ENGINEER'S REPORT
SPECIAL ASSESSMENT
DISTRICT NO. 215
UNSER BOULEVARD AND
98th STREET

Greiner
Engineering

ENGINEER'S COST ESTIMATE

SPECIAL ASSESSMENT DISTRICT #215

Final Eng's Est. Rec'd 3/5/87

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
LOT NO. 1 PAVING					
P- 1	Roadway excavation and disposal of unclassified material, including clearing and grubbing	CY	13,742	$1.00	$13,742.00
P- 2	Roadway excavation including fill, haul & compaction of unclassified material	CY	26,306	$1.69	$44,457.14
P- 3	Cutting, removal, and disposal of exist. asphaltic conc. paving, where sawcutting is required	SY	850	$3.26	$2,771.00
P- 4	Cutting, removal, and disposal of exist. curb & gutter, sidewalk, drivepads, and cut-off walls	SY	91	$3.57	$324.87
P- 5	Process and compact existing subgrade material that has a soil bearing value of 20 or more, 12" in thickness, complete in place	SY	51,900	$0.90	$46,710.00
P- 6	Process and compact existing subbase material that has a soil bearing value of 20 or more, 8" or more in thickness, complete in place	SY	51,900	$2.20	$114,180.00
P- 7	Asphalt treated base course, 4" thick, 1000 lb. stability, machine laydown	SY	51,900	$6.70	$347,730.00
P- 8	Asphaltic conc. base course, 2-1/2" thick, 1500 lb. stability, machine laydown	SY	51,900	3.80 $3.87	$200,853.00
P- 9	Emulsified asphaltic tack coat, complete in place	SY	51,900	$0.26	$13,494.00
P-10	Asphaltic conc. surface course, 2" thick, 1500 lb. stability, machine laydown including 12" subgrade prep.(biketrail)	SY	4,677	3.50 ~~$3.85~~	$18,006.45
P-11	Asphaltic conc. surface course, 1 1/2" thick, 1800 lb. stability, machine laydown	SY	51,900	2.30 ~~$2.61~~	$135,459.00
P-12	Plant mix seal coat, 5/8" thick, complete in place	SY	51,900	$1.55	$80,445.00
P-13	Machine-laid extruded asphalt curb, complete in place	LF	12,660	$2.83	$35,827.80

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
P-14	Portland cement conc. sidewalk, 4" thick, complete in place, including 6" comp subgrade prep	SF	88,900	$1.43	$127,127.00
P-15	Portland cement conc. drivepad, 6" thick, complete in place, including 6" comp. subgrade prep	SF	1,228	$3.16	$3,880.48
P-16	Portland cement conc. red brick patterned, 4" thick, complete in place	SF	4,280	$4.00	$17,120.00
P-17	Portland cement conc. standard curb and gutter, complete in place, including subgrade prep.	LF	14,521	$7.48	$108,617.08
P-18	6" Portland cement conc. median curb and gutter, complete in place, including subgrade prep.	LF	1,581	$6.82	$10,782.42
P-19	4" Portland cement conc. median curb and gutter, complete in place, including subgrade prep.	LF	88	$6.00	$528.00
P-20	Portland cement plain conc. for cut-off walls, in place	LF	654	$12.00	$7,848.00
P-21	Adjust water valve boxes (Type B) to grade in off-street locations	EA	10	$100.00	$1,000.00
P-22	Adjust water valve boxes (Type A) to grade in street locations	EA	17	$100.00	$1,700.00
P-23	Guardrail, metal beam, in place, including posts	LF	546	$16.50	$9,009.00
P-24	Guardrail end anchorage, Type "C"	EA	4	$571.00	$2,284.00
P-25	Traffic signal foundation, mast arm (MA) base, complete in place, Type I	EA	8	$380.00	$3,040.00
P-26	Traffic signal foundation, mast arm (MA) base, complete in place, Type II	EA	4	$380.00	$1,520.00
P-27	Traffic signal foundation, for pedestal (SP) type I, complete in place	EA	9	$230.00	$2,070.00
P-28	Street light pull box, Type T-4, complete in place	EA	8	$212.00	$1,696.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
P-29	Traffic signal pull box, Type T-4 complete in place	EA	23	$212.00	$4,876.00
P-30	Traffic signal pull box, Type Large complete in place	EA	12	$212.00	$2,544.00
P-31	Traffic signal controller foundation, Type II, complete in place	EA	2	$230.00	$460.00
P-32	Traffic signal electrical manhole, complete in place	EA	2	$2,000.00	$4,000.00
P-33	Traffic signal electrical conduit, 2" PVCP, complete in place, including connections to existing conduit, if required	LF	6,240	$4.05	$25,272.00
P-34	Traffic signal conduit, 3" PVCP, complete in place, including connections to existing conduit, if required	LF	1,490	$6.35	$9,461.50
P-35	Traffic control devices (barrels, panels, signs, barricades, and posts)	LS	1	$20,000.00	$20,000.00
P-36	Seeding of all erodible surfaces that are disturbed during construction	Ac	11	$1,200.00	$13,200.00
P-37	Project identification sign per SP-4	EA	1	$500.00	$500.00
	SUBTOTAL PAVING ITEMS (ITEMS P-1 THROUGH P-37)				$1,432,535.74
	LOT NO. 2 DRAINAGE				
K- 1	18" RCP, Class IV, complete in place, in trench	LF	596	$18.66	$11,121.36
K- 2	24" RCP, Class IV, complete in place, in trench	LF	2,127	$26.21	$55,748.67
K- 3	30" RCP, Class III, complete in place, in trench	LF	161	$37.00	$5,957.00
K- 4	42" RCP, Class IV, complete in place, in trench	LF	302	$56.67	$17,114.34
K- 5	48" RCP, Class III, complete in place, in trench	LF	724	$73.50	$53,214.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
K- 6	54" RCP, Class IV, complete in place, in trench	LF	249	$85.00	$21,165.00
K- 7	60" RCP, Class IV, complete in place, in trench	LF	8	$94.00	$752.00
K- 8	Type "A" storm inlet, single grate, complete in place	EA	10	$2,075.00	$20,750.00
K- 9	Type "C" storm inlet, single grate, complete in place	EA	6	$2,075.00	$12,450.00
K-10	Type "C" storm inlet, double grate, complete in place	EA	1	$2,875.00	$2,875.00
K-11	Type "D" storm inlet, single grate, complete in place	EA	4	$1,750.00	$7,000.00
K-12	Type "D" storm inlet, quadruple grate, complete in place	EA	1	$5,520.00	$5,520.00
K-13	Type "D" storm inlet, triple grate, complete in place	EA	1	$3,760.00	$3,760.00
K-14	4' dia. Type "E" MH, 6' to 10' depth, in place	EA	1	$977.61	$977.61
K-15	6' dia. Type "C" MH, less than 6' depth, in place	EA	1	$1,250.00	$1,250.00
K-16	6' dia. Type "E" MH, 6' to 10' depth, in place	EA	2	$1,500.00	$3,000.00
K-17	8' dia. Type "E" MH, 10' to 14' depth, in place	EA	1	$3,235.00	$3,235.00
K-18	8' dia. Type "E" MH, greater than 14' depth, in place	EA	1	$3,600.00	$3,600.00
K-19	Special storm junction box at Sta. 61+53.04, complete in place	EA	1	$7,000.00	$7,000.00
K-20	Special 4' dia. Type "E" MH with slotted cover, 6' to 10' depth, in place	EA	2	$1,200.00	$2,400.00
K-21	Special 4' dia. Type "E" MH with slotted cover, 10' to 14' depth, in place	EA	1	$1,920.00	$1,920.00
K-22	Special 6' dia Type "C" MH with slotted cover, less than 6' depth, in place	EA	1	$1,600.00	$1,600.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
K-23	Special 6' dia Type "E" MH with slotted cover, 6' to 10' depth, in place	EA	3	$2,320.00	$6,960.00
K-24	Sidewalk culvert, including steel plate, complete in place	LF	6	$60.00	$360.00
K-25	Portland cement reinf. conc. for headwalls, retaining walls and box culverts, in place	CY	1,112	$307.14	$341,539.68
K-26	Grouted riprap, complete in place	CY	563	$90.00	$50,670.00
K-27	8' conc. parking bumpers, complete in place	EA	61	$200.00	$12,200.00
K-28	Trenching, backfilling, and compaction for 42" and over pipe, less than 8' trench depth	LF	321	$8.74	$2,805.54
K-29	Trenching, backfilling, and compaction for 42" and over pipe, 8' to 14' trench depth	LF	567	$18.04	$10,228.68
K-30	Trenching, backfilling, and compaction for 42" and over pipe, 14' to 20' trench depth	LF	395	$24.00	$9,480.00
K-31	Trenching, backfilling, and compaction for 18" to 36" pipe, less than 8' trench depth	LF	2,175	$9.51	$20,684.25
K-32	Trenching, backfilling, and compaction for 18" to 36" pipe, 8'to 14' trench depth	LF	709	$11.18	$7,926.62
K-33	Removeable bollards, complete in place	EA	36	$200.00	$7,200.00
K-34	Bollards, complete in place	EA	20	$200.00	$4,000.00
K-35	Rip-rap filter material, 6" in depth, complete in place	CY	270	$80.00	$21,600.00
K-36	Install pipe gate, complete in place	EA	3	$800.00	$2,400.00
	SUBTOTAL DRAINAGE IMPROVEMENTS (BID ITEMS K-1 THROUGH K-36)				$740,464.75

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ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
LOT NO. 3 SANITARY SEWER					
S- 1	8" sewer pipe, complete in trench	LF	424	$5.44	$2,306.56
S- 2	10" sewer pipe, complete in trench	LF	941	$8.50	$7,998.50
S- 3	12" sewer pipe, complete in trench	LF	350	$11.00	$3,850.00
S- 4	15" sewer pipe, complete in trench	LF	1,225	$14.50	$17,762.50
S- 5	Trenching, backfilling, and compaction for 6" to 15" pipe, 8' to 12' trench depth	LF	424	$7.84	$3,324.16
S- 6	Trenching, backfilling, and compaction for 6" to 15" pipe, 12' to 18' trench depth	LF	2,516	$14.77	$37,161.32
S- 7	4' dia. Type "E" MH, 6' to 10' depth, in place	EA	1	$977.61	$977.61
S- 8	4' dia. Type "E" MH, 10' to 14' depth, in place	EA	7	$1,165.00	$8,155.00
S- 9	4' dia. Type "E" MH, greater than 14' depth per vertical foot of depth, in place	VF	11	$64.00	$704.00
S-10	Dry connection of 15" sewer pipe to existing sanitary sewer pipe	EA	1	$265.00	$265.00
S-11	26" steel casing pipe, complete in place	LF	60	$50.00	$3,000.00
SUBTOTAL SANITARY SEWER ITEMS (S-1 THROUGH S-11)					$85,504.65
LOT NO. 4 WATER					
W- 1	8" water pipe, complete in place	LF	862	$16.00	$13,792.00
W- 2	12" water pipe, complete in place	LF	552	$22.50	$12,420.00
W- 3	Median irrigation valve boxes, Type B, in place, including 2" service line	EA	3	$400.00	$1,200.00
W- 4	Remove existing 8" plug and concrete blocking	EA	15	$50.00	$750.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
W- 5	Install 8" plug	EA	15	$150.00	$2,250.00
W- 6	Install blocking	CY	17	$90.85	$1,544.45
W- 7	30" steel casing pipe, complete in place	LF	60	$75.00	$4,500.00
W- 8	6" irrigation sleeves, complete in place	LF	1,610	$9.00	$14,490.00
W- 9	30"x12" reducer, complete in place	EA	1	$2,000.00	$2,000.00
W-10	42" steel casing pipe, complete in place	LF	50	$100.00	$5,000.00
W-11	Remove existing 12" plug and concrete blocking	EA	3	$50.00	$150.00
W-12	Install 12" plug	EA	4	$170.00	$680.00
W-13	Remove 12" blind flange	EA	1	$100.00	$100.00
SUBTOTAL WATER ITEMS (W-1 through W-13)					$58,876.45

BASE BID - TOTAL OF BID ITEMS

1.	Total Lot No. 1 - Paving Improvements (P-1 through P-37)	$1,432,535.74
2.	Total Lot No. 2 - Drainage Improvements (K-1 through K-36)	$740,464.75
3.	Total Lot No. 3 - Sanitary Sewer Improvements (S-1 through S-11)	$85,504.65
4.	Total Lot No. 4 - Water Line Improvements (W-1 through W-13)	$58,876.45
BASE BID - TOTAL OF LOT NO.1 THROUGH LOT NO. 4 IMPROVEMENTS		$2,317,381.59

? DATE unknown
Rec'd 3/5/87

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT

UNIT PRICE

BID PROPROSAL

To the City of Albuquerque, New Mexico (hereafter called "OWNER").

