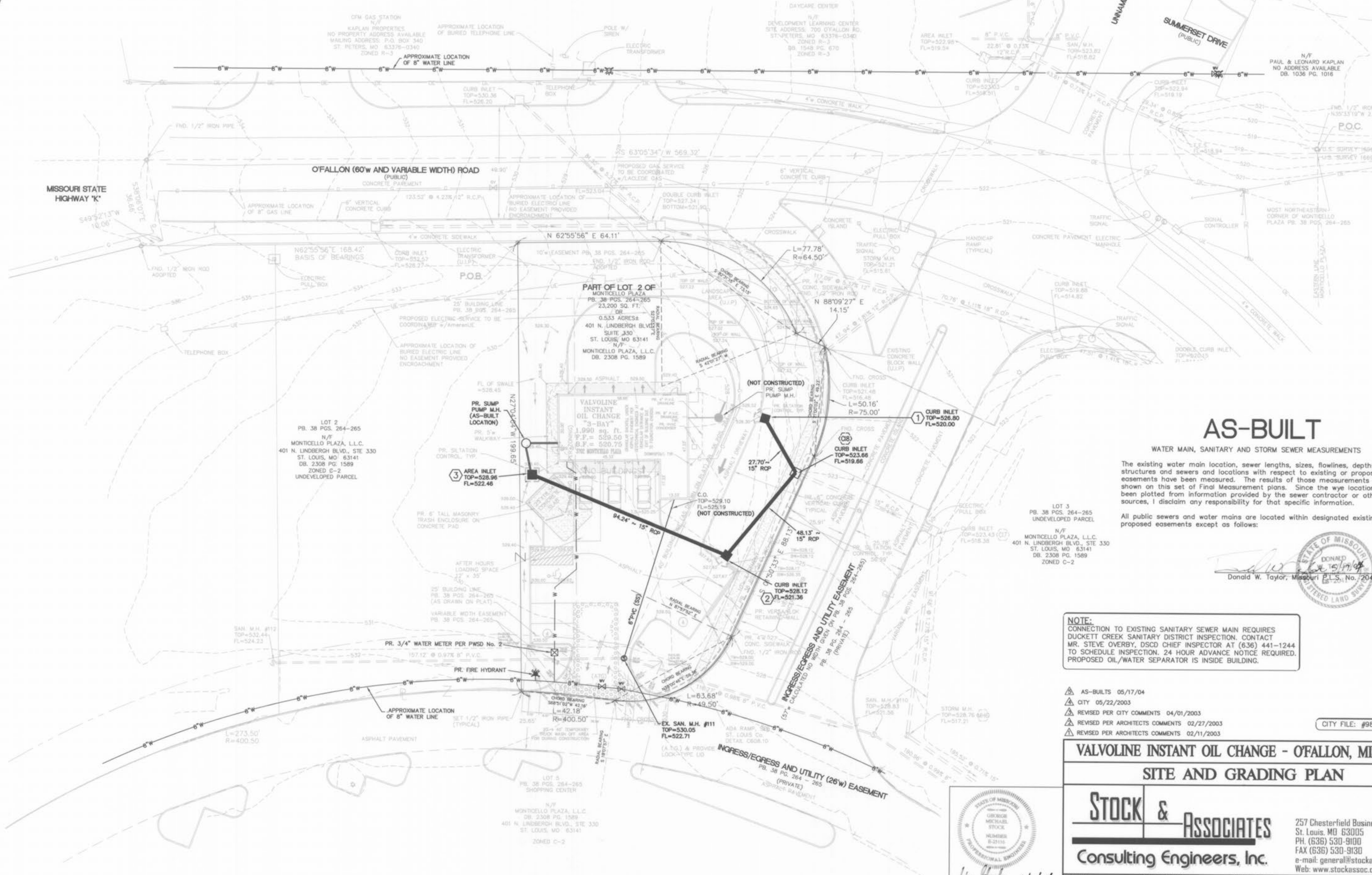
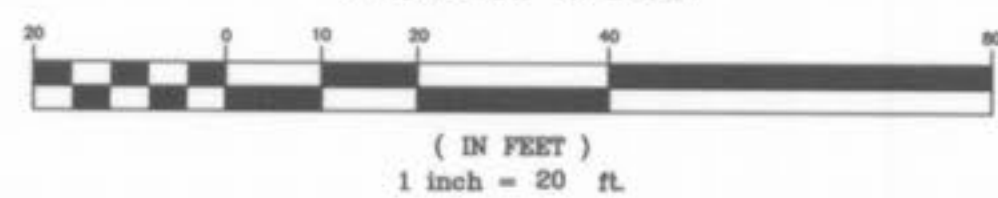


