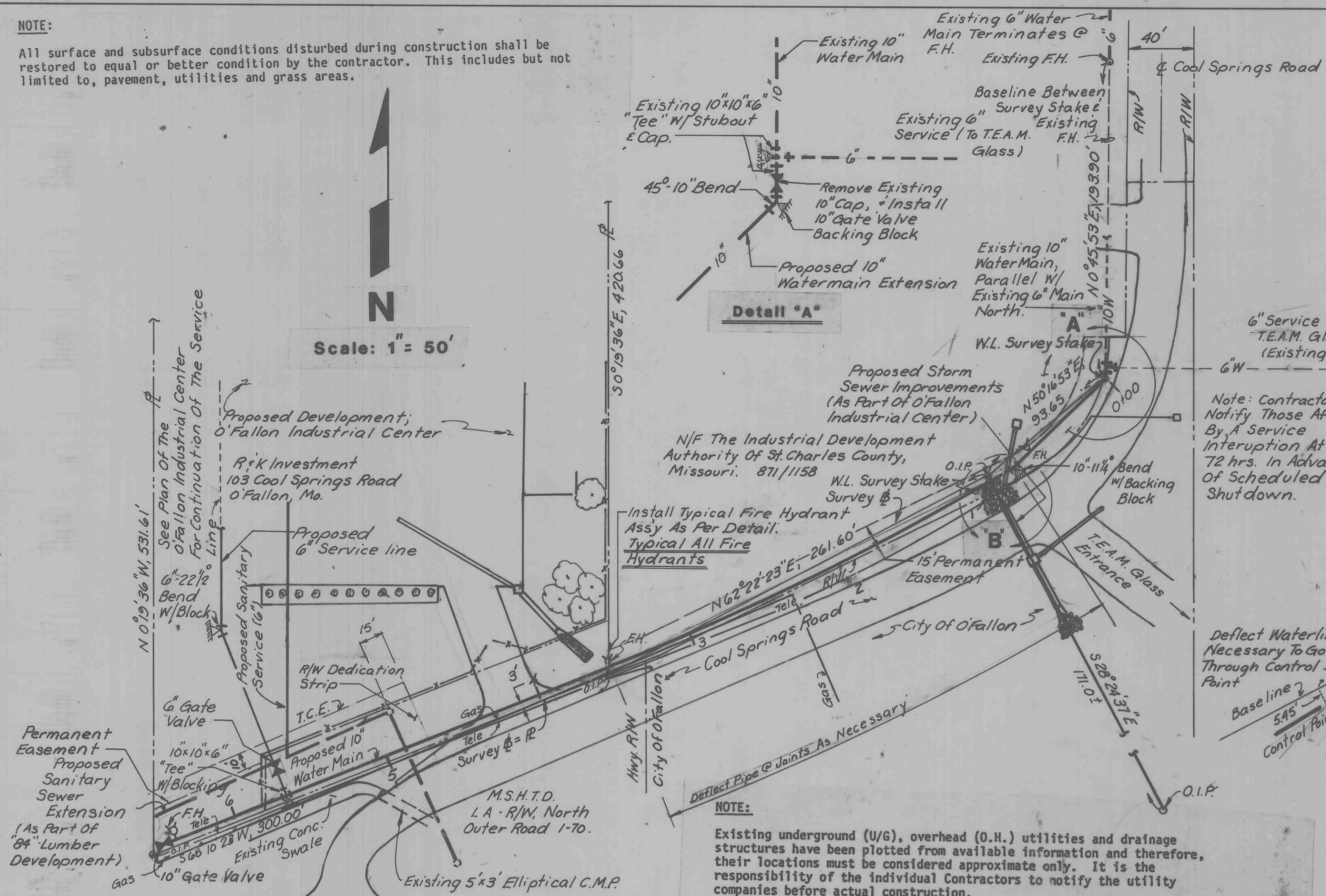
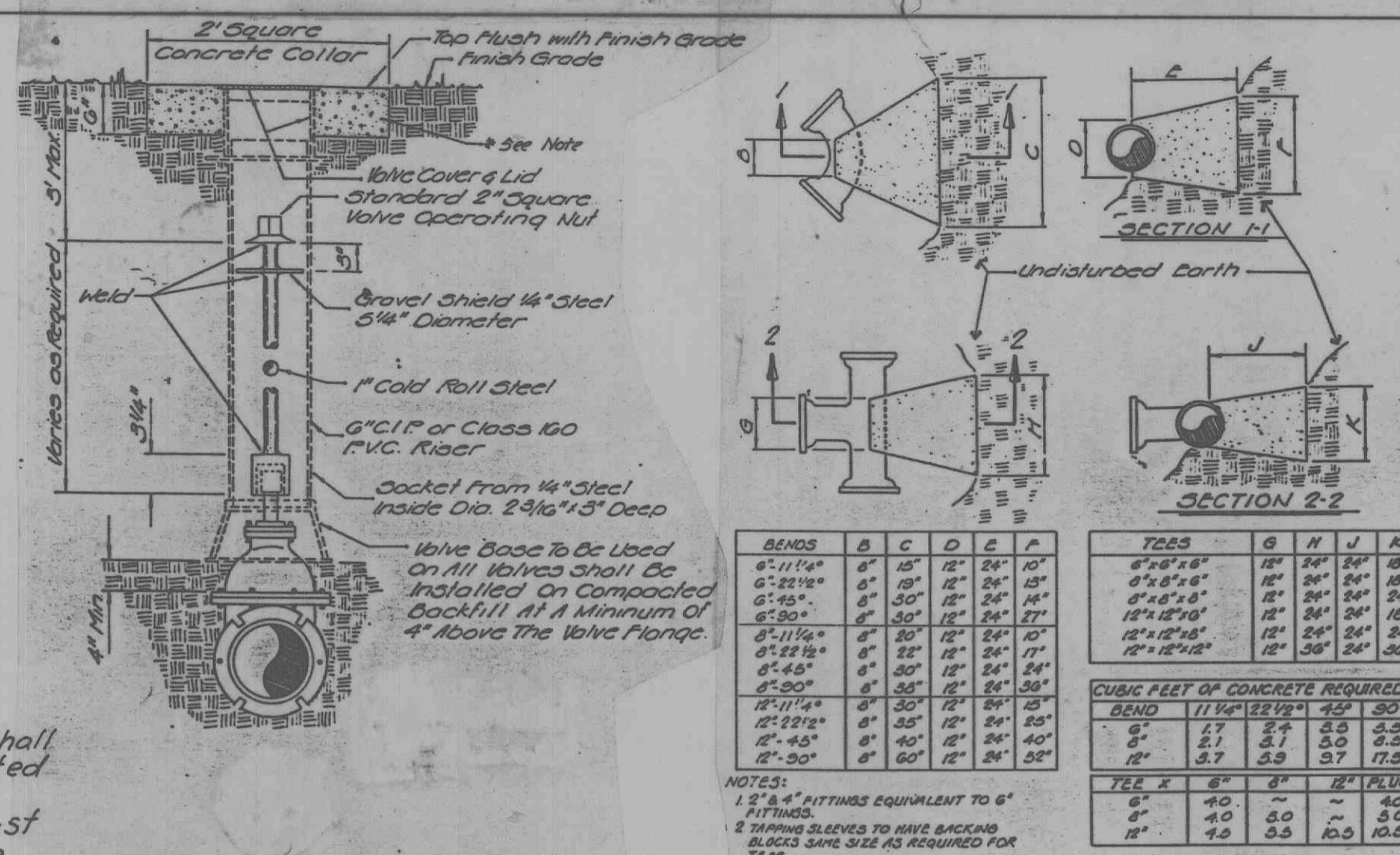


NOTE:
All surface and subsurface conditions disturbed during construction shall be restored to equal or better condition by the contractor. This includes but not limited to, pavement, utilities and grass areas.