1. The undersigned (hereinafter called "Bidder") in compliance with your invitation for bids for the construction of: SPECIAL ASSESSMENT DISTRICT NO. 215: UNSER BOULEVARD FROM LADERA DRIVE TO DURAY ROAD AND 98TH STREET FROM UNSER WEST having carefully examined the Contract Documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the Contract Documents, within the time set forth herein, and at the unit prices stated below These prices are to cover all expenses incurred in performing the work required under the Contract Documents of which this proposal is a part. Quantities shown in this Unit Price Bid Proposal and in Alternates, if any, are estimated and actual payment will be made on the basis of confirmed quantities as constructed.

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
LOT NO. 1 CASH PAVING					
P- 1	Roadway excavation and disposal of unclassified material	CY	13,742	$1.00	$13,742.00
P- 2	Roadway excavation, backfill, and compaction of unclassified material	CY	26,306	$1.69	$44,457.14
P- 3	Cutting, removal, and disposal of exist. asphaltic conc. paving, where sawcutting is required	SY	850	$3.26	$2,771.00
P- 4	Cutting, removal, and disposal of exist. curb & gutter, sidewalk, drivepads, and cut-off walls	SY	91	$3.57	$324.87
P- 5	Process and compact existing material that has a soil bearing value of 20 or more, 6" in thickness, complete in place, residential/arterial	SY	52,529	$0.90	$47,276.10

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
P- 6	Process and compact existing subbase material that has a soil bearing value of 20 or more, 8" or more in thickness, complete in place	SY	52,529	$2.20	$115,563.80
P- 7	Asphalt treated base course, 4" thick, 1000 lb. stability, machine laydown	SY	52,529	$6.70	$351,944.30
P- 8	Asphaltic conc. base course, 2-1/2" thick, 1500 lb. stability, machine laydown	SY	47,023	$3.87	$181,979.01
P- 9	Emulsified asphaltic tack coat, complete in place	SY	47,023	$0.26	$12,225.98
P-10	Asphaltic conc. surface course, 2" thick, 1500 lb. stability, machine laydown including 12" subgrade prep.(biketrail)	SY	4,677	$3.85	$18,006.45
P-11	Asphaltic conc. surface course, 1 1/2" thick, 1800 lb. stability, machine laydown	SY	47,023	$2.61	$122,730.03
P-12	Machine-laid extruded asphalt curb, complete in place	LF	13,917	$2.83	$39,385.11
P-13	Portland cement conc. sidewalk, 4" thick, complete in place, including 6" comp subgrade prep	SF	89,900	$1.43	$128,557.00
P-14	Portland cement conc. drivepad, 6" thick, complete in place, including 6" comp. subgrade prep	SF	1,228	$3.16	$3,880.48
P-15	Portland cement conc. red brick patterned, 4" thick, complete in place	SF	4,280	$4.00	$17,120.00
P-16	Portland cement conc. standard curb and gutter, complete in place, including subgrade prep.	LF	13,627	$7.48	$101,929.96
P-17	6" Portland cement conc. median curb and gutter, complete in place, including subgrade prep.	LF	1,077	$6.82	$7,345.14
P-18	4" Portland cement conc. median curb and gutter, complete in place, including subgrade prep.	LF	88	$6.00	$528.00
P-19	Portland cement plain conc. for cut-off walls, in place	LF	494	$12.00	$5,928.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
P-20	Adjust water valve boxes to grade in off-street locations	EA	10	$100.00	$1,000.00
P-21	Adjust water valve boxes to grade in street locations	EA	17	$100.00	$1,700.00
P-22	Guardrail, metal beam, in place, including posts	LF	546	$16.50	$9,009.00
P-23	Guardrail end anchorage, Type "C"	EA	2	$571.00	$1,142.00
P-24	Traffic signal foundation, mast arm (MA) base, complete in place, Type I	EA	8	$380.00	$3,040.00
P-25	Traffic signal foundation, mast arm (MA) base, complete in place, Type II	EA	4	$380.00	$1,520.00
P-26	Traffic signal foundation, for pedestal (SP) type I, complete in place	EA	9	$230.00	$2,070.00
P-27	Street light pull box, Type T-4, complete in place	EA	8	$212.00	$1,696.00
P-28	Traffic signal pull box, Type T-4 complete in place	EA	23	$212.00	$4,876.00
P-29	Traffic signal pull box, Type Large complete in place	EA	12	$212.00	$2,544.00
P-30	Traffic signal controller foundation, Type II, complete in place	EA	2	$230.00	$460.00
P-31	Traffic signal electrical manhole, complete in place	EA	2	$2,000.00	$4,000.00
P-32	Traffic signal electrical conduit, 2" PVCP, complete in place, including connections to existing conduit, if required	LF	6,240	$4.05	$25,272.00
P-33	Traffic signal conduit, 3" PVCP, complete in place, including connections to existing conduit, if required	LF	1,490	$6.35	$9,461.50
P-34	Traffic control devices (barrels, panels, signs, barricades, and posts)	LS	1	$20,000.00	$20,000.00
P-35	Seeding of all erodible surfaces that are disturbed during construction	Ac	11	$1,200.00	$13,200.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
SUBTOTAL BID ITEMS (ITEMS P-1 TO P-35)					$1,316,684.87
LOT NO. 2 DRAINAGE					
K- 1	18" RCP, Class III, complete in place, in trench	LF	651	$18.66	$12,147.66
K- 2	24" RCP, Class III, complete in place, in trench	LF	2,095	$26.21	$54,909.95
K- 3	30" RCP, Class III, complete in place, in trench	LF	161	$37.00	$5,957.00
K- 4	42" RCP, Class III, complete in place, in trench	LF	149	$56.67	$8,443.83
K- 5	48" RCP, Class III, complete in place, in trench	LF	727	$73.50	$53,434.50
K- 6	54" RCP, Class III, complete in place, in trench	LF	172	$85.00	$14,620.00
K- 7	60" RCP, Class III, complete in place, in trench	LF	150	$94.00	$14,100.00
K- 8	Type "A" catch basin, single grate, complete in place	EA	10	$2,075.00	$20,750.00
K- 9	Type "C" catch basin, single grate, complete in place	EA	6	$2,075.00	$12,450.00
K-10	Type "C" catch basin, double grate, complete in place	EA	1	$2,875.00	$2,875.00
K-11	Type "D" catch basin, single grate, complete in place	EA	4	$1,750.00	$7,000.00
K-12	Type "D" catch basin, quadruple grate, complete in place	EA	1	$5,520.00	$5,520.00
K-13	4' dia. Type "C" or "E" MH, 6' to 10' depth, in place	EA	3	$977.61	$2,932.83
K-14	6' dia. Type "C" or "E" MH, less than 6' depth, in place	EA	1	$1,250.00	$1,250.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
K-15	6' dia. Type "C" or "E" MH, 6' to 10' depth, in place	EA	3	$1,500.00	$4,500.00
K-16	6' dia. Type "C" or "E" MH, 10' to 14' depth, in place	EA	1	$2,330.00	$2,330.00
K-17	Special storm junction box at Sta. 61+69, complete in place	EA	1	$7,000.00	$7,000.00
K-18	Special 4' dia. Type "C" or "E" MH with slotted cover, in place	EA	1	$1,200.00	$1,200.00
K-19	Special 6' dia Type "C" or "E" MH with slotted cover, in place	EA	3	$1,600.00	$4,800.00
K-20	Sidewalk culvert, including steel plate, complete in place	LF	6	$60.00	$360.00
K-21	Portland cement reinf. conc. for headwalls, retaining walls and box culverts, in place	CY	1,112	$307.14	$341,539.68
K-22	Grouted riprap, complete in place	CY	563	$90.00	$50,670.00
K-23	8' conc. parking bumpers, complete in place	EA	61	$200.00	$12,200.00
K-24	Trenching, backfilling, and compaction for 42" and over pipe, less than 8' trench depth	LF	228	$8.74	$1,992.72
K-25	Trenching, backfilling, and compaction for 42" and over pipe, 8' to 14' trench depth	LF	690	$18.04	$12,447.60
K-26	Trenching, backfilling, and compaction for 42" and over pipe, 14' to 20' trench depth	LF	280	$24.00	$6,720.00
K-27	Trenching, backfilling, and compaction for 18" to 36" pipe, less than 8' trench depth	LF	1,334	$9.51	$12,686.34
K-28	Trenching, backfilling, and compaction for 18" to 36" pipe, 8'to 14' trench depth	LF	1,423	$11.18	$15,909.14
K-29	Trenching, backfilling, and compaction for 18" to 36" pipe, 14'to 20' trench depth	LF	150	$20.00	$3,000.00

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
K-30	Removeable bollards, complete in place	EA	75	$200.00	$15,000.00
K-31	Rip-rap filter material, 6" in depth, complete in place	CY	270	$80.00	$21,600.00
SUBTOTAL DRAINAGE IMPROVEMENTS (BID ITEMS K-1 THROUGH K-31)					$730,346.25
LOT NO. 3 SANITARY SEWER					
S- 1	8" PVC sewer pipe, complete in trench	LF	424	$5.44	$2,306.56
S- 2	10" PVC sewer pipe, complete in trench	LF	941	$8.50	$7,998.50
S- 3	12" PVC sewer pipe, complete in trench	LF	350	$11.00	$3,850.00
S- 4	15" PVC sewer pipe, complete in trench	LF	1,225	$14.50	$17,762.50
S- 5	Trenching, backfilling, and compaction for 6" to 15" pipe, 8' to 10' trench depth	LF	424	$7.84	$3,324.16
S- 6	Trenching, backfilling, and compaction for 6" to 15" pipe, 14' to 18' trench depth	LF	1,275	$14.77	$18,831.75
S- 7	4' dia. Type "C" or "E" MH, 6' to 10'depth, in place	EA	1	$977.61	$977.61
S- 8	4' dia. Type "C" or "E" MH, 10' to 14'depth, in place	EA	7	$1,165.00	$8,155.00
S- 9	4' dia. Type "C" or "E" MH, greater than 14' depth per vertical foot of depth, in place	VF	11	$64.00	$704.00
S-10	Dry connection of 15" sewer pipe to existing sanitary sewer pipe	EA	1	$265.00	$265.00
S-11	26" steel casing pipe, complete in place	LF	60	$50.00	$3,000.00
SUBTOTAL SANITARY SEWER ITEMS (S-1 to S-11)					$67,175.08
LOT NO. 4 WATER					

ITEM NO.	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
W- 1	8" PVC water pipe, complete in place	LF	862	$16.00	$13,792.00
W- 2	12" PVC water pipe, complete in place	LF	552	$22.50	$12,420.00
W- 3	Median irrigation valve boxes,in place	EA	3	$400.00	$1,200.00
W- 4	Remove existing 8" plug and concrete blocking	EA	15	$50.00	$750.00
W- 5	Install 8" plug	EA	15	$150.00	$2,250.00
W- 6	Install blocking	CY	17	$90.85	$1,544.45
W- 7	30" steel casing pipe, complete in place	LF	60	$75.00	$4,500.00
W- 8	6" irrigation sleeves, complete in place	LF	1,610	$9.00	$14,490.00
W- 9	30"x12" reducer, complete in place	EA	1	$2,000.00	$2,000.00
W-10	42" steel casing pipe, complete in place	LF	50	$100.00	$5,000.00
W-11	Remove existing 12" plug and concrete blocking	EA	3	$50.00	$150.00
W-12	Install 12" plug	EA	4	$170.00	$680.00
W-13	Remove 12" bl	EA	1	$100.00	$100.00
SUBTOTAL WATER ITEMS (W-1 through W-13)					$58,876.45

BASE BID - TOTAL OF BID ITEMS

1.	Total Lot No. 1 - Paving Improvements (P-1 through P-35)	$1,316,684.87
2.	Total Lot No. 2 - Drainage Improvements (K-1 through K-31)	$730,346.25
3.	Total Lot No. 3 - Sanitary Sewer Improvements (S-1 through S-11)	$67,175.08
4.	Total Lot No. 4 - Water Line Improvements (W-1 through W-13)	$58,876.45
BASE BID - TOTAL OF LOT NO.1 THROUGH LOT NO. 4 IMPROVEMENTS		$2,173,082.65
Contingency of 10%		217,308.27
TOTAL OF ESTIMATED CONSTRUCTION COSTS		$2,390,390.92

PREPARED FOR
CITY OF ALBUQUERQUE

ENGINEER'S REPORT
SPECIAL ASSESSMENT DISTRICT NO. 215
UNSER BOULEVARD AND 98th STREET

AUGUST, 1986
PROJECT NO. 2803

Carl A. Tebbens, P.E.
Principal-In-Charge

DANIEL L. MOREHEAD
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER
8-15-86

D. L. Morehead, P.E.
Project Manager

John Block
Project Engineer

GREINER ENGINEERING SCIENCES, INC.
2601 Wyoming Boulevard, N.E. Albuquerque, New Mexico 87112 (505) 292-1936

August 13, 1986

Mr. Jim Hicks
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

RE: Engineer's Report for Special Assessment District No. 215,

Dear Mr. Hicks:

This report is prepared in conjunction with the Assessment Plats and Estimated Maximum Benefit Roll for Special Assessment District No. 215. The primary purpose of this report is to identify and establish the methodology used in estimating the maximum benefit as shown on the Estimated Maximum Benefit Roll.