GRAPHIC SCALE



AS-BUILT

WATER MAIN, SANITARY AND STORM SEWER MEASUREMENTS

The existing water main location, sewer lengths, sizes, flowlines, depths of structures and sewers and locations with respect to existing or proposed easements have been measured. The results of those measurements are shown on this set of Final Measurement plans. Since the wye locations have been plotted from information provided by the sewer contractor or other sources, I disclaim any responsibility for that specific information.

All public sewers and water mains are located within designated existing or proposed easements except as follows:

STATE OF MISSOURI
DONALD W. TAYLOR
REGISTERED LAND SURVEYOR
No. 2041
EX. 15/17/04

NOTE:
CONNECTION TO EXISTING SANITARY SEWER MAIN REQUIRES DUCKETT CREEK SANITARY DISTRICT INSPECTION. CONTACT MR. STEVE OVERBY, DSCD CHIEF INSPECTOR AT (636) 441-1244 TO SCHEDULE INSPECTION. 24 HOUR ADVANCE NOTICE REQUIRED. PROPOSED OIL/WATER SEPARATOR IS INSIDE BUILDING.

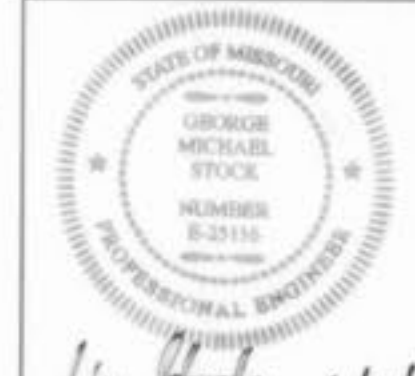
- ▲ AS-BUILTS 05/17/04
- ▲ CITY 05/22/2003
- ▲ REVISED PER CITY COMMENTS 04/01/2003
- ▲ REVISED PER ARCHITECTS COMMENTS 02/27/2003
- ▲ REVISED PER ARCHITECTS COMMENTS 02/11/2003

CITY FILE: #98-74.04-3

VALVOLINE INSTANT OIL CHANGE - O'FALLON, MISSOURI
SITE AND GRADING PLAN

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



George M. Stock 6/8/04
E-25116

DRAWN BY:	DATE:	CHECKED BY:	DATE:	SHEET NUMBER:	SHEET:
B.O.S.	01/07/03	C.A.M.	01/07/03	202-2821	C4 of 10

Valvoline Instant Oil Change

AS-BUILT

WATER MAIN, SANITARY AND STORM SEWER MEASUREMENTS

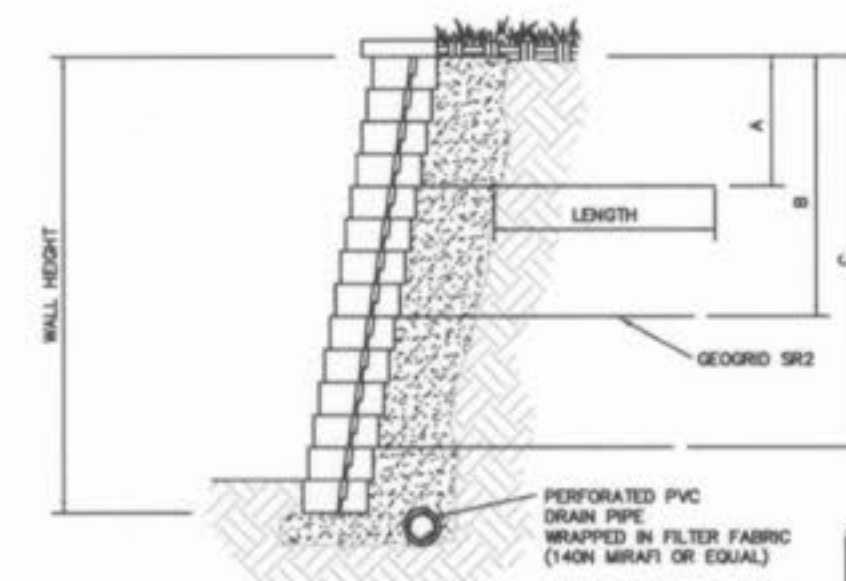
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All public sewers and water mains are located within designated existing or proposed easements except as follows:



