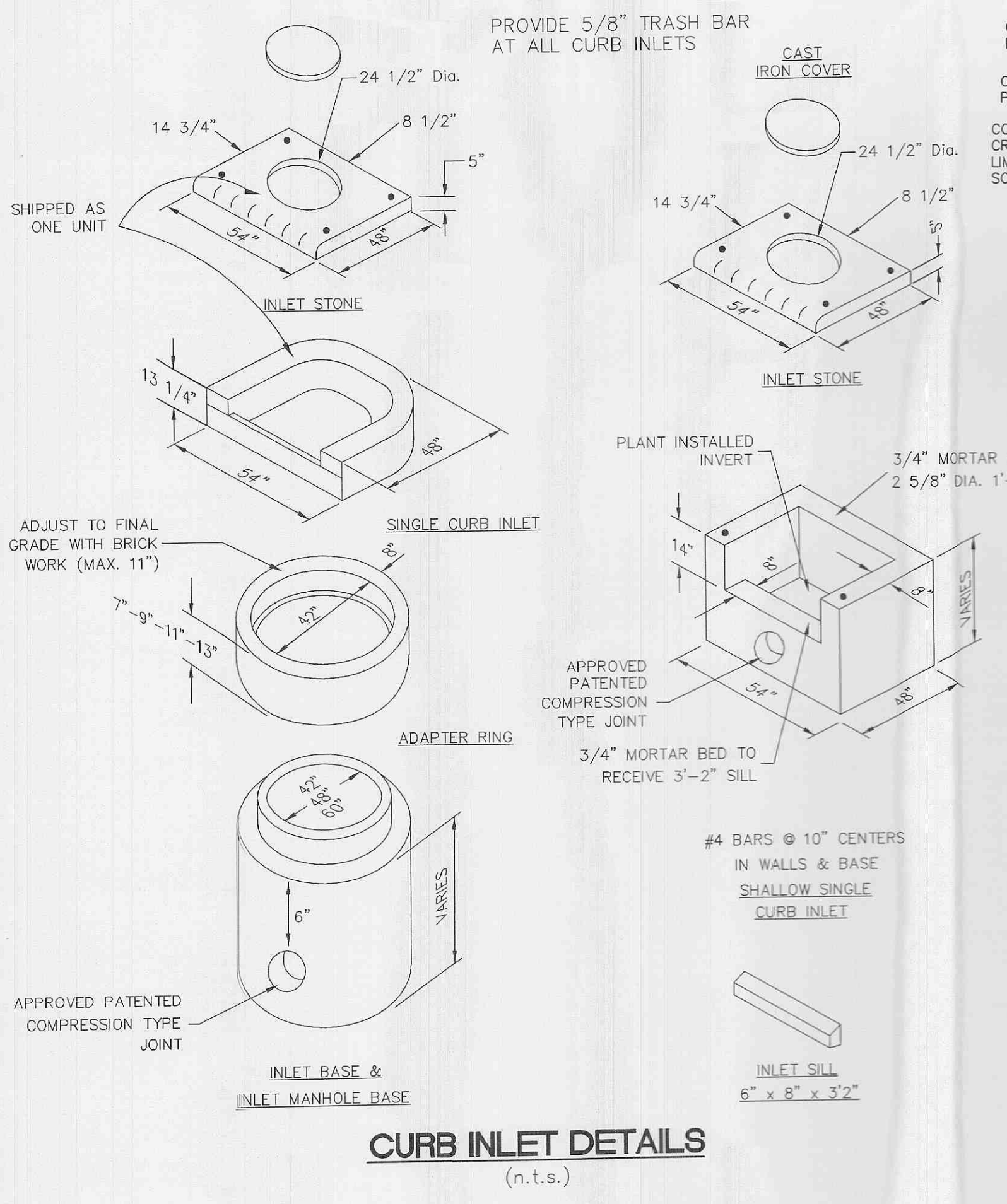
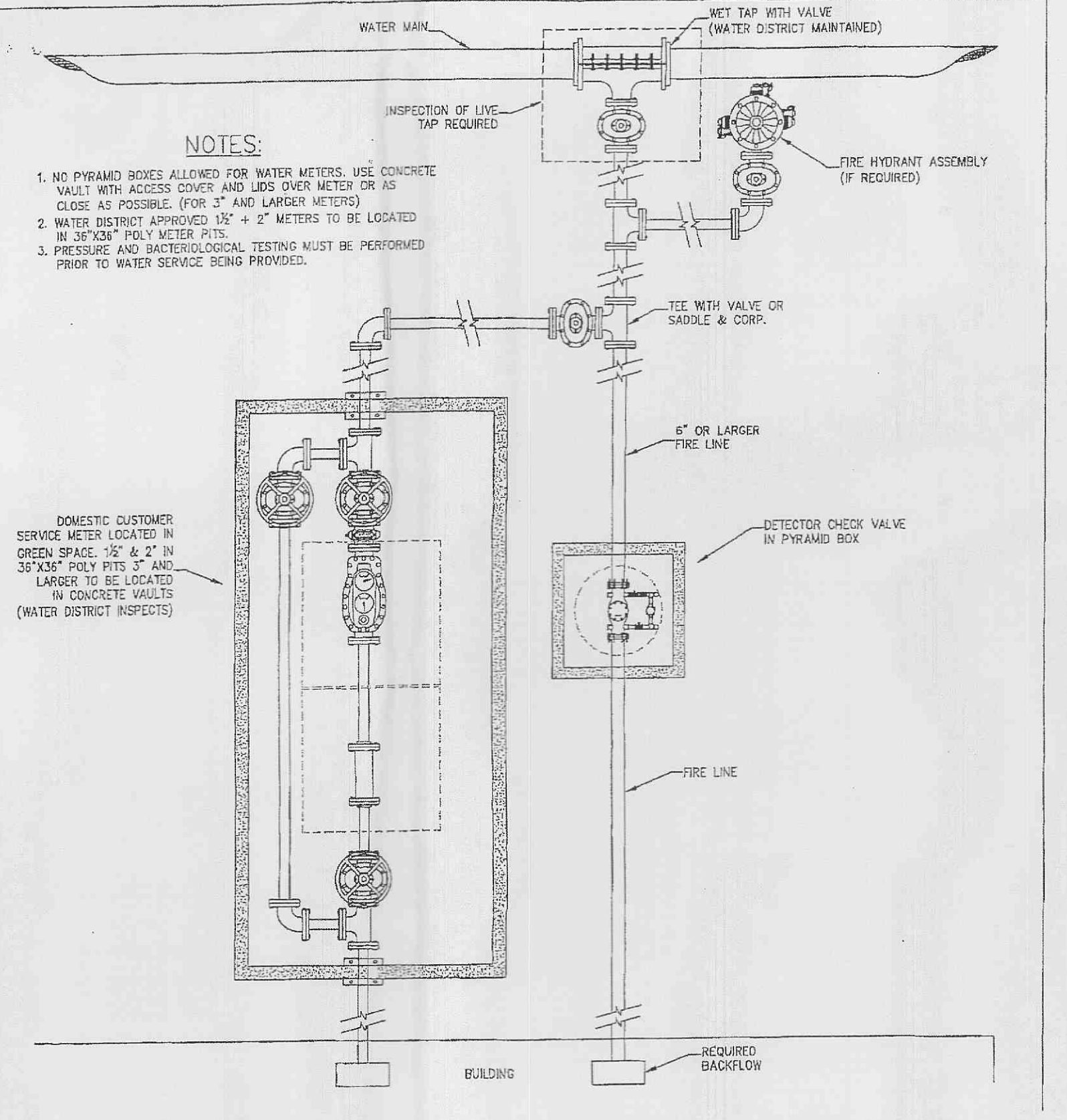