Scale: 1" = 50'



WATER VALVE DETAIL

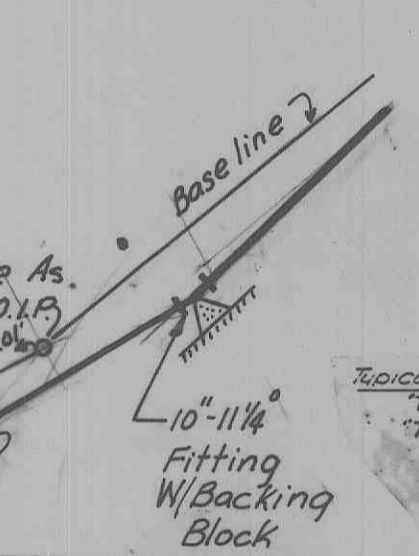


BACKING BLOCKS

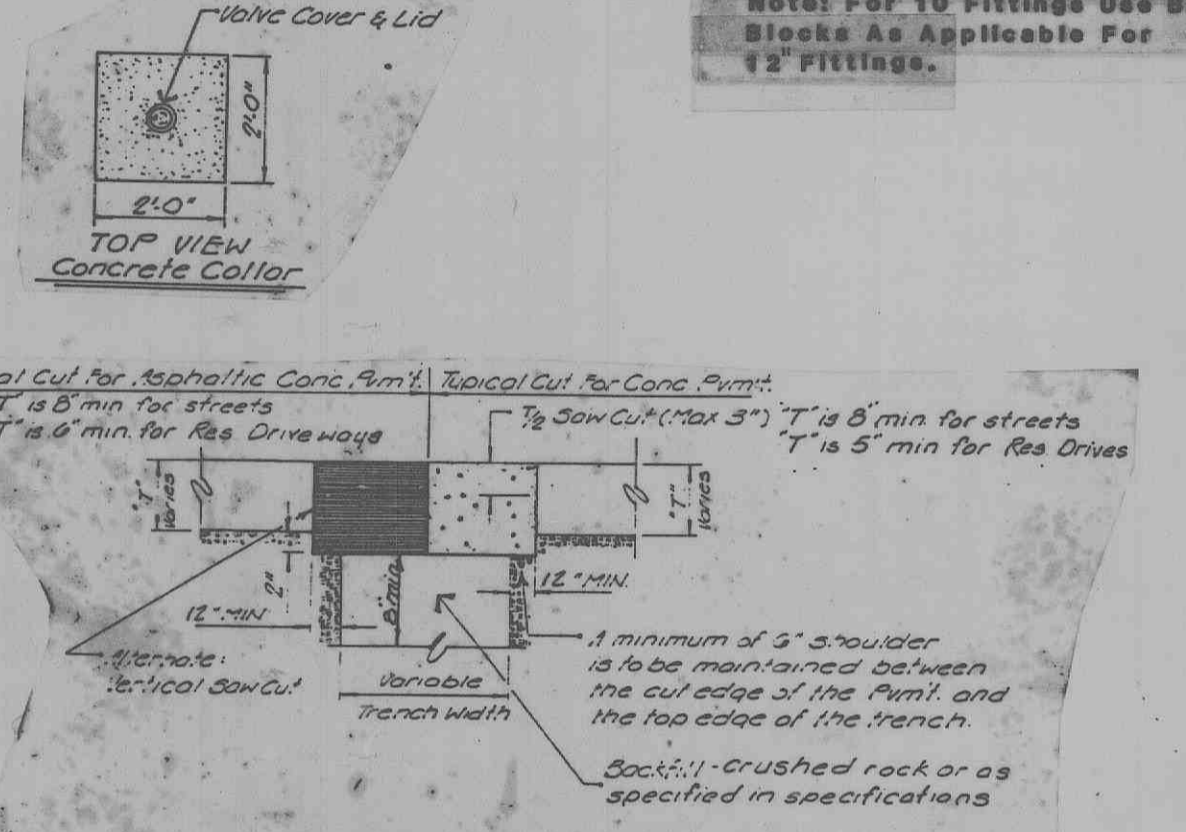
Note: For 10" Fittings Use Backing Blocks As Applicable For 12" Fittings.

BENDS	B	C	D	E	F
6" x 11 1/2"	8"	10"	12"	14"	16"
6" x 12"	8"	10"	12"	14"	16"
6" x 14"	8"	10"	12"	14"	16"
6" x 16"	8"	10"	12"	14"	16"
6" x 18"	8"	10"	12"	14"	16"
6" x 20"	8"	10"	12"	14"	16"
6" x 22"	8"	10"	12"	14"	16"
6" x 24"	8"	10"	12"	14"	16"
6" x 26"	8"	10"	12"	14"	16"
6" x 28"	8"	10"	12"	14"	16"
6" x 30"	8"	10"	12"	14"	16"