Included in the report is a brief background on the selection of the Consulting Engineer, a general description of the proposed improvements, the process of identifying the benefitted properties and ownership thereof, the method used to determine the estimated benefit, the basis of assessment, and a tabulation of project costs.

Sincerely,

GREINER ENGINEERING

Carl A. Tebbens, P.E.
Vice President

D. L. Morehead, P.E. & L.S.
Project Manager

CAT:kw

Enclosure

John Block
Project Engineer

CONTENTS

I Selection of Engineer and Directive

II Proposed Improvements, Criteria and Specifications

III Preliminary Construction Costs

IV Identification of Properties and Determination of Ownership

V Determination of Benefits

VI Basis and Method of Assessment

VII Tabulation of Project Costs

I. SELECTION OF CONSULTING ENGINEER AND DIRECTIVE

Greiner Engineering was selected as the consulting engineers for Special Assessment District No. 215 by Mayor Ken Schultz under the emergency selection provision of the Revised Ordinances of the City of Albuquerque. The emergency selection allowed an expediant ratification of A/E Agreement #86-12, thereby providing a contract under which Greiner Engineering would serve as Consulting Engineers for SAD 215.

Special Assessment District No. 215, Resolution No. 1, adopted June 30, 1986 by the City Council, directs Greiner Engineering to prepare, submit and file with the City Clerk certain preliminary plans, estimates of cost, assessment plats with addendum showing the estimated maximum benefit and this report on the methodology used in determining benefits.

II. PROPOSED IMPROVEMENTS, CRITERIA AND SPECIFICATIONS

The area proposed to receive improvements from Special Assessment District No. 215 includes Unser Boulevard, N.W. from Ladera Drive to Ouray Road and 98th Street, N.W. from Unser Boulevard westerly approximately 2155 feet. The improvements are to consist of street, water, sanitary sewer and storm drainage more specifically containing the following:

Street Improvements:

Street Improvements shall consist of earth grading, asphaltic concrete pavements, standard curbs and gutter, concrete sidewalk and bicycle path. The pavement shall be an arterial section and consist of compacted subgrade, subbbase, cement or asphalt treated base course, asphaltic concrete base course, and asphaltic concrete surface course. Sidewalks are to be placed on both sides of 98th Street and the westerly side of Unser Boulevard, constructed of concrete and 6 feet wide. A bicycle path is to be constructed on the easterly side of Unser Boulevard between the curb and right-of-way line. The bike path is to be 12 feet wide and consist of compacted subgrade and asphaltic concrete surface.

Street grades and right-of-way grading will conform to City of Albuquerque standards. Street grades are designed so that curb elevations are near the elevation of the existing ground. No retaining facilities or steep ramps are required for adjacent property owners to utilize the designed street.

Water Improvements:

Water Improvements shall consist of excavation, backfilling, extending existing stubouts, stubbing for an intersection crossing, adjusting valve boxes to grade and concrete encasing a portions of existing distribution main.

The stub out extensions shall be 8 and 12 inch polyvinyl chloride pipe, cast iron pipe or ductile iron pipe. After the grading of Unser Boulevard and 98th Street, existing valve boxes must be adjusted to the new street grades. These improvements will be where existing facilities are located in Unser Boulevard from Ladera Drive to Ouray Road and in 98th Street from Unser Boulevard Westerly approximately 2155 feet. A section of existing distribution main crossing beneath the Mirehaven Drainage Channel improvements will be concrete encased, along with a section crossing the Ladera Channel.

Sanitary Sewer Improvements:

Sanitary Sewer Improvements shall consist of excavation, backfilling, collection mains, manholes and stubs for future extensions.

The collection mains shall be 8, 10 and 15 inch polyvinyl chloride pipe, vitrified clay pipe, or ductile iron pipe. The mains are to be located in Unser Boulevard, 49 feet west of center, and extend from Ladera Drive to the Ladera Drainage Channel. Four feet diameter manholes are to be located along the main per City standards. Eight inch and 10 inch diameter stubs will be located where future extensions are antisipated.

Sewer grades and alignment will conform to City of Albuquerque standards. All mains will flow by gravity to an existing sewer main.

Storm Drainage Improvements:

Storm Drainage Improvements shall consist of excavation backfilling, reinforced concrete pipes, catch basins, inlet and out fall structures, and major crossing structures. The concrete pipe will consist of 18, 24, 30, 36, 48, 54 and 60 inch diameters. All inlet structures and catch basins are to be constructed per City standards. The improvements will be located in Unser Boulevard from 98th Street to the Ladera Drainage Channel in 98th Street from Unser Boulevard westerly approximately 770 feet and in Ouray Road from the intersection of Ouray Rd. and Unser Blvd., approximately 2200 feet easterly to an unnamed dedicated arroyo which contributes to the Ladera Detention Pond.

Major crossing structures consisting of box culverts, wing walls, aprons and energy disipators will be located in Unser Boulevard at the crossing of the Mirehaven Drainage Channel and the Ladera Drainage Channel. These improvements are to be constructed per New Mexico State Highway Department standards.

The storm drainage improvements have been designed in accordance with a drainage report prepared by Greiner Engineering.

Outline of Specification:

See the "Preliminary Design Information" report for a full listing of Technical Specifications and Standard Details.

III. PRELIMINARY CONSTRUCTION COST ESTIMATE

A preliminary construction cost estimate was completed for the aforementioned improvements. The estimate is based on material quantities as identified on the preliminary plans. The City Engineer's estimated unit prices were used to estimate construction costs. The format of the estimate divides line items into five major categories i.e., paving, intersections, water, sanitary sewer and storm drainage improvements. This format is used in order to conveniently facilitate construction cost distribution. The estimate follows this page.

SAD 215 PRELIMINARY CONSTRUCTION COST ESTIMATE

ITEM ID	SHORT DESCRIPTION	UNIT	QUANTITY	ESTIMATED PRICE PER UNIT	TOTAL
UNSER PAVING					
P-1	EXCAV & DISP	CY	25610	1.00	25,610.00
P-2	EXCAV & COMP	CY	31370	1.69	53,015.30
P-5	SUBG STERIL	SY	34395	0.50	17,197.50
P-19	PROC 6" SUBBS	SY	34395	0.61	20,980.95
P-18	IMP 6" SUBBS	SY	34395	2.00	68,790.00
P-24	6" CTB	SY	30715	3.54	108,731.10
P-27	2-1/2" AC BS-1500-M	SY	30715	3.87	118,867.05
P-30	TK CT	SY	30715	0.26	7,985.90
P-35	1-1/2" AC SF-1800-M	SY	30715	2.61	80,166.15
P-47	PCC MDN C & G	LF	8	6.82	54.56
P-38	AC CURB	LF	11372	2.83	32,182.76
P-46	PCC STD C & G	LF	10080	7.48	75,398.40
P-42	4" PCC SDWK	SY	7330	1.43	10,481.90
P-53	V BOX ADO	EA	9	100.00	900.00
BIKE PATH					
P-19	PROC 6" SUBBS	SY	5050	0.61	3,080.50
P-36	2" AC SF-1800-M	SY	4487	2.71	12,159.77
Unser Subtotal					635,601.84
98TH STREET PAVING					
P-1	EXCAV & DISP	CY	9350	1.00	9,350.00
P-5	SUBG STERIL	SY	15638	0.50	7,819.00
P-19	PROC 6" SUBBS	SY	15638	0.61	9,539.18
P-18	IMP 6" SUBBS	SY	15638	2.00	31,276.00
P-24	6" CTB	SY	13578	3.54	48,066.12
P-27	2-1/2" AC BS-1500-M	SY	13578	3.87	52,546.86
P-30	TK CT	SY	13578	0.26	3,530.28
P-35	1-1/2" AC SF-1800-M	SY	13578	2.61	35,438.58
P-47	PCC MDN C & G	LF	545	6.82	3,716.90
P-46	PCC STD C & G	LF	4956	7.48	37,070.88
P-42	4" PCC SDWK	SY	3319	1.43	4,746.17
P-53	V BOX ADO	EA	13	100.00	1,300.00
98th Subtotal					244,399.97

Paving Subtotal	$880,001.81
Contingency 10%	88,000.18
PAVING TOTAL	$968,001.99

SAD 215 PRELIMINARY CONSTRUCTION COST ESTIMATE

ITEM ID	SHORT DESCRIPTION	UNIT	QUANTITY	ESTIMATED PRICE PER UNIT	TOTAL
UNSER & 98TH STREET					
P-1	EXCAV & DISP	CY	915	1.00	915.00
P-2	EXCAV & COMP	CY	4968	1.69	8,395.92
P-5	SUBG STERIL	SY	6282	0.50	3,141.00
P-19	PROC 6" SUBBS	SY	6282	0.61	3,832.02
P-18	IMP 6" SUBBS	SY	6282	2.00	12,564.00
P-24	6" CTB	SY	5515	3.54	19,523.10
P-27	2-1/2" AC BS-1500-M	SY	5515	3.87	21,343.05
P-30	TK CT	SY	5515	0.26	1,433.90
P-35	1-1/2" AC SF-1800-M	SY	5515	2.61	14,394.15
P-38	AC CURB	LF	908	2.83	2,569.64
P-47	PCC MDN C & G	LF	770	6.82	5,251.40
	BOMNT		4675	3.75	17,531.25
P-46	PCC STD C & G	LF	605	7.48	4,525.40
P-53	V BOX ADO	EA	7	100.00	700.00
K-49	STR CONC	CY	4	280.71	1,122.84
BIKE PATH					
P-36	2" AC SF-1800-M	SY	148	2.71	401.08
P-19	PROC 6" SUBBS	SY	173	0.61	105.53
Unser & 98th Street Subtotal					117,749.28
UNSER & OLD OURAY					
P-1	EXCAV & DISP	CY	163	1.00	163.00
P-2	EXCAV & COMP	CY	1176	1.69	1,987.44
P-5	SUBG STERIL	SY	1252	0.50	626.00
P-19	PROC 6" SUBBS	SY	1252	0.61	763.72
P-18	IMP 6" SUBBS	SY	1252	2.00	2,504.00
P-24	6" CTB	SY	1097	3.54	3,883.38
P-27	2-1/2" AC BS-1500-M	SY	1097	3.87	4,245.39
P-30	TK CT	SY	1097	0.26	285.22
P-35	1-1/2" AC SF-1800-M	SY	1097	2.61	2,863.17
P-38	AC CURB	LF	220	2.83	622.60
P-47	PCC MDN C & G	LF	220	6.82	1,500.40
	BOMNT		1403	3.75	5,261.25
P-46	PCC STD C & G	LF	275	7.48	2,057.00
K-49	STR CONC	CY	2	280.71	561.42
BIKE PATH					
P-36	2" AC SF-1800-M	SY	17	2.71	46.07
P-19	PROC 6" SUBBS	SY	22	0.61	13.42
Unser & Old Ouray Subtotal					27,383.48