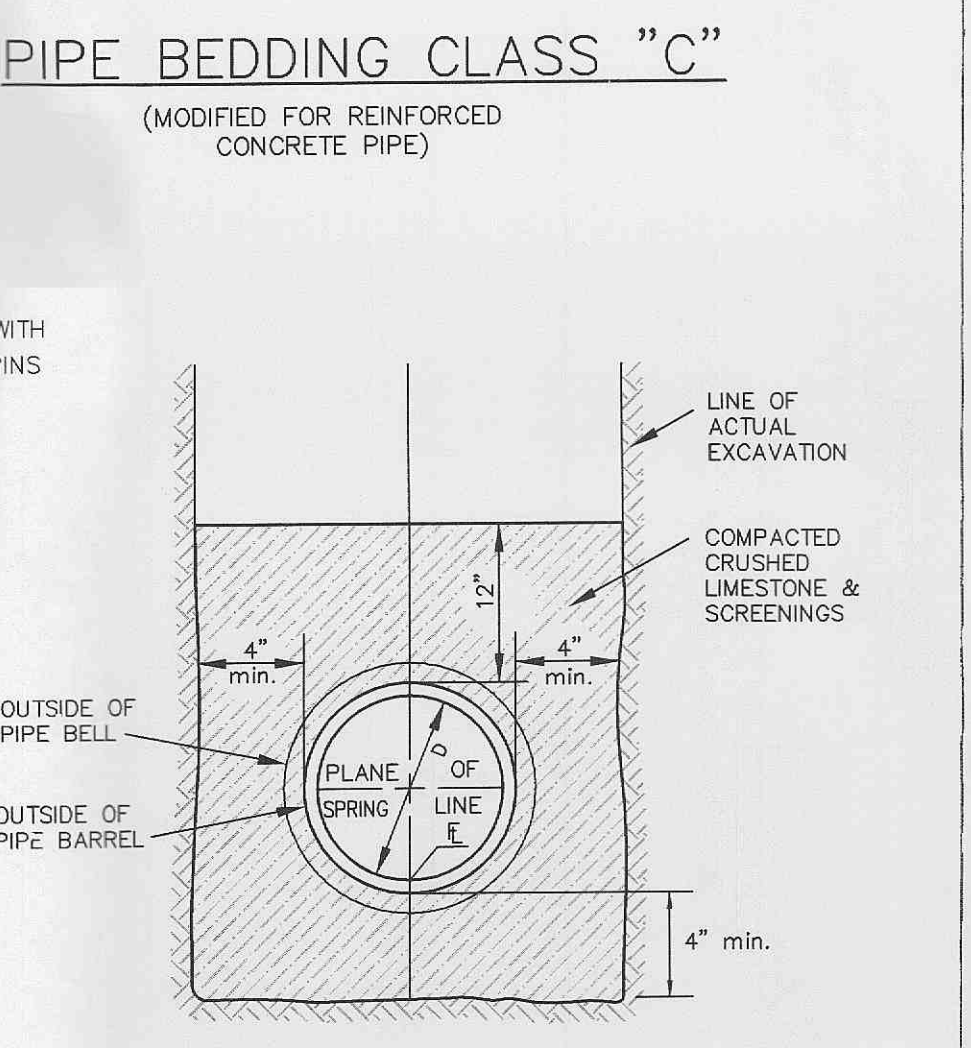
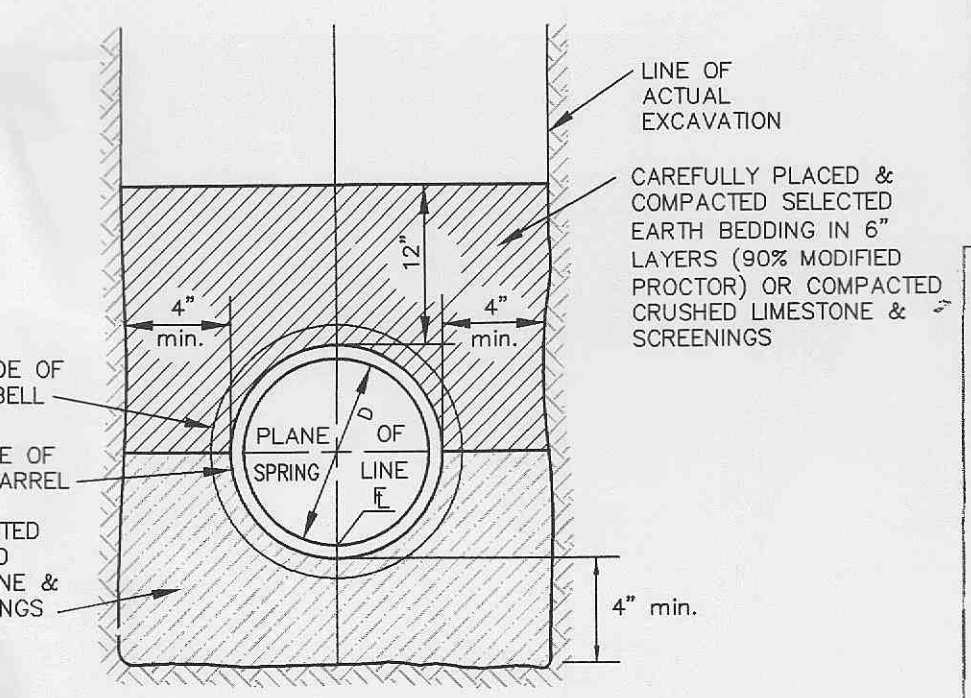