RETAINING WALL PROFILE

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'



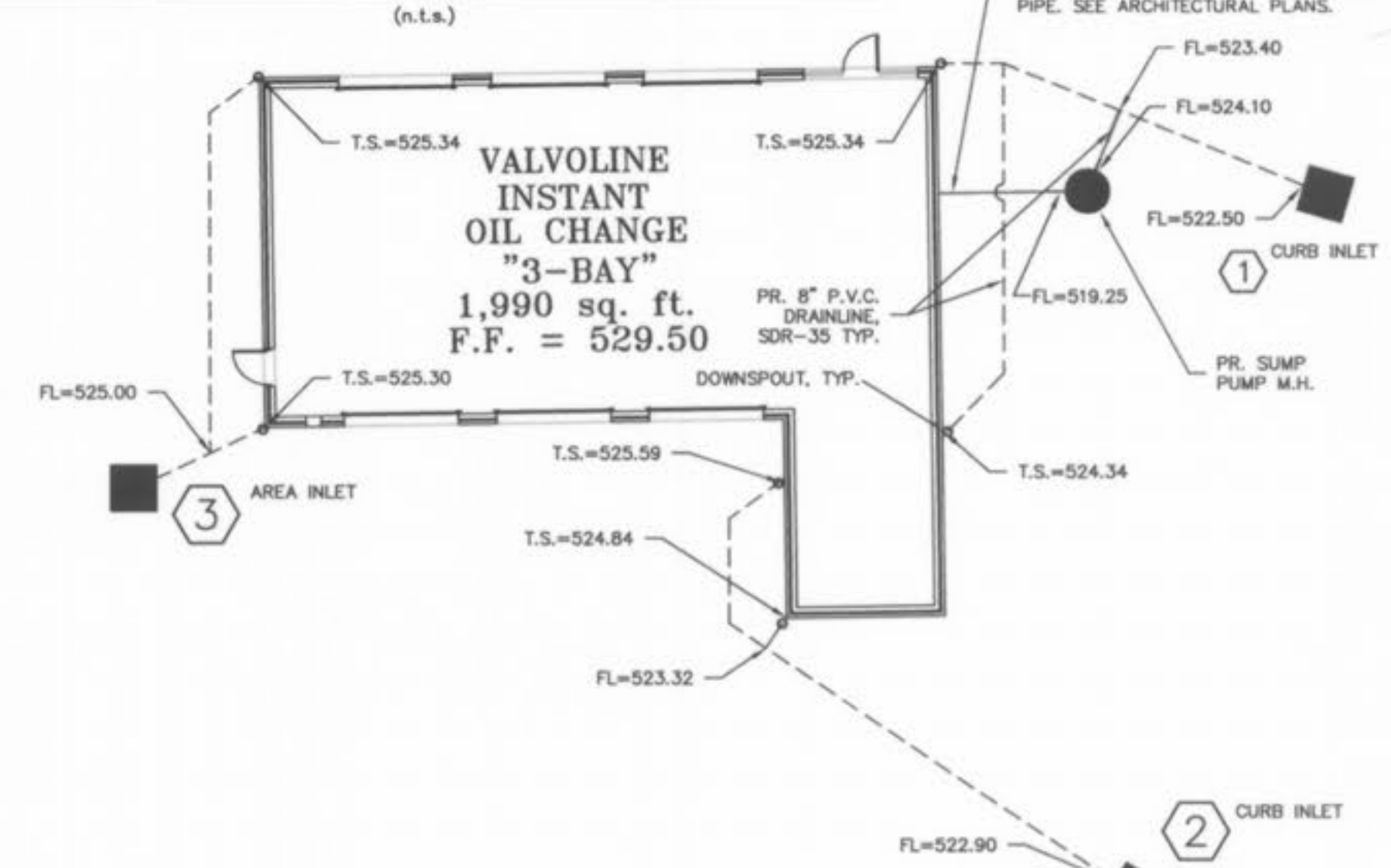
NOTE: THE ABOVE INFORMATION IS A CONCEPT ONLY. ACTUAL DESIGN OF RETAINING WALL SHALL BE BY A LICENSED PROFESSIONAL ENGINEER & SUBMITTED TO STOCK AND ASSOCIATES FOR GENERAL COMPLIANCE W/ GRADING PLAN.