SAD 215 PRELIMINARY CONSTRUCTION COST ESTIMATE

ITEM ID	SHORT DESCRIPTION	UNIT	QUANTITY	ESTIMATED PRICE PER UNIT	TOTAL
UNSER & OURAY					
P-1	EXCAV & DISP	CY	5756	1.00	5,756.00
P-2	EXCAV & COMP	CY	924	1.69	1,561.56
P-5	SUBG STERIL	SY	7262	0.50	3,631.00
P-19	PROC 6" SUBBS	SY	7262	0.61	4,429.82
P-18	IMP 6" SUBBS	SY	7262	2.00	14,524.00
P-24	6" CTB	SY	5617	3.54	19,884.18
P-27	2-1/2" AC BS-1500-M	SY	5617	3.87	21,737.79
P-30	TK CT	SY	5617	0.26	1,460.42
P-35	1-1/2" AC SF-1800-M	SY	5617	2.61	14,660.37
P-38	AC CURB	LF	853	2.83	2,413.99
P-47	PCC MDN C & G	LF	880	6.82	6,001.60
	BOMNT		4785	3.75	17,943.75
P-46	PCC STD C & G	LF	605	7.48	4,525.40
K-49	STR CONC	CY	10	280.71	2,807.10
P-53	V BOX ADO	EA	2	100.00	200.00
BIKE PATH					
P-36	2" AC SF-1800-M	SY	100	2.71	271.00
P-19	PROC 6" SUBBS	SY	115	0.61	70.15
Unser & Ouray Subtotal					121,878.13

Intersection Subtotal	$267,010.89
Contingency 10%	26,701.09
INTERSECTION TOTAL	$293,711.98

SAD 215 PRELIMINARY CONSTRUCTION COST ESTIMATE

ITEM ID	SHORT DESCRIPTION	UNIT	QUANTITY	ESTIMATED PRICE PER UNIT	TOTAL
UNSER WATER					
W-37	TRCHG, (4"-14"), 8'-14' D	LF	814	3.50	2,849.00
B-3	8" PVC/FRP P	LF	327	9.37	3,063.99
B-5	12" PVC/FRP P	LF	484	16.60	8,034.40
M-40	RF PCC (BDNG OR ENCSMT)	CY	45	200.00	9,000.00
S-26	6' MH, ADD D CST TO 4' MH	VF	5	85.49	427.45
W-78	V STM EXT	LF	90	25.71	2,313.90
Unser Water Subtotal					25,688.74
98TH STREET WATER					
W-37	TRCHG, (4"-14"), 8'-14' D	LF	550	3.50	1,925.00
B-3	8" PVC/FRP P	LF	550	9.37	5,153.50
98th Street Water Subtotal					7,078.50

Water Subtotal	$32,767.24
Contingency 10%	3,276.72
WATER TOTAL	$36,043.96

SAD 215 PRELIMINARY CONSTRUCTION COST ESTIMATE

ITEM ID	SHORT DESCRIPTION	UNIT	QUANTITY	ESTIMATED PRICE PER UNIT	TOTAL
UNSER S'LY SEWER (from Ladera Rd. to Ladera Channel)					
S-13	TRCHG, (6"-15"), 8'-10' D	LF	586	7.84	4,594.24
S-14	TRCHG, (6"-15"), 10'-14' D	LF	766	11.19	8,571.54
S-15	TRCHG, (6"-15"), 14'-18' D	LF	2052	14.77	30,308.04
G-3	8" PVCP	LF	540	5.08	2,743.20
G-4	10" PVCP	LF	1525	6.45	9,836.25
G-6	15" PVCP	LF	1350	13.50	18,225.00
S-22	4' MH, 6'-10' D	EA	2	977.61	1,955.22
S-23	4' MH, 10' TO 14' D	EA	5	1,165.00	5,825.00
S-30	DROP MH	LF	10	127.90	1,279.00
S-38	WET CONN, (12"-15")	EA	1	265.00	265.00
	PLUG	EA	4	50.00	200.00
Unser S'ly Sewer Subtotal					83,802.49
UNSER N'LY SEWER (@ Ouray intersection)					
S-14	TRCHG, (6"-15"), 10'-14' D	LF	320	11.19	3,580.80
G-3	8" PVCP	LF	320	5.08	1,625.60
S-23	4' MH, 10' TO 14' D	EA	1	1,165.00	1,165.00
	PLUG	EA	1	50.00	50.00
Unser N'ly Sewer Subtotal					6,421.40
		Sewer Subtotal			$90,223.89
		Contingency 10%			9,022.39
		SEWER TOTAL			$99,246.28

SAD 215 PRELIMINARY CONSTRUCTION COST ESTIMATE

ITEM ID	SHORT DESCRIPTION	UNIT	QUANTITY	ESTIMATED PRICE PER UNIT	TOTAL
MIREHAVEN DRAINAGE					
K-29	CB-A-S	EA	2	2,075.00	4,150.00
K-33	CB-D-S	EA	1	1,750.00	1,750.00
K-31	CB-C-S	EA	1	2,075.00	2,075.00
P-38	AC CURB	LF	33	2.83	93.39
K-51	6" REIN CHAN LIN	SF	595	3.92	2,332.40
K-68	GR RPRP	CY	15	90.00	1,350.00
K-50	REIN STR CONC	CY	465	307.14	142,820.10
K-50	REIN STR CONC	CY	28	307.14	8,599.92
K-51	6" REIN CHAN LIN	SF	5700	3.92	22,344.00
	FILTER BL		165	3.97	655.05
K-68	GR RPRP	CY	493	90.00	44,370.00
P-55	GDRL	LF	286	16.50	4,719.00
P-57	GDRL ANCH-C	EA	4	571.00	2,284.00
P-43	6" PCC DRVPD	SY	420	3.16	1,327.20
P-5	SUBG STERIL	SY	6600	0.50	3,300.00
Mirehaven Drainage Subtotal					242,170.06
LADERA DRAINAGE					
S-17	TRCHG, (18"-36"), LESS THAN 8' D	LF	348	9.51	3,309.48
K-81	TRCHG, (42" & OVER), LESS THAN 8' DEEP	LF	330	8.74	2,884.20
K-82	TRCHG, (42" & OVER), 8'-14' D	LF	482	18.04	8,695.28
K-3	18" RCP	LF	97	18.66	1,810.02
K-5	24" RCP	LF	220	26.21	5,766.20
K-7	30" RCP	LF	15	37.00	555.00
K-11	48" RCP	LF	807	73.50	59,314.50
S-22	4' MH, 6'-10' D	EA	3	977.61	2,932.83
S-26	6' MH, ADD D CST TO 4' MH	VF	48	85.49	4,103.52
S-23	4' MH, 10 TO 14' D	EA	1	1165.00	1,165.00
P-38	AC CURB	LF	35	2.83	99.05
K-29	CB-A-S	EA	3	2,075.00	6,225.00
98th Street					
K-29	CB-A-S	EA	4	2,075.00	8,300.00
K-3	18" RCP	LF	88	18.66	1,642.08
K-5	24" RCP	LF	770	26.21	20,181.70
S-17	TRCHG, (18"-36"), LESS THAN 8' D	LF	770	9.51	7,322.70
S-22	4' MH, 6'-10' D	EA	2	977.61	1,955.22
S-26	6' MH, ADD D CST TO 4' MH	VF	15	85.49	1,282.35
K-50	REIN STR CONC	CY	415	307.14	127,463.10
K-50	REIN STR CONC	CY	15	307.14	4,607.10
K-49	STR CONC	CY	96	280.71	26,948.16
	FILTER BL		95	3.97	377.15
K-68	GR RPRP	CY	280	90.00	25,200.00
P-55	GDRL	LF	260	16.50	4,290.00
P-57	GDRL ANCH-C	EA	4	571.00	2,284.00
	ENRG DISP		152	30.00	4,560.00
P-43	6" PCC DRVPD	SY	210	3.16	663.60
Ladera Drainage Subtotal					333,937.24

SAD 215 PRELIMINARY CONSTRUCTION COST ESTIMATE

ITEM ID	SHORT DESCRIPTION	UNIT	QUANTITY	ESTIMATED PRICE PER UNIT	TOTAL
OURAY DRAINAGE					
S-18	TRCHG, (18"-36"), 8'-14' D	LF	405	11.18	4,527.90
K-82	TRCHG, (42" & over), 8'-14' D	LF	1920	18.04	34,636.80
K-83	TRCHG, (42" & OVER), 14'-20' D	LF	280	24.00	6,720.00
K-3	18" RCP	LF	217	18.66	4,049.22
K-7	30" RCP	LF	25	37.00	925.00
K-9	36" RCP	LF	165	54.06	8,919.90
K-12	54" RCP	LF	155	85.00	13,175.00
K-13	60" RCP	LF	2200	94.00	206,800.00
S-23	4' MH, 10' TO 14' D	EA	3	1165.00	3,495.00
S-26	6' MH, ADD D CST TO 4' MH	VF	30	85.49	2,564.70
S-27	8' MH, ADD D CST TO 4' MH	VF	18	180.00	3,240.00
K-29	CB-A-S	EA	3	2075.00	6,225.00
K-33	CB-D-S	EA	2	1750.00	3,500.00
K-34	CB-D-D	EA	2	2760.00	5,520.00
K-67	PLAIN RPRP	CY	100	37.95	3,795.00
Ouray Drainage Subtotal					308,093.52

Storm Drainage Subtotal	$884,200.82
Contingency 10%	88,420.08
STORM DRAINAGE TOTAL	$972,620.90

PRELIMINARY CONSTRUCTION COST ESTIMATE TOTALS:

PAVING	$ 968,001.99
INTERSECTIONS	293,711.98
WATER	36,043.96
SEWER	99,246.28
STORM DRAINAGE	972,620.90
GRAND TOTAL	$2,369,625.11

IV. IDENTIFICATION OF PROPERTIES AND DETERMINATION OF OWNERSHIP

Properties that may receive special benefit from the improvements must be identified and the ownership determined, to create the roll in which estimated benefits will be assigned.

A preliminary review by Greiner Engineering, of recorded plats, identified properties at the location of the proposed improvements. Greiner Engineering also retained Rio Grande Title Company to verify the identified properties and determine the ownership thereof. Bernalillo County tax parcel code numbers were identified for the parcels which have such numbers. One parcel of land is newly plated/annexed and a tax parcel code number is not yet available from the County Assessor.

V. DETERMINATION OF BENEFITS

The determination of benefits is performed to comply with City Council Resolution No. 1 for SAD 215 which directs Greiner Engineering to prepare an addendum to the Assessment Plats showing the amount of maximum benefit estimated to accrue to each tract or parcel of land. The amount of estimated benefit establishes a limit on the amount of assessment as stated in New Mexico statutes 3-33-1 through 3-33-43, (1978).

Mr. D. L. Morehead, P.E. & L.S. of Greiner Engineering, with the purpose of identifying a methodology of determining benefit, has traveled to the location of the proposed improvements and observed the specific and general area. Observing the undeveloped condition, size and relative location to developed properties, Mr. Morehead is of the opinion that special benefit would be derived by increased property values due to the improvements.

Martin J. Molloy and Associates was retained by Greiner Engineering to study and appraise land values in the area of the improvements. The results of Martin J. Molloy and Associates' appraisal is incorporated in the determination of the estimated maximum benefits. The appraisal is based on before and after landvalues of similar properties. Increased values have been identified for each property and are as follows:

PARCEL #	ESTIMATED MAXIMUM BENEFIT
1	$ 20,000
2	1,562,000
3	1,174,000
4	1,396,000
5	155,000
6	204,000
7	25,400
8	33,200
9	232,700
10	117,700

The appraisal report prepared by Martin J. Molloy and Associates, under separate cover, identifies and certifies these appraisals. Benefit allocations will be discussed in the sections which follow.

Paving Benefits:

The benefits from paving result from the installation of asphaltic concrete driving surfaces, concrete curbs and gutters and concrete sidewalks. The value to land is increased by the following factors:

* Improved access to properties.

* Requirements by the local building codes that structures be served by suitable access for the public and for emergency vehicles.

* Requirements established by the City of Albuquerque for curb and gutter, and sidewalks.