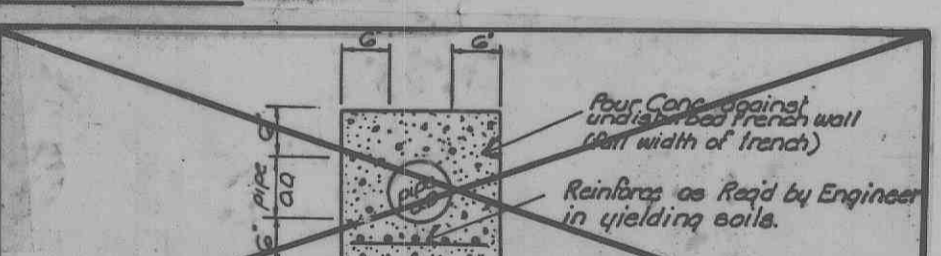
Detail B



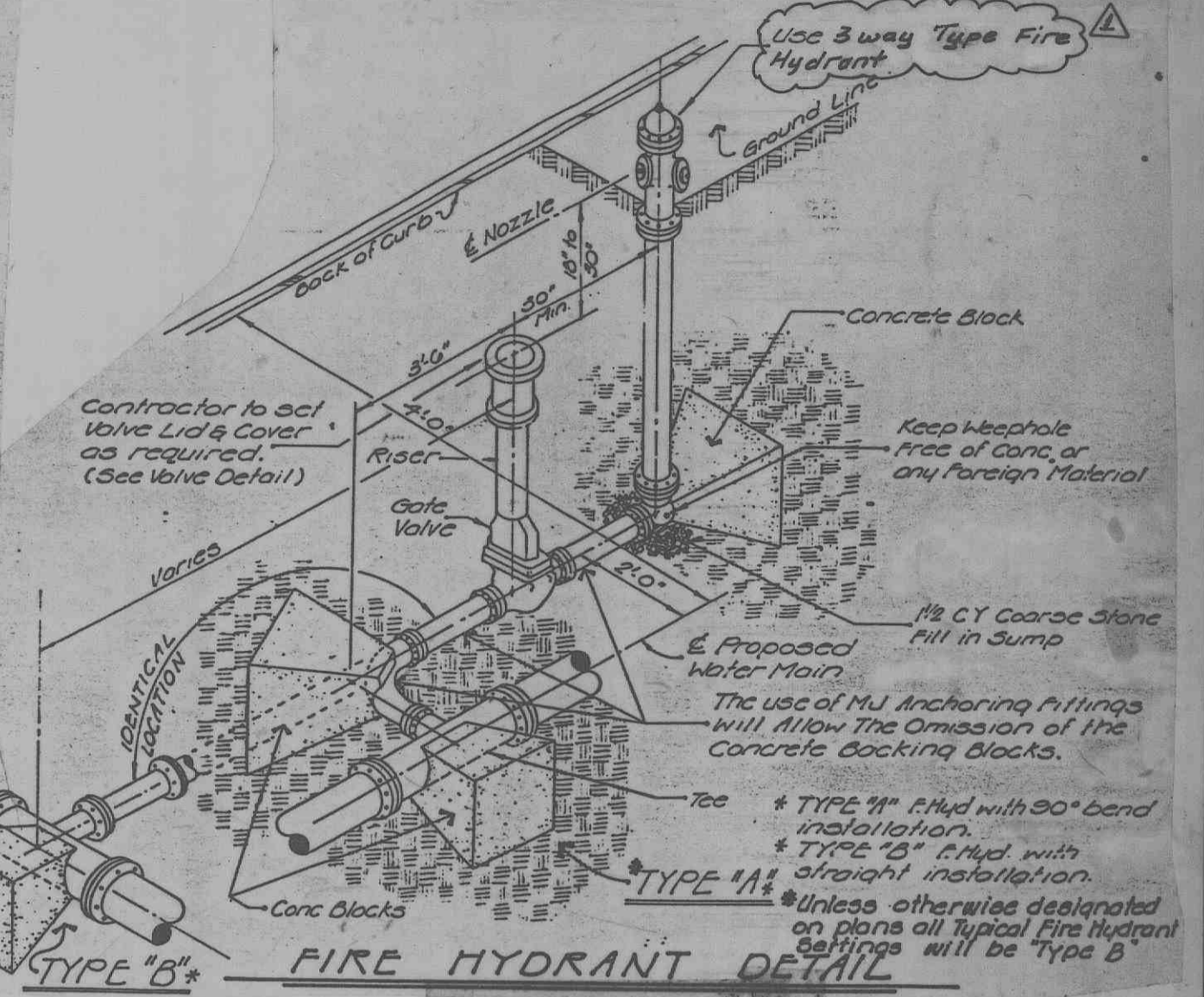
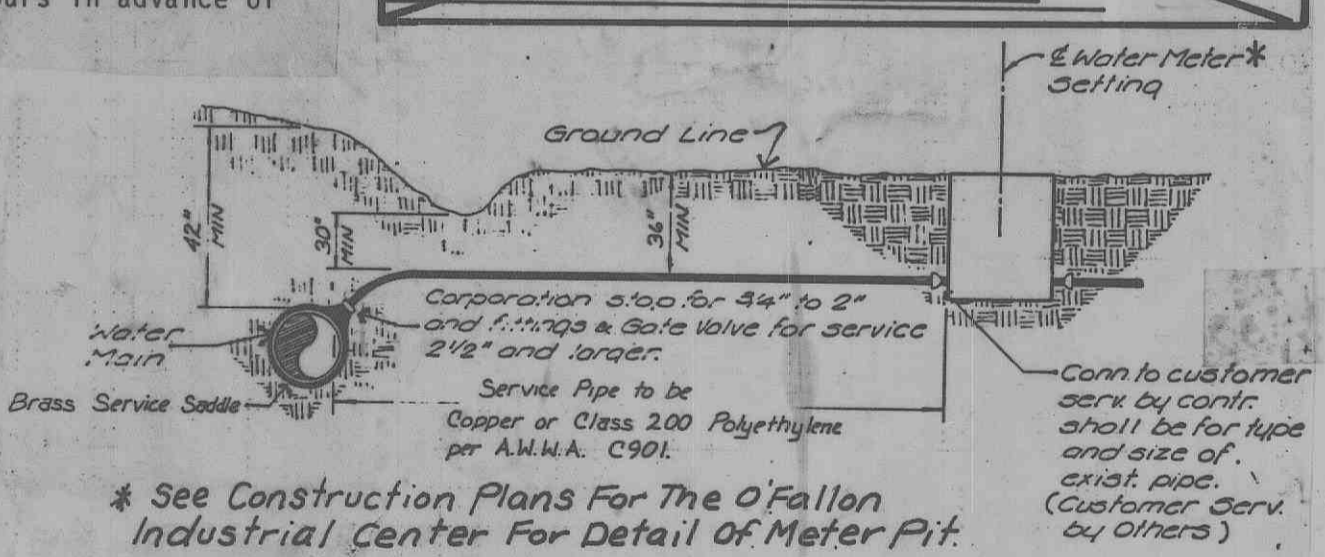
PAVEMENT REPAIR DETAIL (if Req'd)