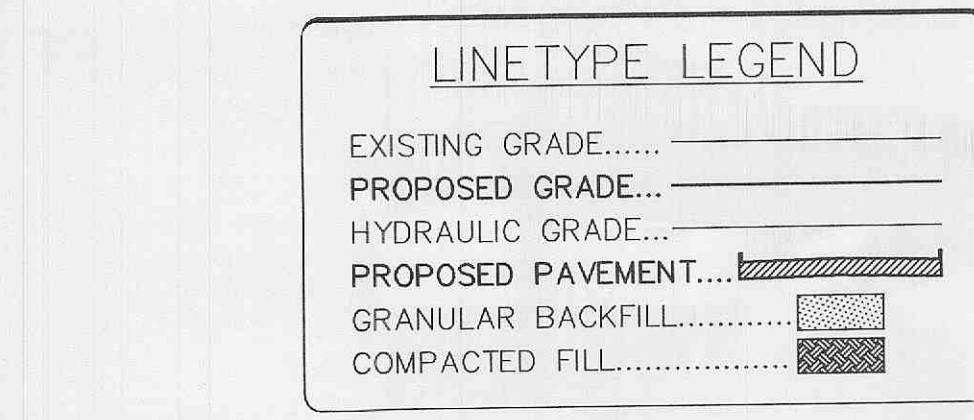
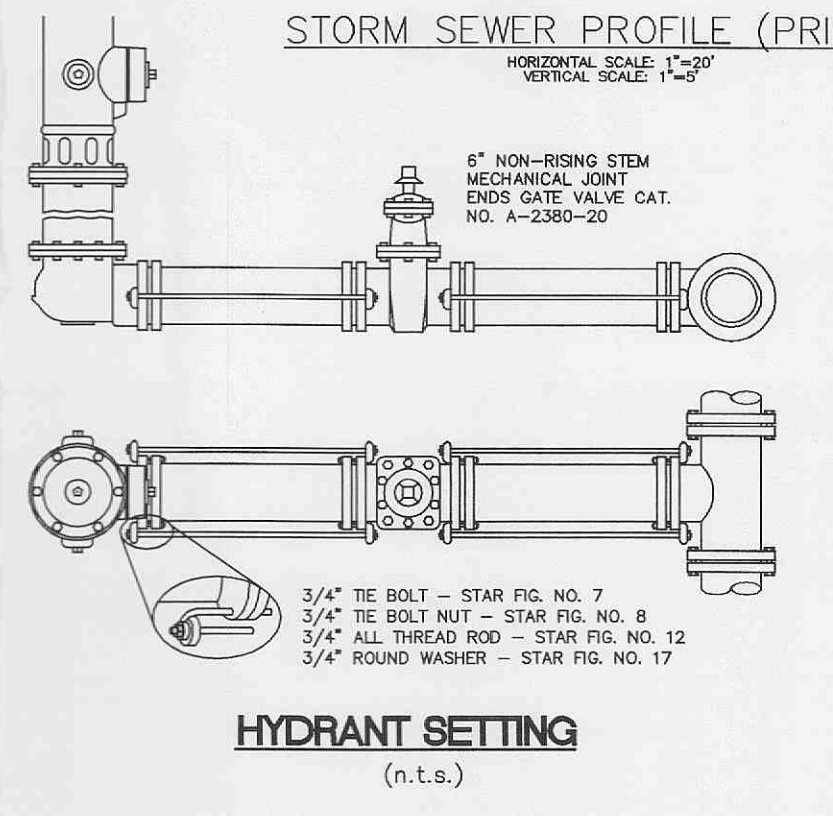