The portions of Unser Boulevard and 98th Street to be developed incorporate a standard arterial roadway section. Review of each of the properties has determined that each one is capable of benefiting from an arterial street without exception. The presence of an arterial street directly fronting properties will increase the property value. In addition, the overall network of roadways (including intersections) in the immediate vicinity of properties will increase property values.

It is estimated the paving benefit including sidewalks will be the following:

PARCEL #	ESTIMATED BENEFIT
1	$ 20,000
2	1,038,200
3	776,500
4	925,100
5	138,500
6	185,100
7	25,400
8	33,200
9	20,900
10	3,800

The above figures include the projected benefits from intersections and similar features. Properties with frontages on two streets would be expected to benefit from all frontages. The above figures are based on the expected increase in land values as a result of constructing the paving improvements.

Water Benefit:

Water line benefits result from the installation of 8 and 12 inch water stub-outs in Unser Boulevard and 98th Street to specific properties. The value of land is increased by the following factors:

* Availability of water for domestic consumption including acceptable quality for public use.

* Availability of large quantities of water for fighting fires.

* Requirements for safe and sufficient water supply established by the State of New Mexico and the City of Albuquerque.

Most of the benefitted properties involve very large tracts which will require water main stub-outs for development purposes. It is estimated that the water system benefit excluding service lines should be the following:

PARCEL #	ESTIMATED MAXIMUM BENEFIT
2	$ 29,400
3	23,200
4	62,700

The above figures represent the expected increase in property values as result of constructing the water system improvements.

Sanitary Sewer Benefit:

Sanitary sewer benefits result from the installation of 10 inch to 15 inch sewer pipe, manholes and stub-outs. The sanitary sewer system is to be constructed in Unser Boulevard from Ladera Road to the Ladera Channel and at Ouray Road. The value of land is increased by the following factors:

* Availability of appropriate disposal of liquid wastes.

* Requirements for safe disposal of liquid wastes established by the State of New Mexico and the City of Albuquerque.

It is estimated that the sewer system benefit excluding service lines should be the following:

PARCEL #	ESTIMATED BENEFIT
3	$ 360,800
4	93,500

The above figures represent the expected increase in property values as a result of constructing sewer mains and manholes, exclusive of service lines.

Storm Sewer Benefit:

Storm sewer benefits result from the construction of 18 inch through 60 inch storm sewer pipe, manholes, and catch basins. Storm drainage facilities are to be located at Unser Boulevard and the Mirehaven Drainage Channel, along Unser Boulevard from 98th Street to the Ladera Drainage Channel and at Unser Boulevard and Ouray Road; and Ouray Road east to an unnamed arroyo.

Protection Benefits

The existing storm runoff from properties west of Unser Boulevard will be fully intercepted by the construction of facilities within Unser Boulevard. Protection from these improvements will be provided for properties to the east of Unser Boulevard. Areas of land benefited by protection were established for each drainage system and parcel.

Contribution Benefits

The existing runoff from properties west of Unser Boulevard receive benefit by having facilities which allow free discharge of runoff. Due to the undeveloped nature of all parcels within the District the value of protection and contribution benefits have been determined to be equal.

It is estimated the storm drainage benefits will be the following:

PARCEL #	ESTIMATED BENEFIT
2	$ 494,400
3	13,500
4	314,700
5	16,500
6	18,900
9	211,800
10	113,900

VI. BASIS AND METHOD OF ASSESSMENT

The amount to be assessed should include all costs associated with the improvements, i.e. construction costs and administrative costs. This basis, however, may not exceed the estimated maximum benefit. To identify if the assessments would exceed the estimated maximum benefits, construction cost and administrative cost must be distributed to each parcel in the District.

Estimated construction costs were generally distributed by the front foot method and area method. The estimated street improvement costs were distributed on a front foot method where costs were distributed by the proportion of frontage along any street. An adjustment for the difference in cost between the proposed roadway construction and a residential street section was included for properties west of Unser Boulevard which are anticipated to be developed for residential purposes. Properties to the east of Unser Boulevard received an adjustment for the difference in cost between the proposed roadway construction and a 24 foot half-width street but using an arterial section due to the anticipated commercial development of the property. Street intersection costs were distributed in a similar front foot method with adjustments for width and appropriate section, however the distribution was proportioned for frontage which abutts any portion of a street which is within one-half the distance to the next intersection from the intersection that is being improved.

Estimated water improvement costs were distributed on a front foot method for the frontage of general improvements, but where improvements strictly benefited a specific property the cost was distributed in whole to the specific property. Two portions of water main are to be encased in concrete in connection with major drainage crossing, these costs will not be distributed to the parcels within the District.

Estimated sanitary sewer costs were distributed on a front foot method for the frontage of improvements, however the distribution was for property on the west side of Unser Boulevard which is the property upgrade from the improvements. Service connections are not anticipated.

The estimated storm drainage costs were distributed by an area method where the costs were distributed by the proportion of area either contributing to, or receiving protection from, a paricular storm drainage system. Properties to the east of Unser Blvd., and north of Ouray received an equitable adjustment proportional to benefits.

An electronic spread sheet was used to calculate and display the distribution of the estimated construction costs (see following pages). The line items from the Preliminary Construction Cost Estimate are displayed with the costs distributed to the appropriate parcel. Parcels are numbered as in the Estimate Maximum Benefit Roll. The adjustment to the distributed paving costs was accomplished by means of including a factor in the extension of the distributed line items. The factor accounts for the difference in the width of the proposed paving and a 24 feet half width roadway and any cost differential for the item used in the street section (see calculation sheet following cost distribution).

SAD 215 Construction Cost Distribution

	Quantity	Unit Price	Estimated Cost	Res. factor	MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage					241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage							2157.82	2149.96							
Ouray frontage											542.02	638.14	608.04	737.06	
Acreage					31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
UNSER PAVING															
cut	25610 cy	1.00	25610.00	0.42	243.80	2770.66	2134.61	3337.36	1156.16	1193.00					14774.41
fill	31370 cy	1.69	53015.30	0.42	504.69	5735.55	4418.86	6908.68	2393.36	2469.63					30584.53
sub steril	34395 sy	0.50	17197.50	0.96	371.47	4221.50	3252.39	5084.96	1761.57	1817.71					687.90
subgrade	34395 sy	0.61	20980.95	0.96	453.19	5150.24	3967.92	6203.65	2149.12	2217.60					839.24
subbase	34395 sy	2.00	68790.00	0.48	742.93	16886.02	6504.78	10169.91	7046.30	7270.83					20169.23
treated base	30715 sy	3.54	108731.10	0	0.00	26690.44	0.00	0.00	11137.54	11492.44					59410.67
base course	30715 sy	3.87	118867.05	0.61	1652.04	29178.53	14464.56	22614.65	12175.79	12563.77					26217.70
tack coat	30715 sy	0.26	7985.90	0.96	172.50	1960.31	1510.29	2361.27	818.01	844.08					319.44
surface course	30715 sy	2.61	80166.15	0.93	1685.23	19678.55	14755.15	23068.96	8211.58	8473.24					4293.44
median curb	8 lf	6.82	54.56	0	0.00	0.00	0.00	0.00	0.00	0.00					54.56
ac curb	11372 lf	2.83	32182.76	0	0.00	0.00	0.00	0.00	0.00	0.00					32182.76
std curb&gutter	10080 lf	7.48	75398.40	1	1696.46	19279.37	14853.48	23222.71	8045.01	8301.36					0.00
sidewalk	7330 sy	1.43	10481.90	0.66	157.24	1786.90	1376.69	2152.39	745.65	769.41					3493.62
adj valve box	9 ea	100.00	900.00	1	20.25	230.13	177.30	277.20	96.03	99.09					0.00
BIKE PATH															
subgrade	5050 sy	0.61	3080.50												3080.50
surface course	4487 sy	2.71	12159.77												12159.77
Unser subtotal			635601.84		7699.80	133568.21	67416.05	105401.74	55736.13	57512.16					208267.76
98th PAVING															
cut	9350 cy	1.00	9350.00	0.62			2915.89	2905.42							3528.69
sub steril	15638 sy	0.50	7819.00	1			3916.54	3902.46							0.00
subgrade	15638 sy	0.61	9539.18	1			4778.18	4761.00							0.00
subbase	15638 sy	2.00	31276.00	0.5			7833.07	7804.93							15638.00
treated base	13578 sy	3.54	48066.12	0			0.00	0.00							48066.12
base course	13578 sy	3.87	52546.86	0.64			16934.75	16873.90							18738.21
tack coat	13578 sy	0.26	3530.28	1			1768.32	1761.96							0.00
surface course	13578 sy	2.61	35438.58	0.97			17275.45	17213.37							949.75
median curb	545 lf	6.82	3716.90	0			0.00	0.00							3716.90
std curb&gutter	4956 lf	7.48	37070.88	1			18568.80	18502.08							0.00
sidewalk	3319 sy	1.43	4746.17	0.66			1584.98	1579.29							1581.90
adj valve box	13 ea	100.00	1300.00	1			651.17	648.83							0.00
98th subtotal			244399.97				76227.16	75953.24							92219.57
contingency			88000.18		769.98	13356.82	14364.32	18135.50	5573.61	5751.22					30048.73
PAVING TOTAL			968001.99		8469.78	146925.03	158007.53	199490.47	61309.74	63263.38					330536.07

SAD 215 Construction Cost Distribution

					MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage					241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage							2157.82	2149.96							
Ouray frontage											542.02	638.14	608.04	737.06	
Acreage					31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
	Quantity	Unit	Estimated Cost	Res. factor											
UNSER & 98th															
cut	915 cy	1.00	915.00	0.26		120.51	30.13	30.13							734.24
fill	4968 cy	1.69	8395.92	0.26		1105.74	276.44	276.44							6737.31
sub steril	6282 sy	0.50	3141.00	0.96		1507.68	376.92	376.92							879.48
subgrade	6282 sy	0.61	3832.02	0.96		1839.37	459.84	459.84							1072.97
subbase	6282 sy	2.00	12564.00	0.24		6030.72	376.92	376.92							5779.44
treated base	5515 sy	3.54	19523.10	0		9371.09	0.00	0.00							10152.01
base course	5515 sy	3.87	21343.05	0.39		10244.66	1060.22	1060.22							8977.95
tack coat	5515 sy	0.26	1433.90	0.96		688.27	172.07	172.07							401.49
surface course	5515 sy	2.61	14394.15	0.90		6909.19	1636.08	1636.08							4212.81
ac curb	908 lf	2.83	2569.64	0		0.00	0.00	0.00							2569.64
median curb	770 lf	6.82	5251.40	0		0.00	0.00	0.00							5251.40
bomnt	4675	3.75	17531.25	0		0.00	0.00	0.00							17531.25
std curb&gutter	605 lf	7.48	4525.40	1		2262.70	565.68	565.68							1131.35
adj valves	7 ea	100.00	700.00	1		350.00	87.50	87.50							175.00
cutoff wall	4 cy	280.71	1122.84	0.96		538.96	134.74	134.74							314.40
BIKE PATH															
surface course	148 sy	2.71	401.08												401.08
subbase	173 sy	0.61	105.53												105.53
subtotal			117749.28			40968.90	5176.52	5176.52							66427.34
UNSER & old ouray															
cut	163 cy	1.00	163.00	0.26		21.47			21.47						120.07
fill	1176 cy	1.69	1987.44	0.26		261.75			261.75						1463.95
sub steril	1252 sy	0.50	626.00	0.96		300.48			300.48						25.04
subgrade	1252 sy	0.61	763.72	0.96		366.59			366.59						30.55
subbase	1252 sy	2.00	2504.00	0.96		1201.92			1201.92						100.16
treated base	1097 sy	3.54	3883.38	0.96		1864.02			1864.02						155.34
base course	1097 sy	3.87	4245.39	0.96		2037.79			2037.79						169.82
tack coat	1097 sy	0.26	285.22	0.96		136.91			136.91						11.41
surface course	1097 sy	2.61	2863.17	0.96		1374.32			1374.32						114.53
ac curb	220 lf	2.83	622.60	0		0.00			0.00						622.60
median curb	220 lf	6.82	1500.40	0		0.00			0.00						1500.40
bomnt	1403	3.75	5261.25	0		0.00			0.00						5261.25
std curb&gutter	275 lf	7.48	2057.00	1		1028.50			1028.50						0.00
cutoff wall	2 cy	280.71	561.42	0.96		269.48			269.48						22.46
BIKE PATH															
surface course	17 sy	2.71	46.07												46.07
subgrade	22 sy	0.61	13.42												13.42
subtotal			27383.48			8863.22			8863.22						9657.05