- NOTES:
- 1.) ALL CONSTRUCTION SHALL BE PER THE MANUFACTURERS RECOMMENDATION.
 - 2.) SHOP DRAWINGS BEARING THE SEAL OF A REGISTERED ENGINEER IN THE STATE OF MISSOURI TO BE SUPPLIED TO CITY FOR APPROVAL.
 - 3.) ACCEPTED ALTERNATE WALL SYSTEM: KEYSTONE OR HERCULES.
 - 4.) TW= TOP OF RETAINING WALL, BW= GRADE AT BASE OF WALL.
 - 5.) COLOR TO CLOSELY MATCH EX. WALL AT N.E. CORNER OF SITE.

ISOMETRIC VIEW

WALL HEIGHT	LENGTH OF CURB	PERIMETER	A	B	C
1	1	2	1	1	1
2	2	4	2	2	2
3	3	6	3	3	3
4	4	8	4	4	4
5	5	10	5	5	5

VERSALOK RETAINING WALL - TYPICAL SECTION



DRAINLINE TAIL STAKE & FLOWLINE ELEVATIONS

- (n.l.s.)
- AS-BUILTS 05/17/04
 - CITY 05/22/2003
 - REVISED PER CITY COMMENTS 04/01/2003
 - REVISED PER ARCHITECTS COMMENTS 02/27/2003
 - REVISED PER ARCHITECTS COMMENTS 02/11/2003

CITY FILE: #98-74.04-3

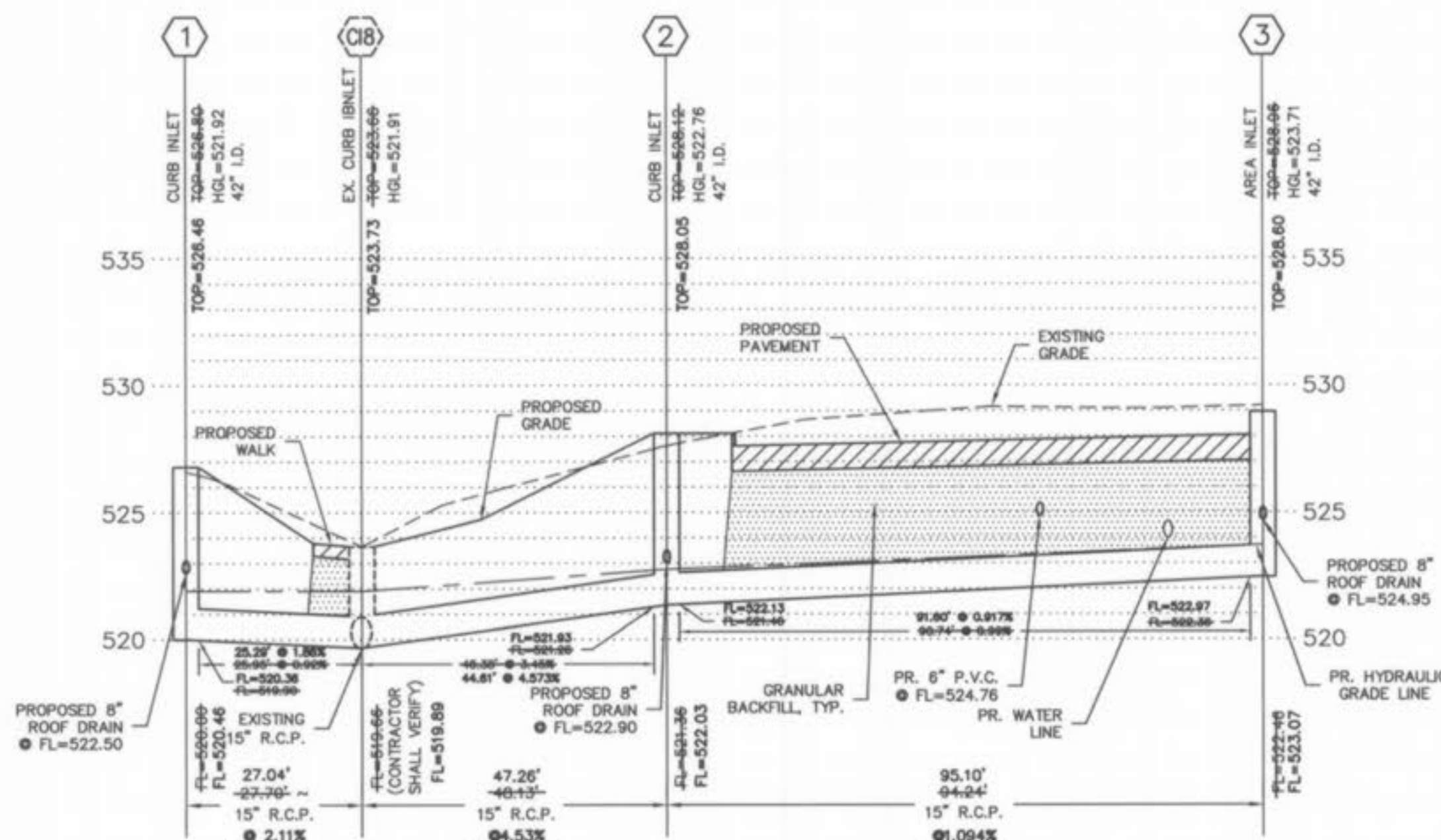
VALVOLINE INSTANT OIL CHANGE - O'FALLON, MISSOURI SEWER AND WALL PROFILES AND DETAILS