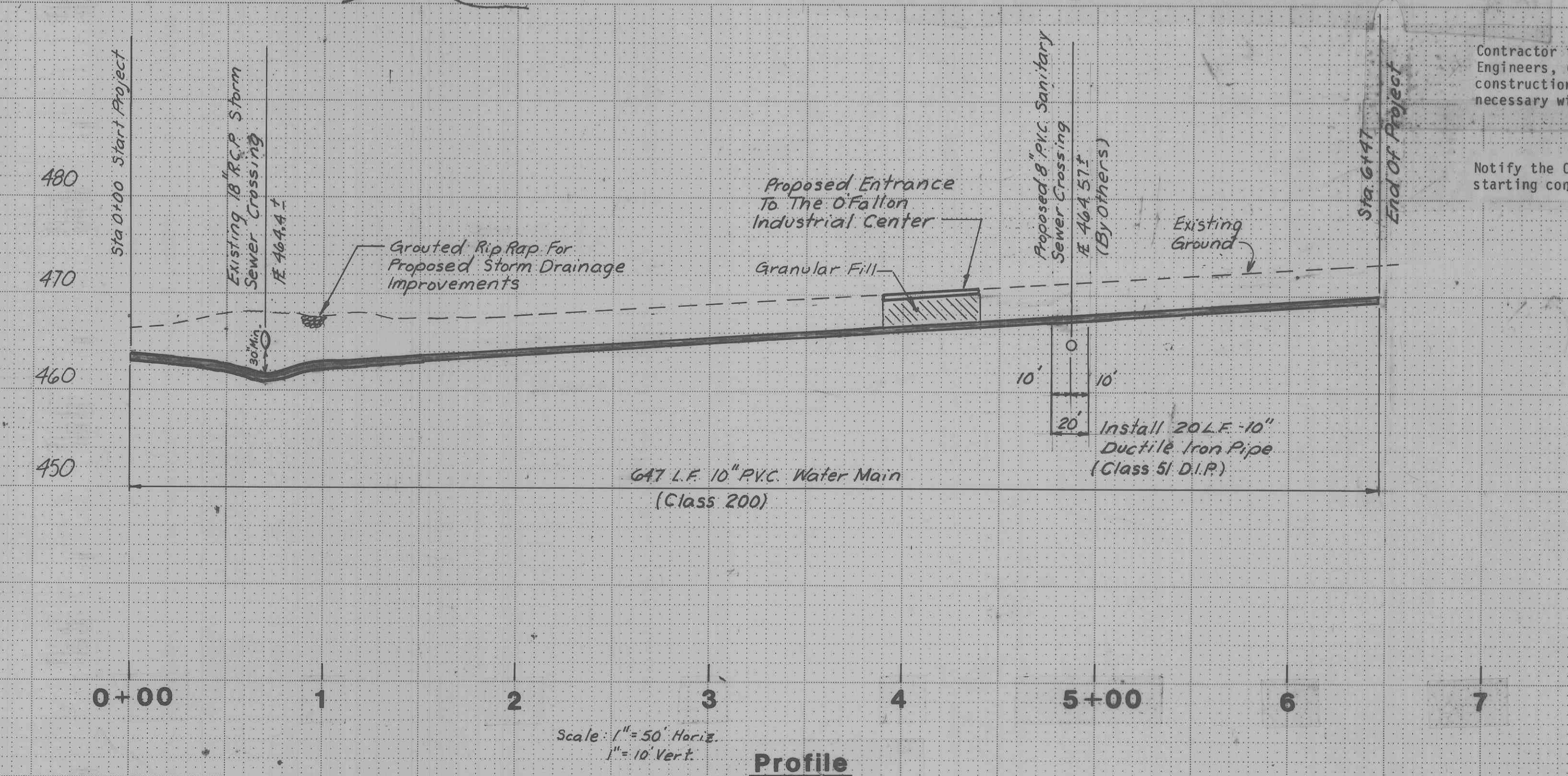
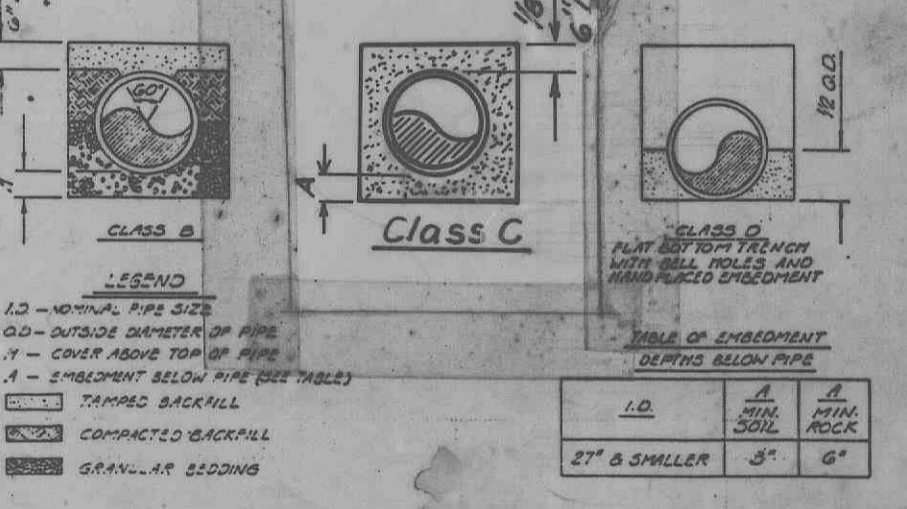
CONCRETE ENCASEMENT



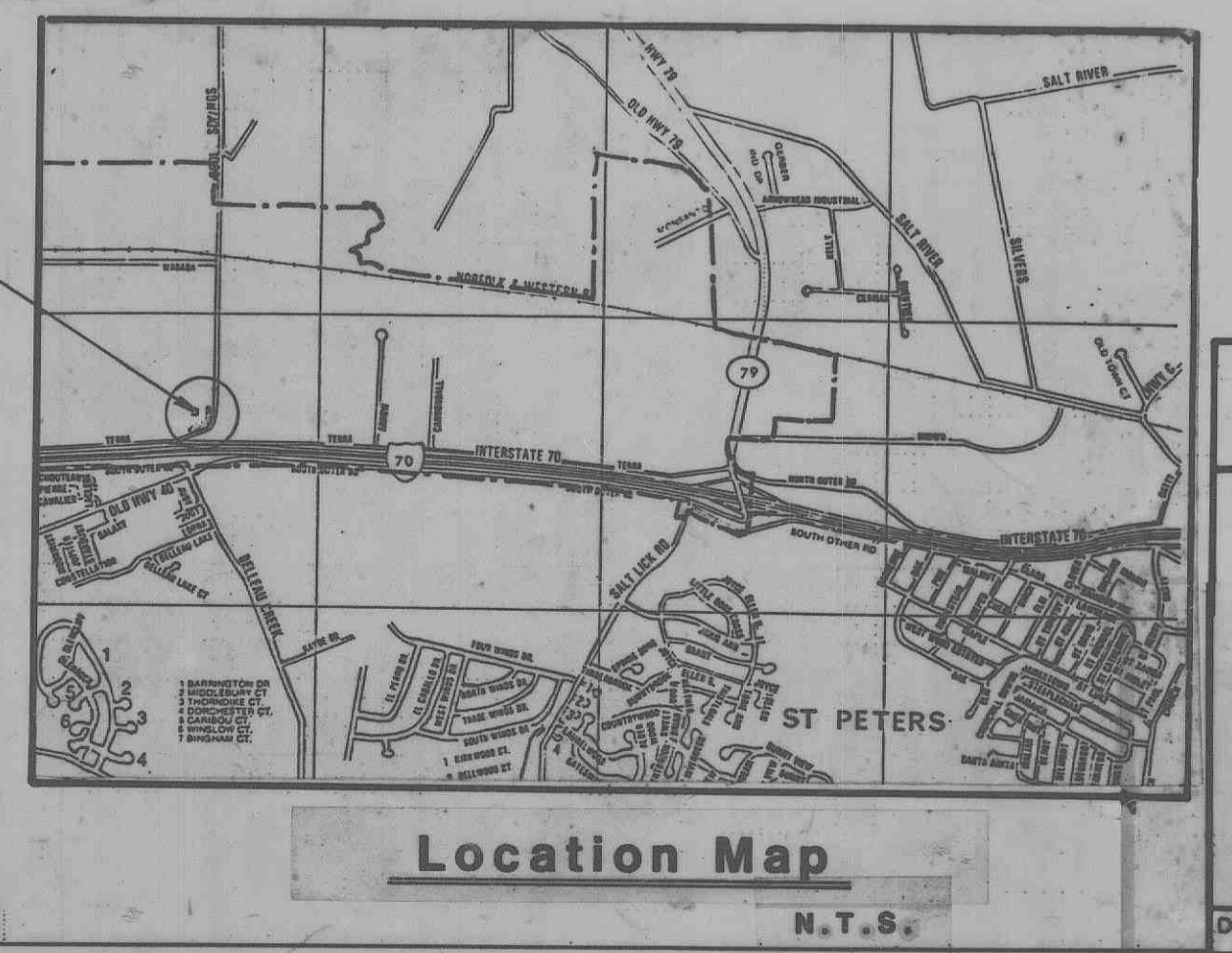
TYPICAL SERVICE ASSEMBLY



WATER MAIN EMBEDMENT



Surveying By:
LANDMARK SURVEYING, INC.
802 E. MAIN
Wentzville, Missouri 63385



As Constructed 10-11-88 S.A.S.