SAD 215 Construction Cost Distribution

	Quantity	Unit Price	Estimated Cost	Res. factor	MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage					241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage							2157.82	2149.96							
Ouray frontage											542.02	638.14	608.04	737.06	
Acreage					31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
UNSER & OURAY															
cut	5756 cy	1.00	5756.00	0.26				758.07		379.03	144.96	44.56	146.25	43.27	4239.87
fill	924 cy	1.69	1561.56	0.26				205.66		102.83	39.33	12.09	39.68	11.74	1150.25
sub steril	7262 sy	0.50	3631.00	0.96				1742.88		871.44	333.28	102.44	336.25	99.47	145.24
subgrade	7262 sy	0.61	4429.82	0.96				2126.31		1063.16	406.60	124.97	410.22	121.36	177.19
subbase	7262 sy	2.00	14524.00	0.24				1742.88		3485.76	1333.13	409.75	1344.98	397.90	5809.60
treated base	5617 sy	3.54	19884.18	0				0.00		4772.20	1825.13	560.97	1841.35	544.75	10339.77
base course	5617 sy	3.87	21737.79	0.39				4319.30		5217.07	1995.27	613.27	2013.01	595.53	6984.35
tack coat	5617 sy	0.26	1460.42	0.96				701.00		350.50	134.05	41.20	135.24	40.01	58.42
surface course	5617 sy	2.61	14660.37	0.90				6665.34		3518.49	1345.65	413.60	1357.61	401.64	958.06
ac curb	853 lf	2.83	2413.99	0				0.00		0.00	0.00	0.00	0.00	0.00	2413.99
median curb	880 lf	6.82	6001.60	0				0.00		0.00	0.00	0.00	0.00	0.00	6001.60
bomnt	4785	3.75	17943.75	0				0.00		0.00	0.00	0.00	0.00	0.00	17943.75
std curb&gutter	605 lf	7.48	4525.40	1				2262.70		1131.35	432.68	132.99	436.53	129.14	-0.00
cutoff wall	10 cy	280.71	2807.10	0.96				1347.41		673.70	257.66	79.19	259.95	76.90	112.28
adj valve box	2 ea	100.00	200.00	1				100.00		50.00	19.12	5.88	19.29	5.71	-0.00
BIKE PATH															
surface course	100 sy	2.71	271.00												271.00
subbase	115 sy	0.61	70.15												70.15
subtotal			121878.13					21971.54		21615.53	8266.86	2540.91	8340.35	2467.41	56675.52
contingency			26701.09			4983.21	517.65	2714.81	886.32	2161.55	826.69	254.09	834.04	246.74	13275.99
INTERSECTION TOTAL			293711.98			54815.33	5694.17	29862.87	9749.54	23777.09	9093.55	2795.00	9174.39	2714.15	146035.90

SAD 215 Construction Cost Distribution

	Quantity	Unit	Unit Price	Estimated Cost	Res. factor	MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage						241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage								2157.82	2149.96							
Duray frontage												542.02	638.14	608.04	737.06	
Acreage						31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
Unser WATER																
trench 10-14	814	lf	3.50	2849.00			1139.60	427.35	1282.05							
8" pipe	327	lf	9.37	3063.99			2144.79	919.20								
12" pipe	484	lf	16.60	8034.40			803.44		7230.96							
conc. encsmnt	45	cy	200.00	9000.00			0.00									9000.00
adj arv valt	5	vf	85.49	427.45			170.98	64.12	192.35							
adj valve stem	90	lf	25.71	2313.90			925.56	347.09	1041.26							
subtotal				25688.74			5184.37	1757.75	9746.62							9000.00
98th WATER																
trench 6-10	550	lf	3.50	1925.00				728.61	1196.39							
8" pipe	550	lf	9.37	5153.50				1950.60	3202.90							
subtotal				7078.50				2679.21	4399.29							
contingency				3276.72			518.44	443.70	1414.59							900.00
WATER TOTAL				36043.96			5702.81	4880.66	15560.50							9900.00

SAD 215 Construction Cost Distribution

					MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage					241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage							2157.82	2149.96							
Ouray frontage											542.02	638.14	608.04	737.06	
Acreage					31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
	Quantity	Unit	Estimated Cost	Res. factor											
Unser S'ly SEWER (Ladera Rd. to Ladera Channel)															
trench 8-10	586	lf	7.84	4594.24			3791.17	803.07							
trench 10-14	766	lf	11.19	8571.54			7073.23	1498.31							
trench 14-18	2052	lf	14.77	30308.04			25010.19	5297.85							
8" pipe	540	lf	5.08	2743.20			2263.69	479.51							
10" pipe	1525	lf	6.45	9836.25			8116.87	1719.38							
15" pipe	1350	lf	13.50	18225.00			15039.27	3185.73							
manhole 6-10	2	ea	977.61	1955.22			1613.45	341.77							
manhole 10-14	5	ea	1165.00	5825.00			4806.79	1018.21							
MH add depth	10	lf	127.90	1279.00			1055.43	223.57							
MH connect	1	ea	265.00	265.00			218.68	46.32							
plug	4	ea	50.00	200.00			165.04	34.96							
subtotal				83802.49			69153.81	14648.68							
Unser N'ly SEWER (@ Ouray Rd. intersection)															
trench 10-14	320	lf	11.19	3580.80				3580.80							
8" pipe	320	lf	5.08	1625.60				1625.60							
manhole	1	ea	1165.00	1165.00				1165.00							
plug	1	ea	50.00	50.00				50.00							
subtotal				6421.40				6421.40							
contingency				9022.39			6915.38	2107.01							
SEWER TOTAL				99246.28			76069.20	23177.08							

SAD 215 Construction Cost Distribution

					MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage					241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage							2157.82	2149.96							
Ouray frontage											542.02	638.14	608.04	737.06	
Acreage					31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
	Quantity	Unit	Unit Price	Estimated Cost	Res. factor										
MIREHAVEN DRAINAGE															
A-s inlet	2	ea	2075.00	4150.00		3205.46	721.27								223.27
D-s inlet	1	ea	1750.00	1750.00		1351.70	304.15								94.15
C-s inlet	1	ea	2075.00	2075.00		1602.73	360.64								111.63
ac curb	33	lf	2.83	93.39		72.13	16.23								5.02
conc. rundown	595	sf	3.92	2332.40		1801.55	405.37								125.48
rip rap	15	cy	90.00	1350.00		1042.74	234.63								72.63
sub total				11750.79		9076.31	2042.29								632.19
Crossing structure															
box str	465	cy	307.14	142820.10											142820.10
wing walls	28	cy	307.14	8599.92											8599.92
apron	5700	sf	3.92	22344.00											22344.00
filter bl	165		3.97	655.05											655.05
rip rap	493	cy	90.00	44370.00											44370.00
guard rail	286	lf	16.50	4719.00											4719.00
rail anchor	4	ea	571.00	2284.00											2284.00
drive pad	420	sy	3.16	1327.20											1327.20
sub steril	6600	sy	0.50	3300.00											3300.00
subtotal				230419.27											230419.27
Mirehaven sub total				242170.06		9076.31	2042.29								231051.46

SAD 215 Construction Cost Distribution

	Quantity	Unit	Unit Price	Estimated Cost	Res. factor	MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage						241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage								2157.82	2149.96							
Ouray frontage												542.02	638.14	608.04	737.06	
Acreage						31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
LADERA DRAINAGE																
trench 18-36 <8	348	lf	9.51	3309.48			1971.79	81.74	1059.36							196.58
trench 48 <8	330	lf	8.74	2884.20			1718.41	71.24	923.23							171.32
trench 48 8-14	482	lf	18.04	8695.28			5180.65	214.77	2783.36							516.50
18" pipe	97	lf	18.66	1810.02			1078.41	44.71	579.39							107.52
24" pipe	220	lf	26.21	5766.20			3435.50	142.43	1845.76							342.51
30" pipe	15	lf	37.00	555.00			330.67	13.71	177.66							32.97
48" pipe	807	lf	73.50	59314.50			35339.58	1465.07	18986.57							3523.28
manhole 6-10	3	ea	977.61	2932.83			1747.38	72.44	938.80							174.21
manhole 10-14	1	ea	1165.00	1165.00			694.11	28.78	372.92							69.20
MH upsize 6'	48	vf	85.49	4103.52			2444.88	101.36	1313.54							243.75
ac curb	35	lf	2.83	99.05			59.01	2.45	31.71							5.88
A-s inlet	3	ea	2075.00	6225.00			3708.86	153.76	1992.62							369.77
sub total				96860.08			57709.24	2392.44	31004.91							5753.49
98th street																
A-s inlet	4	ea	2075	8300.00												8300.00
18" pipe	88	lf	18.66	1642.08												1642.08
24" pipe	770	lf	26.21	20181.70												20181.70
trench 18-36 <8	770	lf	9.51	7322.70												7322.70
manhole 6-10	2	ea	977.61	1955.22												1955.22
MH upsize 6'	15	vf	85.49	1282.35												1282.35
Crossing structure																
box str	415	cy	307.14	127463.10												127463.10
wing walls	15	cy	307.14	4607.10												4607.10
apron	96	sf	280.71	26948.16												26948.16
filter bl	95		3.97	377.15												377.15
rip rap	280	cy	90.00	25200.00												25200.00
guard rail	260	lf	16.50	4290.00												4290.00
rail anchor	4	ea	571.00	2284.00												2284.00
enrg disp	152	ea	30.00	4560.00												4560.00
drive pad	210	sy	3.16	663.60												663.60
subtotal				237077.16												237077.16
Ladera sub total				333937.24			57709.24	2392.44	31004.91							242830.65

SAD 215 Construction Cost Distribution

					MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
Unser frontage					241.12	2741.63	2112.16	3302.38	1143.91	1180.76					
98th frontage							2157.82	2149.96							
Ouray frontage											542.02	638.14	608.04	737.06	
Acreage					31.0936	130.1308	97.8056	116.2842	6.7546	9.0451			38.7941	33.6218	
	Quantity	Unit	Unit Price	Estimated Cost	Res. factor										
OURAY DRAINAGE															
trnch 18-36 8-14	405	lf	11.18	4527.90				600.85	83.31	111.39			1244.72	1078.55	1409.08
trnch 54-60 14-20	280	lf	24.00	6720.00				891.74	123.65	165.31			1847.33	1600.70	2091.26
18" pipe	217	lf	18.66	4049.22				537.33	74.51	99.61			1113.13	964.52	1260.12
30" pipe	25	lf	37.00	925.00				122.75	17.02	22.76			254.28	220.34	287.86
36" pipe	165	lf	54.06	8919.90				1183.67	164.13	219.43			2452.08	2124.72	2775.87
54" pipe	155	lf	85.00	13175.00				1748.32	242.42	324.11			3621.81	3138.29	4100.06
60" pipe	2200	lf	94.00	206800.00				27442.36	3805.12	5087.28			56849.32	49259.76	64356.16
manhole 10-14	3	ea	1165.00	3495.00				463.79	64.31	85.98			960.78	832.51	1087.64
MH upsize 6'	30	vf	85.49	2564.70				340.34	47.19	63.09			705.04	610.91	798.13
MH upsize 8'	18	vf	180.00	3240.00				429.95	59.62	79.70			890.68	771.77	1008.29
A-s inlet	3	ea	2075.00	6225.00				826.06	114.54	153.14			1711.25	1482.80	1937.22
D-s inlet	2	ea	1750.00	3500.00				464.45	64.40	86.10			962.15	833.70	1089.20
D-d inlet	2	ea	2760.00	5520.00				732.50	101.57	135.79			1517.45	1314.86	1717.82
trnch 60" 8-14	1920	lf	18.04	34636.80				4596.30	637.32	852.07			9521.66	8250.49	10778.97
rip rap	100	cy	37.95	3795.00				503.60	69.83	93.36			1043.25	903.97	1181.00
Ouray sub total				308093.52				40884.01	5668.92	7579.10			84694.91	73387.88	95878.70
contingency				88420.08		6678.55	443.47	7188.89	566.89	757.91			8469.49	7338.79	56976.08
STORM DRAINAGE TOTAL				972620.90		73464.10	4878.20	79077.81	6235.81	8337.01			93164.40	80726.66	626736.90