Stock & Associates
Consulting Engineers

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

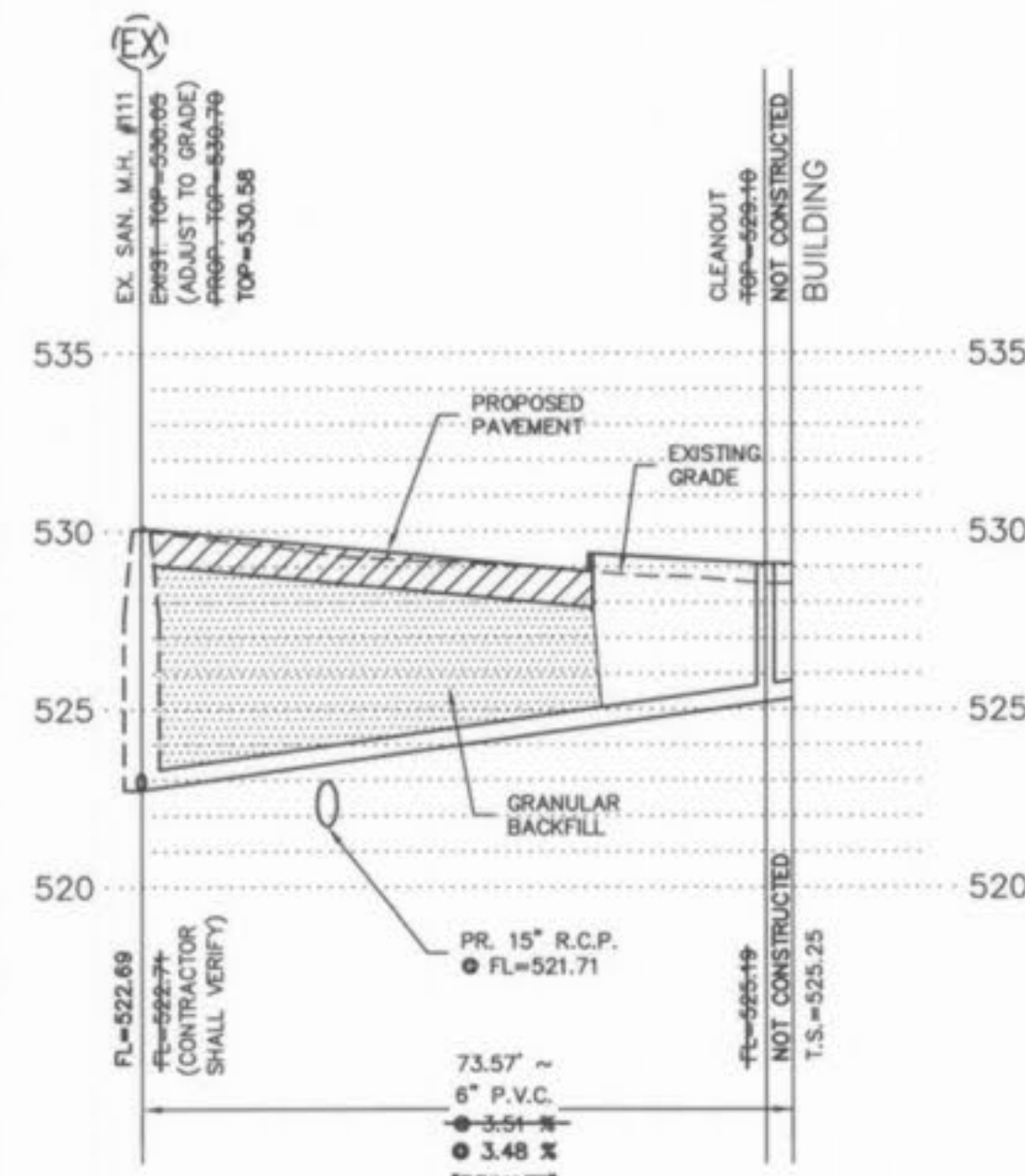


DRAWN BY: DATE: CHECKED BY: DATE: JOB NUMBER: SHEET: 202-2821 C7 of 10



"PRIVATE" - STORM SEWER PROFILE

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'



"PRIVATE" - SANITARY SEWER PROFILE

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=5'

HYDRAULIC CALCULATION SHEET (SEE DRAINAGE AREA MAP SHEETS FOR P.I. AND Q (inflow) FOR EACH STRUCTURE)

Structure Number	Upper structure	Lower structure	FLOW LINE ELEVATIONS		Length (ft)	Flowline Grade ft/ft	Pipe Size (in.)	Full Flow Cap. (cfs)	Total (Q) (cfs)	Mean Full Flow Vel. (V) (ft/s)	Bend Coef.	Velocity Head (V ² /2g) (ft)	QV ² (ft ³ /s ³)	Pipe Coef. (n)	H _f (ft)	Junction (ft)	Bend (ft)	Total H _{loss} (ft)	Hydraulic Elevations				Structure Free Board	Structure Number	
			Upper	Lower															Upper F.L.	Lower H.E.	Lower H.E.	Upper			Structure
1	1	1	520.00	519.66	27.70	0.0123	15	7.18	0.96	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	521.25	521.92	521.91	521.92	526.80	4.88	1