GBA GEORGE BUTLER ASSOCIATES, INC.
Engineers / Architects / Landscape Architects / Planners
Suite 200 / 225 S. Main St. / O'Fallon, Missouri 63368

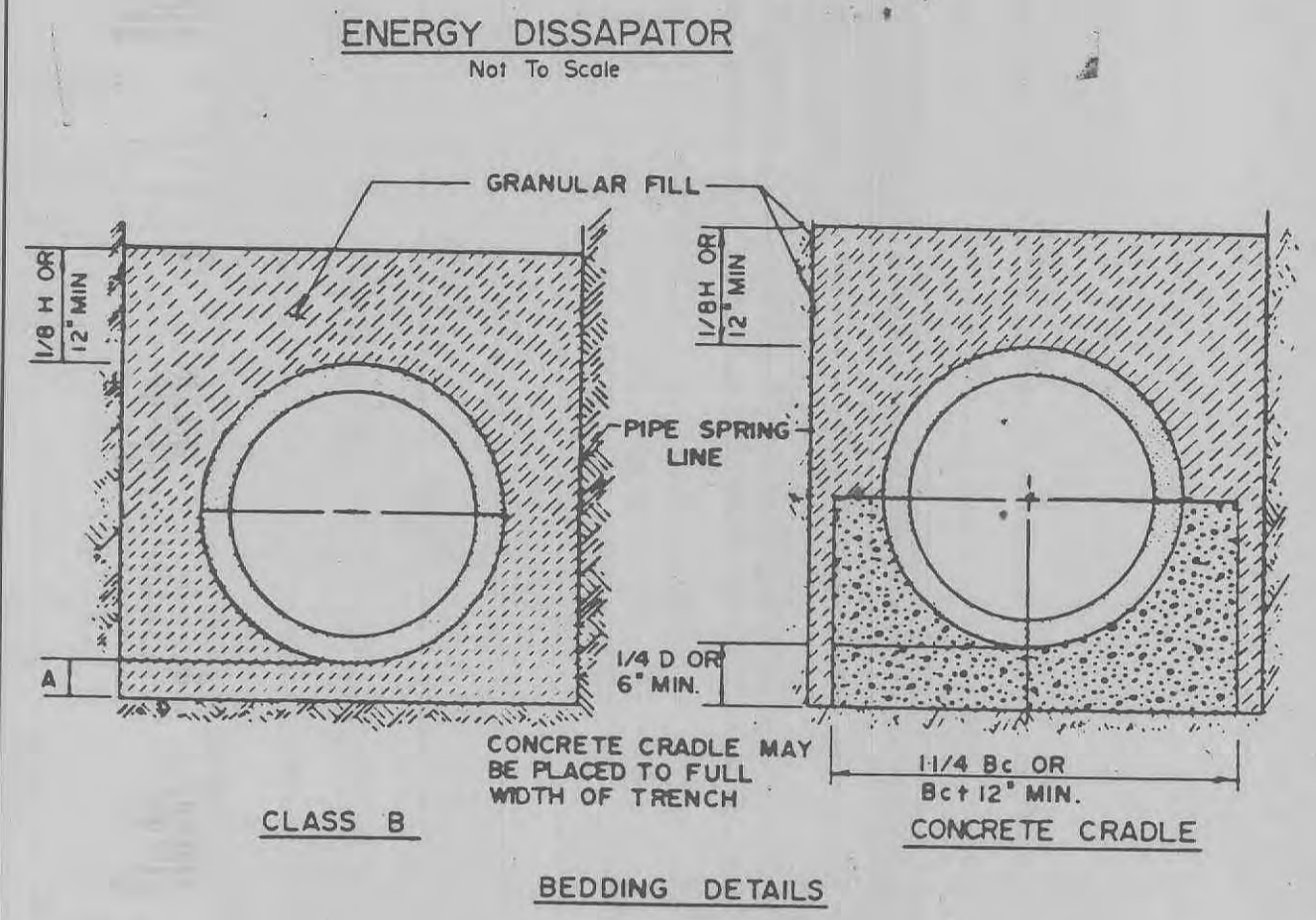