Preliminary Construction Cost Distribution Totals

		MBR#1	MBR#2	MBR#3	MBR#4	MBR#5	MBR#6	MBR#7	MBR#8	MBR#9	MBR#10	City to Pay
PAVING TOTAL	968001.99	8469.78	146925.03	158007.53	199490.47	61309.74	63263.38	0.00	0.00	0.00	0.00	330536.07
INTERSECTION TOTAL	293711.98	0.00	54815.33	5694.17	29862.87	9749.54	23777.09	9093.55	2795.00	9174.39	2714.15	146035.90
WATER TOTAL	36043.96	0.00	5702.81	4880.66	15560.50	0.00	0.00	0.00	0.00	0.00	0.00	9900.00
SEWER TOTAL	99246.28	0.00	0.00	76069.20	23177.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STORM DRAINAGE TOTAL	972620.90	0.00	73464.10	4878.20	79077.81	6235.81	8337.01	0.00	0.00	93164.40	80726.66	626736.90
GRAND TOTAL	2369625.11	8469.78	280907.26	249529.76	347168.73	77295.09	95377.48	9093.55	2795.00	102338.79	83440.82	1113208.86

Greiner Engineering

☐ DENVER, COLORADO
☐ COLORADO SPRINGS, COLORADO
☐ ALBUQUERQUE, NEW MEXICO
☐ KEMMERER, WYOMING

PROJECT SAD - 215
JOB NUMBER 0690587 SHEET 1 OF
CALCULATED BY J. BLOCK DATE 7/3/86
CHECKED BY dlm DATE 7/21/86

RESIDENTIAL FACTOR CALCULATION

ASSESSABLE SECTION ≈ 24' HALF WIDTH
COMMERCIAL PROPERTY – ARTERIAL PAVING
RESIDENTIAL PROPERTY – RESIDENTIAL PAVING

WIDTH DIFFERENCE
98TH STREET 22' < 24' ∴ WIDTH FULLY ASSESSABLE
UNSER BLVD 25' > 24' ∴ 1' WIDTH UNASSESSABLE
WIDTH COEFFICIENT 98TH = 1.00
UNSER = 0.96 = 24/25

PAVING DIFFERENCE

RESIDENTIAL	COST	DIFFERENCE	COST	ARTERIAL
STERIL SUBGRD.	0.50	1.00	0.50	STERIL SUBGRD
SUBGRADE	0.61	1.00	0.61	SUBGRADE
SUB BASE	1.00	0.50	2.00	SUB BASE
		—	3.54	TREATED BASE
BASE	2.49	0.6434	3.87	BASE
TACK COAT	0.26	1.0	0.26	TACK COAT
SURFACE	2.54	0.9732	2.61	SURFACE

RESIDENTIAL FACTOR = PRODUCT OF WIDTH COEFF. AND PAVING DIFF.

98TH STREET FACTOR			ITEM	UNSER BLVD FACTOR
1.0 X 1.0	=	1.0	STERIL SUB	0.96 X 1.0 = 0.96
1.0 X 1.0	=	1.0	SUBGRADE	0.96 X 1.0 = 0.96
1.0 X 0.5	=	0.5	SUB BASE	0.96 X 0.5 = 0.48
1.0 X 0	=	0	TREATED BASE	0.96 X 0 = 0
1.0 X .6434	=	0.6434	BASE	0.96 X 0.6434 = 0.6177
1.0 X 1.0	=	1.0	TACK COAT	0.96 X 1.0 = 0.96
1.0 X .9732	=	0.9732	SURFACE	0.96 X .9732 = 0.9343

WHERE COMMERCIAL PROPERTY FRONTS ON UNSER, THE PAVING SECTION IS FULLY ASSESSABLE FOR A 24' WIDTH
∴ FACTOR BECOMES 0.96 FOR ALL ITEMS

WIDTH DIFFERENCE FOR GRADING
98TH 106'/66' = 0.4231
UNSER 156'/66' = 0.6236

The administrative costs associated with the assessment District were estimated and are listed in the following table. These costs are also listed as a percentage of the total construction cost.

Design Fee	5.600%	132,720.00
Drainage Analysis	0.243%	5,750.00
Assessment Documentation	1.245%	29,500.00
Construction Staking	3.000%	71,088.75
Construction Observation	4.500%	106,633.13
Testing	1.500%	35,544.38
Special Services	0.465%	11,025.00
Gross Receipts Tax	0.807%	19,122.74
Bond Discount and Attorney Fees	2.600%	61,610.25
City Incidental Fees	1.000%	23,696.25
Contingencies	9.040%	214,197.03
Total	30.000%	710,887.53

The administrative costs to be assessed were estimated and are listed in the following table. These costs are also listed in the Tabulation of Project Costs. These costs are also listed as a percentage of the assessable construction costs.

Design Fee	10.563%	132,720.00
Drainage Analysis	0.458%	5,750.00
Assessment Documentation	2.348%	29,500.00
Construction Staking	3.000%	37,692.48
Construction Observation	4.500%	56,538.73
Testing	1.500%	18,846.25
Special Services	0.877%	11,025.00
Gross Receipts Tax	1.133%	14,238.53
Bond Discount and Attorney Fees	4.904%	61,610.25
City Incidental Fees	1.886%	23,696.25
Contingencies	9.802%	123,155.99
Total	40.971%	514,773.48

The total percentage of these costs has been added to the distributed construction costs for each parcel in the District. The distributed construction cost and the administrative costs for each parcel are listed in the following table.

EMB ROLL PARCEL	CONSTRUCTION COST	ADMIN. COST	EST. ASSESSMENT
#1	8,469.78	3,470.20	$ 11,939.98
#2	280,907.27	115,092.12	395,999.39
#3	249,529.76	102,236.26	351,766.02
#4	347,168.73	142,240.48	489,409.21
#5	77,295.09	31,669.01	108,964.10
#6	95,377.48	39,077.65	134,455.13
#7	9,093.55	3,725.77	12,819.32
#8	2,795.00	1,145.15	3,940.15
#9	102,338.79	41,929.81	144,268.60
#10	83,440.81	34,187.01	117,627.82

VII. TABULATION OF PROJECT COSTS

TABULATION OF PROJECT COST
SPECIAL ASSESSMENT DISTRICT NO. 215
JULY, 1986

(1)a. STREET IMPROVEMENTS - ASSESSABLE

Construction	$ 785,142.00
Basic Design Fee	86,530.73
Special Services	6,889.59
Preparation of Maximum Benefit Roll	18,434.73
Construction Monitoring	35,331.39
Construction Staking	23,554.26
Construction Testing	11,777.13
Gross Receipts Tax	8,897.74
Bond Discount and Attorney Fees	38,500.61
City Incidental Fees	14,807.93
TOTAL	$1,029,866.11

(1)b. STREET IMPROVEMENTS - UNASSESSABLE

Construction	$ 476,571.97
Construction Monitoring	21,445.74
Construction Staking	14,297.16
Construction Testing	7,148.58
Gross Receipts Tax	2,090.96
TOTAL	$ 521,554.41

(2)a. SANITARY SEWER IMPROVEMENTS - ASSESSABLE

Construction	$ 99,246.28
Basic Design Fee	10,937.96
Special Services	870.88
Preparation of Maximum Benefit Roll	2,330.25
Construction Monitoring	4,466.08
Construction Staking	2,977.39
Construction Testing	1,488.69
Gross Receipts Tax	1,124.72
Bond Discount and Attorney Fees	4,866.69
City Incidental Fee	1,871.80
TOTAL	$ 130,180.74

(3)a. WATERLINE IMPROVEMENTS - ASSESSABLE

Construction	$ 26,143.96
Basic Design Fee	2,881.33
Special Services	229.41
Preparation of Maximum Benefit Roll	613.85
Construction Monitoring	1,176.48
Construction Staking	784.32
Construction Testing	392.16
Gross Receipts Tax	296.28
Bond Discount and Attorney Fees	1,282.01
City Incidental Fee	493.08
TOTAL	$ 34,292.88

(3)b. WATERLINE IMPROVEMENTS - UNASSESSABLE

Construction	$ 9,900.00
Construction Monitoring	445.50
Construction Staking	297.00
Construction Testing	148.50
Gross Receipts Tax	43.44
TOTAL	$ 10,834.44

(4)a. STORM SEWER IMPROVEMENTS - ASSESSABLE

Construction	$ 345,884.00
Basic Design Fee	38,119.98
Special Services	3,035.12
Preparation of Maximum Benefit Roll	8,121.17
Construction Monitoring	15,564.78
Construction Staking	10,376.51
Construction Testing	5,188.27
Gross Receipts Tax	3,919.79
Bond Discount and Attorney Fees	16,960.94
City Incidental Fee	6,523.44
TOTAL	$ 453,694.00

(4)b. STORM SEWER IMPROVEMENTS - UNASSESSABLE

Construction	$ 626,736.90
Construction Monitoring	28,203.16
Construction Staking	18,802.11
Construction Testing	9,401.05
Gross Receipts Tax	2,749.81
SUBTOTAL	$ 685,893.03

(a) PROJECT COST - ASSESSABLE

Construction	$1,256,416.24
Basic Design Fee	138,470.00
Special Services	11,025.00
Preparation of Maximum Benefit Roll	29,500.00
Construction Monitoring	56,538.73
Construction Staking	37,692.48
Construction Testing	18,846.25
Gross Receipts Tax	14,238.53
Bond Discount and Attorney Fees	61,610.25
City Incidental Fee	23,696.25
Contingencies	123,155.99
SUBTOTAL - A	$1,771,189.72

(b) PROJECT COST - UNASSESSABLE

Street Improvements	$ 521,554.41
Waterline Improvements	10,834.44
Storm Sewer Improvements	685,893.03
Contingencies	91,041.04
TOTAL A & B	$1,309,322.92

COMBINED PROJECT COSTS - ASSESSABLE & UNASSESSABLE

Construction	$2,369,625.11
Basic Design Fee	138,470.00
Special Services	11,025.00
Preparation of Maximum Benefit Roll	29,500.00
Construction Monitoring	106,633.13
Construction Staking	71,088.75
Construction Testing	35,544.38
Gross Receipts Tax	19,122.74
Bond Discount and Attorney Fees	61,610.25
City Incidental Fee	23,696.25
Contingencies	214,197.03
TOTAL	$3,080,512.64

Greiner

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

November 24, 1986

RECEIVED
JAN 27 1987
PWD/TRANS DIV.

Mr. Jesse Ortiz
Engineering Division
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Addendum to SAD 215 Ouray Storm Drain from Unser Boulevard to Ronda de Lechusas

Dear Mr. Ortiz:

We are sending you an addendum to the "Preliminary Design Information" for Special Assessment District No. 215, dated August 18, 1986. An addendum is necessary due to the inclusion of the storm drain outfall system within the Ouray Road right-of-way. The 60 inch storm drain was added to SAD 215 subsequent to the Preliminary Design Information Report.

If you have any questions regarding this addendum, please call.

Sincerely,

GREINER ENGINEERING

Rick Beltramo

Rick Beltramo, P.E.
Project Engineer

RB:tw

Enclosures

cc: Steve Boberg, Project Engineer, Utility Design Section
Lee Lunsford, Special Assessment Engineer
Billy Goolsby, City Hydrologist, Hydrology Section

Job No. 0690585

FIRST ADDENDUM

TO

PRELIMINARY DESIGN INFORMATION

SPECIALL ASSESSMENT DISTRICT

NUMBER 215

INTRODUCTION

The section of Unser Boulevard from Ladera Drive to Ouray Road including 98th Street is to be improved under Special Assessment District No. 215. These improvements include paving, storm drainage and utilities. As part of the storm drainage, a storm sewer outfall system has been added. The storm drain is located within the Ouray right-of-way, starting at Unser Boulevard heading east approximately 2200 ft. and outfailing to an existing channel.

Following are the design concepts for the Ouray Storm Drain System.

DESIGN REQUIREMENTS

A meeting was held with City of Albuquerque Hydrology Section to determine the design requirements the Ouray Storm Drain would have to meet. As a result of meetings and subsequent follow-up telephone conversations the following items were agreed upon.