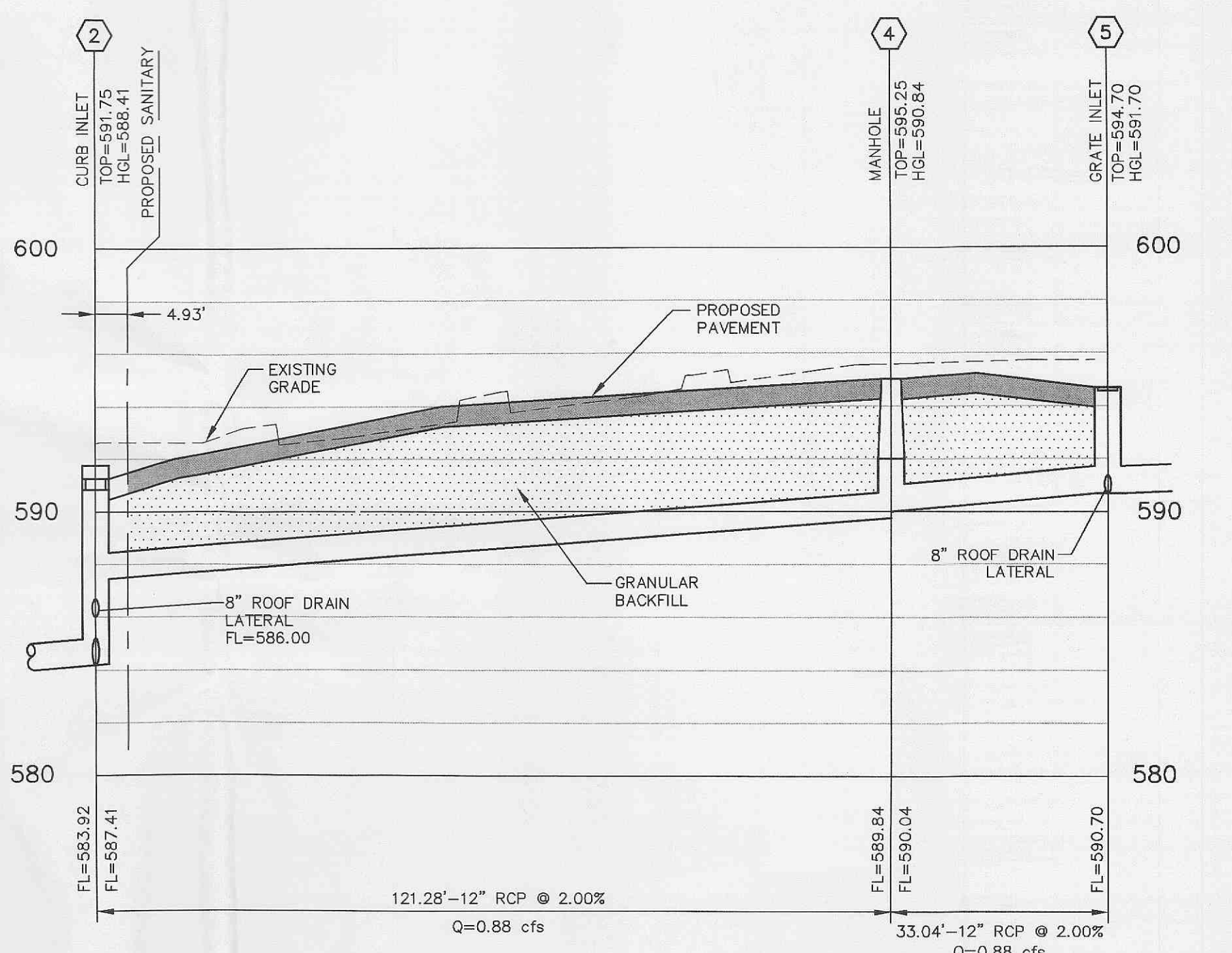
Project name: FIFTH THIRD BANK  
Project number: 206-3665.1 (HGY K)  
Storm: 15yr-20min.  