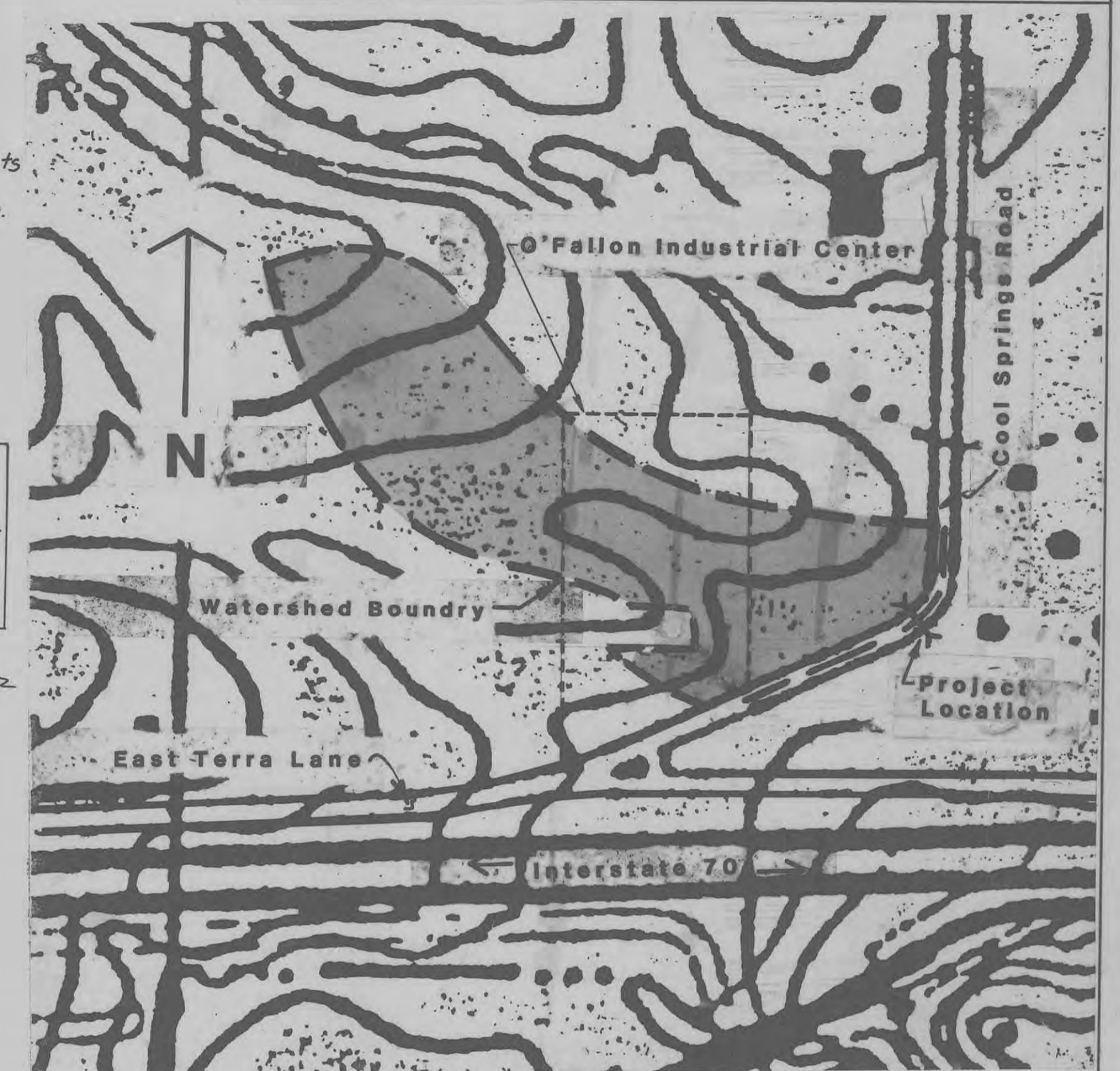
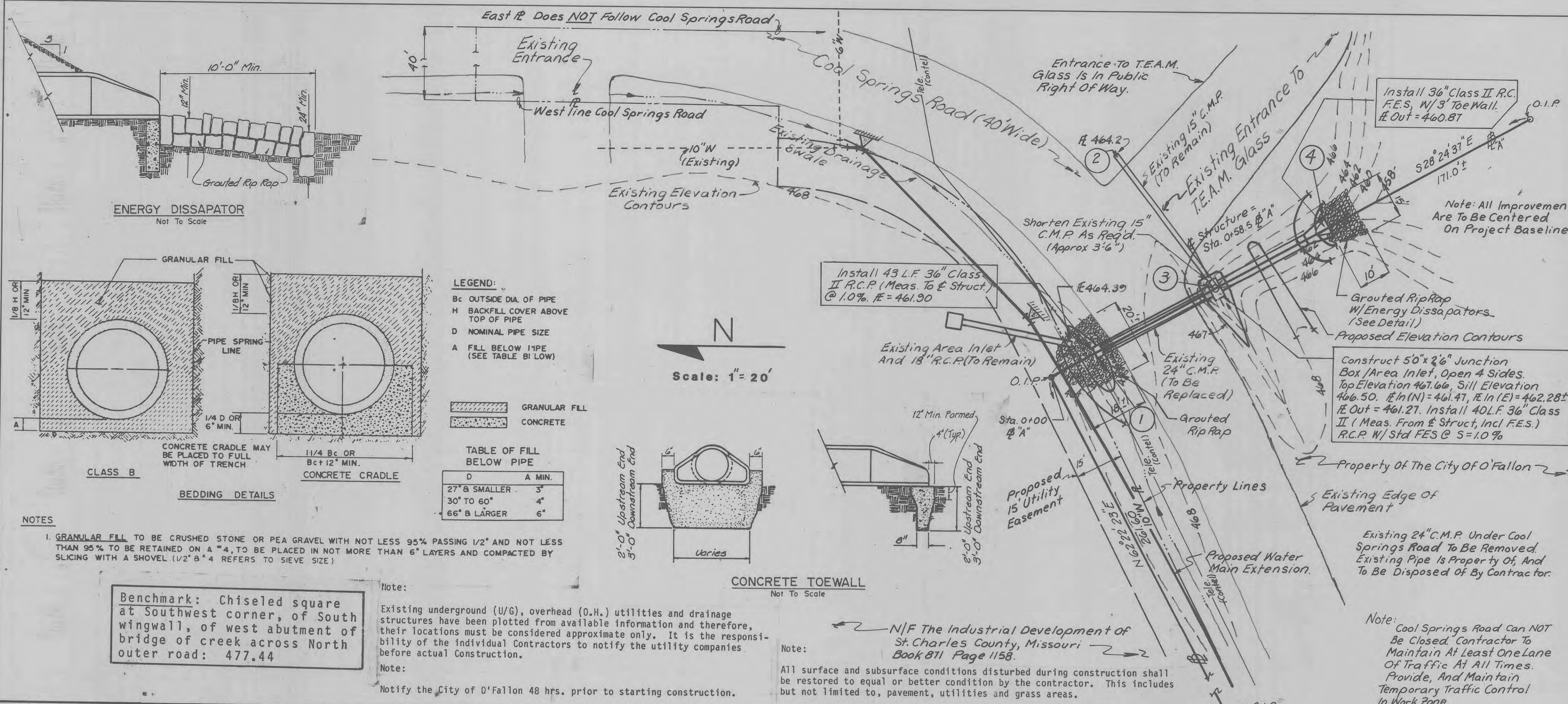
Cool Springs Road Water Main Extension
For
GJH Contracting Co.
O'Fallon, Missouri