2	2	2	522.46	521.36	94.24	0.0117	15	7.00	4.54	0.21	0.46	0.00	0.00	0.01	0.00	0.00	0.00	0.00	523.71	523.22	522.76	523.71	528.96	5.25	3
3	3	3	521.36	519.66	48.13	0.0353	15	12.17	4.62	3.76	0.6	0.22	1.02	0.013	0.25	0.02	0.13	0.15	522.81	522.15	521.91	522.76	528.12	5.36	2
4	4	4	519.66	518.38	67.00	0.0191	15	8.95	6.27	5.11	0.6	0.43	2.54	0.013	0.63	0.32	0.13	0.45	520.91	521.46	520.82	521.91	523.86	1.75	2
5	5	5	517.21	515.62	195.52	0.0081	15	5.84	6.89	5.61	0.57	0.49	3.37	0.013	2.22	0.00	0.28	0.28	518.46	519.09	516.87	519.37	528.76	9.39	5

FORMULAS: MEAN FULL FLOW VELOCITY: $V = Q / A$; FRICTION LOSS (H): $H_f = 2.48 n^2 L V^{1.49} / R^{4.76}$; VELOCITY HEAD: $V_h = V^2 / 2g$; JUNCTION LOSSES (JUNC) = $[Q_{in} V_{in} - \sum Q_{out} V_{out}] / g$; BEND LOSSES (BEND) = $(V^3) / g \times \text{ANGLE COEFFICIENT}$; Note: 1. IF MORE THAN ONE INCOMING LINE, CALC. EACH BEND LOSS AND ADD TOGETHER. 2. NO STRUCTURE LOSSES TO BE CALCULATED AT A DROP. 3. IF $QV_{in} > QV_{out}$, NO JUNCTION LOSSES TO BE CALCULATED.

NOTE: PROVIDE 0.2' DROP THRU ALL STORM SEWER STRUCTURES.