Calculated By: JPP  
Checked By: GMS  
Date: 03-13-06

Structure Number	LINE	ELEVATIONS		Length (ft)	Flowline (ft)	Pipe Size (in.)	Full Flow (cfs)	Total (ft)	Total (ft)	Mean Full Flow Vel. (ft/s)	Bend Coef.	Velocity Head (ft)	Q <sub>v</sub> (ft <sup>3</sup> /s)	Pipe Coef. (n)	H <sub>f</sub> (ft)	Junction (ft)	Bend (ft)	Total (ft)	Hydraulic Elevations			Structure TOP Elevation	Free Board	Structure Number
		Upper Structure	Lower Structure																Upper Structure	Lower Structure	H <sub>u</sub> + Dia. + H <sub>f</sub>			
5	3	4	590.70	590.04	33.04	0.0200	12	5.05	0.78	0.99	0.02	0.01	0.013	0.02	0.00	0.00	0.00	0.00	591.70	591.06	591.04	591.70	3.00	5
4	4	2	589.84	587.41	121.28	0.0200	12	5.06	0.90	1.15	0.02	0.02	0.013	0.06	0.00	0.00	0.00	590.84	588.49	588.41	590.84	4.41	4	
2	2	2	589.92	584.12	190.91	0.0200	12	5.05	1.86	2.50	0.10	0.19	0.013	0.58	0.00	0.00	0.00	588.94	585.70	585.12	588.94	4.56	3	
3	3	2	587.94	584.12	190.91	0.0200	12	5.05	1.86	2.50	0.10	0.19	0.013	0.58	0.00	0.00	0.00	588.94	585.70	585.12	588.94	4.56	3	
2	2	1	583.92	583.57	17.31	0.0200	12	5.06	2.85	3.63	0.20	0.58	0.013	0.11	0.00	0.00	0.00	584.92	584.68	584.57	592.25	7.33	2	
1	1	1	582.82	582.82	0.00	0.0000	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	582.82	582.82	582.82	582.82	0.00	1

**FORMULAS:**  
MEAN FULL FLOW VELOCITY:  $V = Q_{avg}/A_{pipe}$   
FRICTION LOSS (H<sub>f</sub>):  $H_f = 2.47 n^2 (L/V^{4.75})$   
VELOCITY HEAD:  $V_v = V^2/2g$

**JUNCTION LOSSES (UNCL) = [Q<sub>v</sub>V<sub>u</sub> - Sum (Q<sub>v</sub>V<sub>h</sub>)] x 1.33/Out**  
**BEND LOSSES (BEND) = (V<sub>u</sub>) x ANGLE COEFFICIENT**

**Notes:**  
1. IF MORE THAN ONE COMING LINE, CALCULATE EACH BEND LOSS AND ADD TOGETHER.  
2. NO STRUCTURE LOSSES TO BE CALCULATED AT A DROP  
3. IF Q<sub>v</sub> > Q<sub>v</sub>min, NO JUNCTION LOSSES TO BE CALCULATED.



P&Z NOS: 0106  
APPROVED ON 05/04/2006  
06-16-06  
GEORGE M. STOCK E-25116

06-16-06 REVISED PER CITY COMMENTS

SEWER PROFILES, DETAILS, AND HYDRAULICS  
FIFTH THIRD BANK - HIGHWAY K

**STOCK & ASSOCIATES**  
Consulting Engineers, Inc.

257 Chesterfield Business Parkway  
St. Louis, MO 63005  
PH. (636) 530-9100  
FAX (636) 530-9130  
e-mail: general@stockassoc.com  
Web: www.stockassoc.com

DRAWN BY: J.P.P. DATE: 05/08/06 CHECKED BY: G.M.S. DATE: 05/08/06 JOB NUMBER: 205-3665.1 SHEET: C7 of 14