DESIGNED BY: MJH DRAWN BY: MJH CHECKED BY: FLK

JOB NO. 87-5128
DATE: Jan., 1988
SCALE: As Noted
SHEET NO. 1 OF 1

PROPERTY OF
CITY OF OFFALLON
BUILDING DEPARTMENT

As BUILT
GJH CONTRACTING CO.



LEGEND:

- Bc OUTSIDE DIA. OF PIPE
- H BACKFILL COVER ABOVE TOP OF PIPE
- D NOMINAL PIPE SIZE
- A FILL BELOW PIPE (SEE TABLE B' BELOW PIPE)

TABLE OF FILL BELOW PIPE

D	A MIN.
27" & SMALLER	3"
30" TO 60"	4"
66" & LARGER	6"

NOTES:

1. GRANULAR FILL TO BE CRUSHED STONE OR PEA GRAVEL WITH NOT LESS 95% PASSING 1/2" AND NOT LESS THAN 35% TO BE RETAINED ON A #4, TO BE PLACED IN NOT MORE THAN 6" LAYERS AND COMPACTED BY SLICING WITH A SHOVEL (1/2" & 4" REFERS TO SIEVE SIZE)

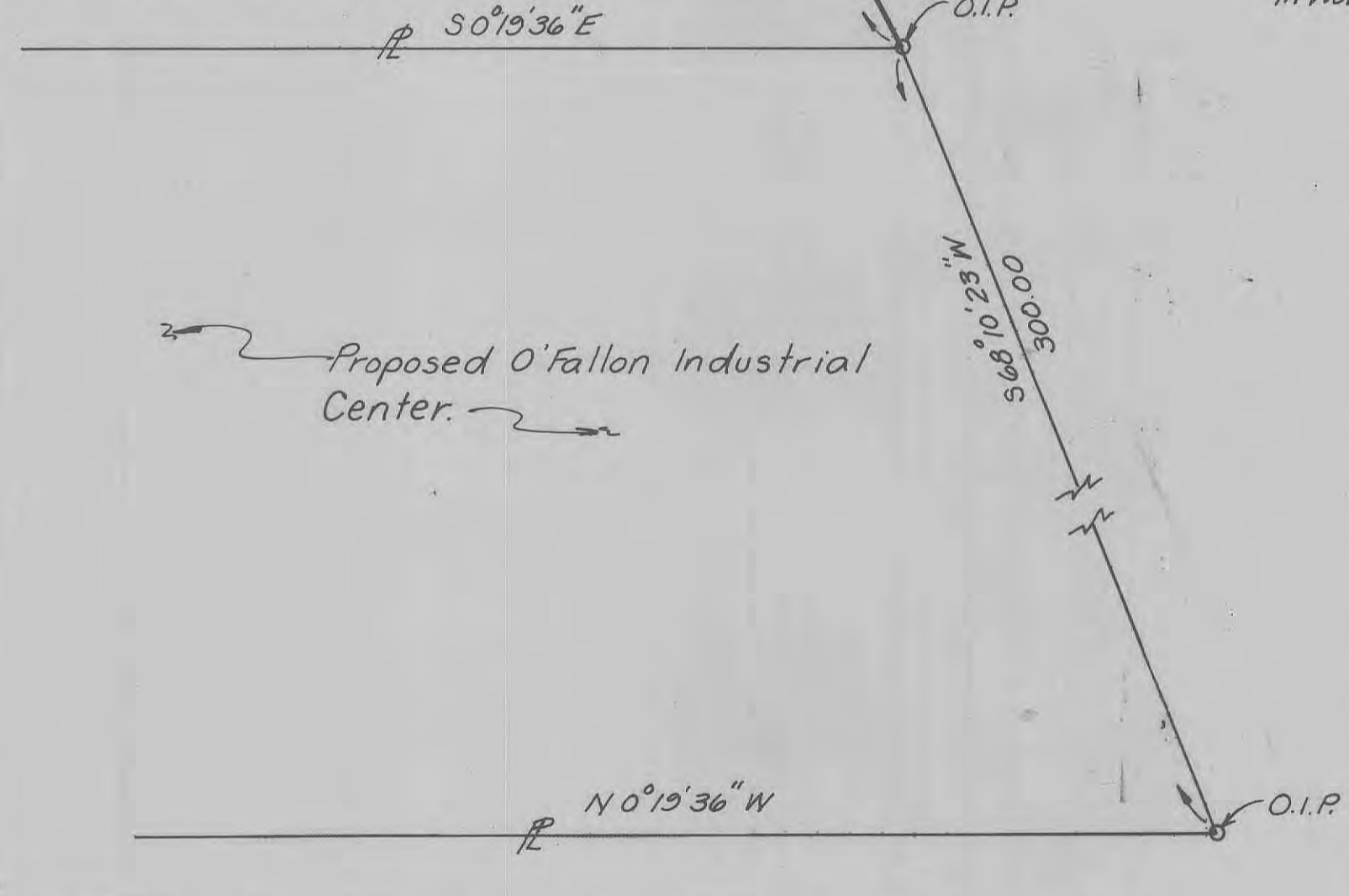
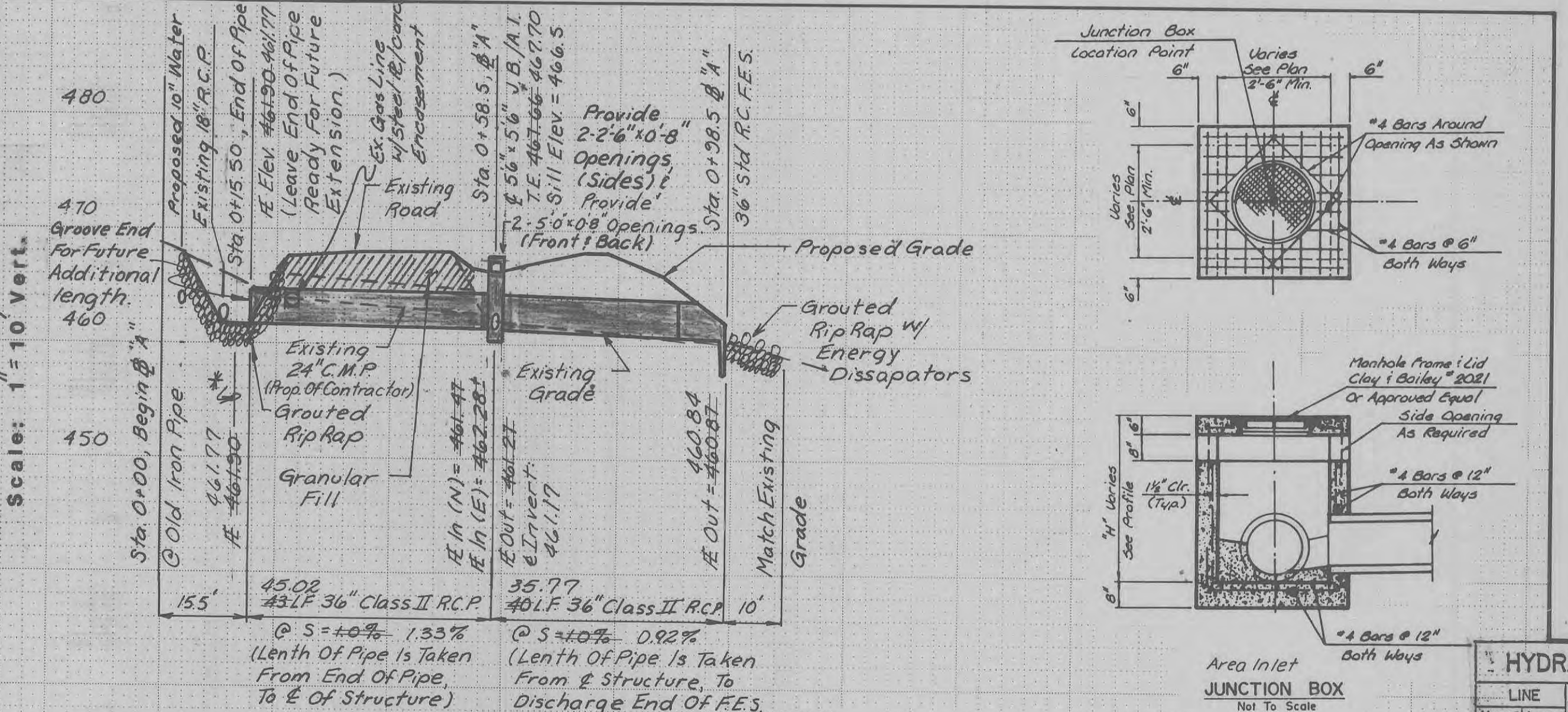
Benchmark: Chiseled square at Southwest corner of South wingwall, of west abutment of bridge of creek across North outer road: 477.44

Note: Existing underground (U/G), overhead (O.H.) utilities and drainage structures have been plotted from available information and therefore, their locations must be considered approximate only. It is the responsibility of the individual Contractors to notify the utility companies before actual construction.

Note: Notify the City of O'Fallon 48 hrs. prior to starting construction.

Note: All surface and subsurface conditions disturbed during construction shall be restored to equal or better condition by the contractor. This includes but not limited to, pavement, utilities and grass areas.

Note: Cool Springs Road can NOT be closed. Contractor to maintain at least one lane of traffic at all times. Provide, and maintain temporary traffic control in work zone.



G.J.H. Contracting
 Offsite Storm Drainage Improvements
 Hydraulic Calculations

Design Discharge

Drainage Basin area tributary to culvert: 7.76 Acres

As per the O'Fallon Subdivision and Land Development Ordinance Culverts at or near low points shall be designed on a storm frequency of 100 years, with entrance control, and two feet of freeboard at the shoulder line.

Assume 70 percent total impervious area at full development.
 $P_{100} = 5.21$ cubic feet per second per acre (c.f.s./Ac.)

Design Discharge: $Q = 7.76 \text{ Acres} \times 5.21 \text{ c.f.s./Ac.} = 40.43 \text{ c.f.s.}$

Shoulder Elevation at the edge of the road above the proposed culvert flowline = 467.90 ft.

Maximum allowable water surface elevation, considering inlet control:
 $467.90 - 2 = 465.90 \text{ ft.}$

Try 36" R.C.P., $Q = 40.43 \text{ c.f.s.}$, using groove End Pipe, Projecting from embankment.
 $HW/d = 1.05, HW = 3(1.05) = 3.15$

Proposed Flowline = 461.90 $A = \pi(3)^2(1/4) = 7.07 \text{ s.f.}$

Headwater Available: $465.90 - 461.90 = 4.0'$ $V = 40.03/7.07 = 5.72 > 3.0 \text{ f.p.s.}$ (Flow full, Avg. Velocity) Avg. = 5.72 f.p.s.

4.0 > 3.15 o.k. Use 36" R.C.P., Groove End Projecting From Embankment, with a discharge flowline of 461.90.

With $Q = 40.43 \text{ c.f.s.}$, 36" R.C.P., $S_p = .0037 \text{ ft/ft}$

Install 36" R.C.P. at 1.0 percent as required by the O'Fallon Subdivision and Land Development ordinance.

Since $S = 1.0\%$ is much greater than $S = 0.37\%$ this culvert will operate entrance control unless flooded from downstream.

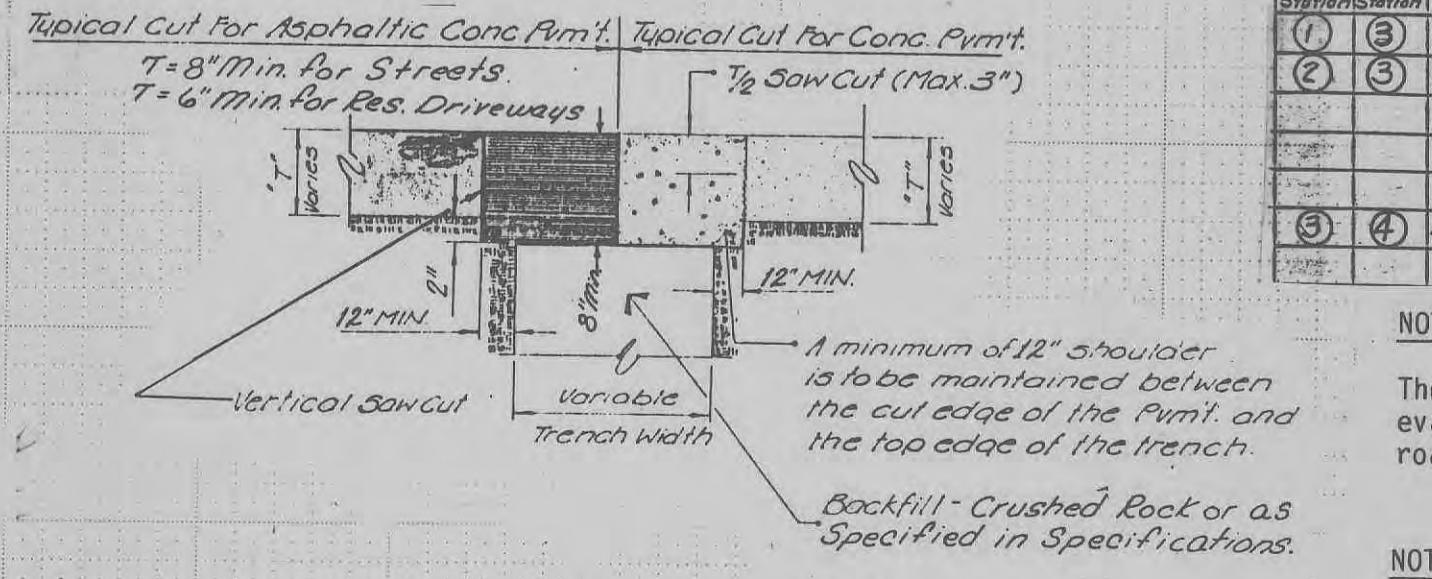
Provide 0.20 feet of fall through the junction box/area inlet as required by the O'Fallon Subdivision and Land Development ordinance.

Note: This roadway culvert is located in the Belleau Creek flood plain, with a base flood watersurface elevation of 467.90'. At this elevation the water will be above the shoulder of the road, but not yet over topping. As required, the culvert depth and vertical grade has been established by the City of O'Fallon design criteria for pipe culverts in the flood plain rather than hydraulic calculations predicting and comparing flow performance under conditions of inlet vs outlet control. Hydraulic calculations will be provided using top of pipe for the starting downstream water surface elevation.

Contractor to submit plan and details for temporary "sho-fly" access to the City of O'Fallon Building Department for approval.

Contractor to notify affected residents in writing 72 hours in advance of starting construction.

Storm Sewer Profile
 Scale: 1" = 20' Horiz.



HYDRAULIC DATA PROJECT: Cool Springs Road Culvert SHEET 1 OF 1

LINE	Length	Size	Upper Flow Line	Lower Flow Line	FL Elev.	Upper Elev.	Lower Elev.	Depth	Upper Elev.	Lower Elev.	Hy. Head	Frict. Head	Vel. Head	V. Loss	K _e	Turn Loss	Area	P.L.	Quantity	T. Q.		
(1) (3)	43.00	36" R.C.P.	461.90	461.47	461.90	468.20	2.45	465.42	465.11	3.66	.15	0.27	.51	10	-	L.P.	NA	7.76	521	40.43	66.92	
(2) (5)	50.00	36" R.C.P.	464.20	462.28	394.42	467.84	0.0	467.0	465.71	1.75	.375	0.27	.74	37	52	L.P.	NA	NA	8.5	8.5	12.70	
(3) (4)	40.00	36" R.C.P.	461.27	460.87	110%	468.2	NA	2.49	465.17	463.87	5.06	.20	0.27	.74	37	-	L.P.	NA	-	-	48.93	66.92

NOTE: The discharge from the 15" C.M.P. side pipe driveway culvert, (2 - 3) was evaluated inlet control, with the water surface elevation up to the edge of road, (i.e.: No freeboard, depth to hydraulic grade line = 0)

NOTE: The area inlet structure has not been designed to accept any specific amount of flow. The dimensions selected are the minimum required for a junction box. The inlet slots are added benefit.

As Constructed 10-11-88 S.A.S.

Surveying Provided By:

LANDMARK SURVEYING, INC.
 802 E. MAIN
 Wentzville, Missouri 63385

GBA
 GEORGE BUTLER ASSOCIATES, INC.
 Engineers / Architects / Landscapes Architects / Planners
 Suite 200 / 225 S. Main St. / O'Fallon, Missouri 63368

Cool Springs Road Storm Drainage Improvements
 For
GJH Contracting Co.
 O'Fallon, Missouri

JOB NO: 87-5128
 DATE: Dec. 24, '87
 SCALE: As Noted
 SHEET NO: 1 OF 1

DESIGNED BY: MJH DRAWN BY: MJH CHECKED BY: GRH