1. The City of Albuquerque will allow full developed discharge from El Rancho Atrisco Tracts 4X, 6X, and 7X. The outfall to the Ouray System will include almost this entire area. The only exceptions are a part of Unser Boulevard right-of-way which crosses the northwest corner of the basin and the section of land west of it. The other exception is the 200 foot PNM easement at the far east edge of the property which drains directly to the City of Albuquerque drainage channel. Design of the Ouray System is to be such that it can accommodate the full developed runoff plus the offsite flows from the west.

2. The Master Plan covering the area, entitled Drainage Plan for Volcano Business Park for Westland Development company, will be used.

3. Flows from Tracts 4X, 6X and 7X will be determined by the Rational Method based on masterplanned land use and densities. A conservative approach will be taken in order to insure adequate downstream capacity for the full developed outfall. The analysis will not serve as a drainage report for Tracts 4X, 6X and 7X, but only to properly size the Ouray Storm Drain. Future development of Tracts 4X, 6X and 7X will require the proper submittals and reviews at the appropriate time. The hydrological calculations will be submitted for review along with the design calculations for the hydraulics. This information will be presented as an addendum to the SAD 215 Drainage Report.

4. Off-Site Flows emptying into the system from Unser Boulevard and Ouray have been determined in the "SAD 215 Drainage Report".

5. The Ouray System will be designed to carry the above mentioned flows. No stub outs will be provided for drainage from Tracts 4X, 6X and 7X. The necessary storm drain improvements needed to drain these parcels will be designed and constructed at the appropriate times. These improvements will be the owner's responsibility.

6. The City owned and maintained channel at the eastern end of the SAD 215 project will be an acceptable outfall for the storm drain system. No channel design hydrology or hydraulics is available. The downstream capacity of the channel will be analyzed. The capacity of the five 42 inch culverts under Ronda de Lechusas will also be analyzed since these may be the controlling structures in the system. Hydraulics analysis concerning the structure outlet to the channel will also be necessary.

HYDROLOGY

Based on the above items a drainage report was prepared to determine flows to the Ouray System and was submitted to the City Hydrology Section as "First Addendum to Drainage Analysis Report Special Assessment District No. 215/Unser Boulevard and 98th Street". Results are summarized in Exhibit 2 of that report. The 100-year storm design flow to the Ouray Storm Drain is 360 cfs. A 60 inch reinforced concrete pipe was necessary to carry this flow. The 100-year storm design flow to the City owned and maintained channel is 430 cfs.

DESIGN DETAILS

The 60 inch pipe will be located within the Ouray Road right-of-way 20 feet north of centerline. The north side of the street was choosen because the south side has an existing arterial pavement section. The 20 foot dimension was selected because this would locate the storm drain in the division of the proposed future two lane section. A waterline is also located within the right-of-way, 10 feet north of centerline. This design will place the storm drain 10 feet away from the waterline. This will be far enough to allow construction of the storm drain without distrubing the waterline and will contain the fill slopes within the right-of-way of Ouray.

Beveled pipe will be used for curvilinear sections of pipe. The deflection required for each of the two curves encountered are too great for standard pipe. An extra manhole was considered but this option would not work due to space requirements. The beveled pipe option was also found to be cost effective.

The controlling factors in the pipe slope were the manhole in Unser Boulevard at the upstream end and the existing City drainage channel at the downstream end. The slope out of the channel is fairly flat, 0.47%. This was necessary because of existing topography and the required 4 foot cover at the preceeding manhole. This does place the pipe in pressure flow for a majority of the reach. A straight slope of 1.97% was used from the manhole just upstream of the channel to the beginning of the line at Unser Boulevard. With the slope of 1.97% the pipe unseals approximately 230 feet downstream of Unser Boulevard.

The pipe approximately follows existing ground with a minimum cover of 6 feet. It was assumed the future roadway will follow existing ground within ± 2 feet.

The last section of 60 inch pipe approximately parallels an existing 42 inch pipe which empties into the drainage channel. The 42 inch pipe carries the runoff from Volcano Business Park, a development south of Ouray Road. The 42 inch had insufficient capacity to carry the extra flow from the Ouray System so it was not possible to interconnect the two systems.

A rip rap outlet will be constructed at the pipe outlet in the existing drainage channel. This structure will be 150 feet long and includes a rip rap energy dissipator. A three foot deep basin will be formed by dropping at a 2ft:1V slope from the pipe outlet then flat approximately 25 feet where the slope will go back up at at 2ft:1V slope for three vertical feet. See the attached sketch, Exhibit 1. As shown on the sketch, the flow is heading directly for the opposite side of the channel. To protect the channel side slope rip rap will be placed. The rip rap will cover the entire width of the channel. Along the north side a 1 to 1 side slope will be used. The steeper side slope will help in redirecting the flow. The design of the energy dissipator is based on the Federal Highway Administration (FHWA) Hydraulic Design Circular No. 14. This method offers the most economic and maintanence solution to the outfall problems.

EXHIBIT 2

HYDROLOGY — PROPOSED CONDITIONS

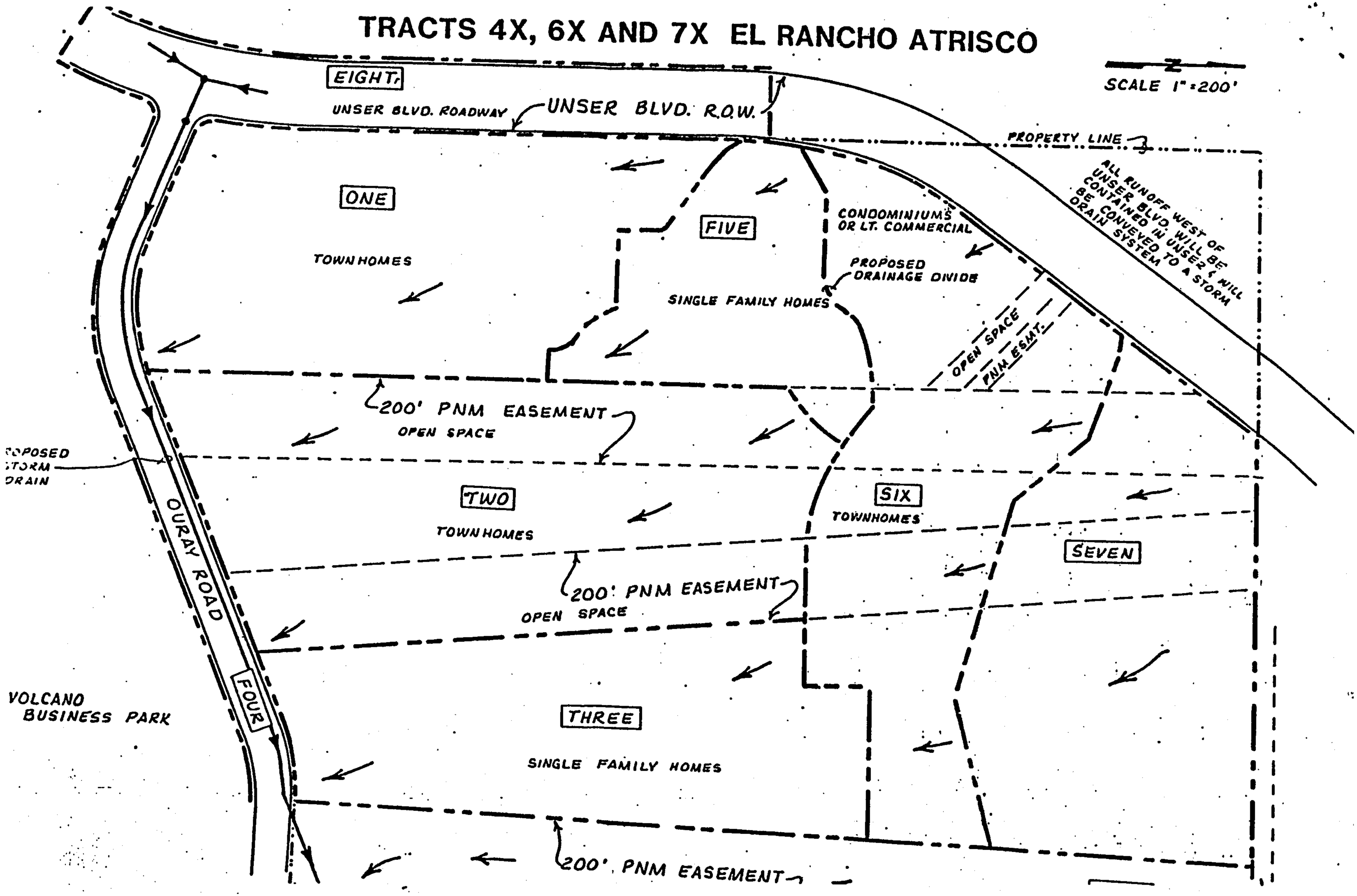
BASIN	AREA AC.	RUNOFF COEF. C	C x A	Tc min.	I100 in./hr.	Q10 cfs	Q100 cfs	COMMENTS
ONE	15.69	0.75	11.77	8.8	4.77	37	56	TOWNHOMES
TWO	7.73	0.75	5.80					TOWNHOMES
	13.86	0.30	4.16					OPEN SPACE
	21.59		9.96	9.8	4.77	31	47	
THREE	13.80	0.50	6.90	11.9	4.36	20	30	SINGLE FAMILY
FOUR	3.90	0.95	3.71	2.0	4.77	12	18	OURAY ROAD RIGHT OF WAY
FIVE	6.95	0.50	3.48	10	4.77	11	17	SINGLE FAMILY
SIX	7.58	0.75	5.68					TOWNHOMES
	5.48	0.30	1.64					OPEN SPACE
	3.44	0.80	2.75					CONDOMINIUMS OR COMMERCIAL
	16.50		10.07	10	4.77	32	48	
SEVEN	4.60	0.30	1.38					PNM EASEMENT AND OPEN SPACE
	11.21	0.75	8.41					TOWNHOMES AND SINGLE FAMILY
	15.81		9.79	10	4.77	31	47	
EIGHT	12.90	0.95	12.26	10	4.77	39	58	UNSER BLVD. RIGHT OF WAY
E*	107.60	0.41	44.19	33.3	2.52	74	111	WEST OF UNSER BLVD.
G*	163.00	0.51	83.13	66.7	1.77	97	147	WEST OF UNSER BLVD.
H*	22.40	0.45	10.16	10	4.65	31	47	WEST OF UNSER BLVD.
TOTAL	384.33		205.42	68.7	1.74	236	357	TOTAL AREA DRAINING TO OURAY ROAD STORM DRAAIN
TOTAL TO CHANNEL	10.93	0.30	3.28					AREA NINE - PNM EASEMENT/OPEN SPACE
	47.20	0.75	37.29					VOLCANO BUSINESS PARK **
	458.27		245.99	68.7	1.74	283	428	TOTAL AREA DRAINING TO C.O.A. CHANNEL - INCLUDES ALL OF ABOVE

* SEE DRAINAGE REPORT FOR S.A.D. 215 UNSER BLVD. AND 98TH STREET

** DRAINAGE AREAS AND "C" VALUES WERE OBTAINED FROM THE DRAINAGE PLAN FOR VOLCANO BUSINESS PARK

INFORMATION FOR THIS TABLE WAS OBTAINED FROM THE DRAINAGE REPORT FOR TRACTS 4X, 6X AND 7X EL RANCHO ATRISCO EXCEPT WHERE NOTED

TRACTS 4X, 6X AND 7X EL RANCHO ATRISCO



DRAINAGE ANALYSIS REPORT
SPECIAL ASSESSMENT
DISTRICT NO. 215
UNSER BOULEVARD AND
98th STREET

Greiner
Engineering

PREPARED FOR
CITY OF ALBUQUERQUE

DRAINAGE ANALYSIS REPORT
SPECIAL ASSESSMENT DISTRICT NO. 215
UNSER BOULEVARD AND 98th STREET

JULY, 1986
PROJECT NO. 2803
JN 0690586

Carl A. Tebbens, P.E.
Principal-In-Charge

DANIEL L. MOREHEAD
NEW MEXICO
6299
REGISTERED PROFESSIONAL ENGINEER

7-8-86
D. L. Morehead, P.E.
Project Manager

Rick Beltramo
Project Engineer

GREINER ENGINEERING SCIENCES, INC.
2601 Wyoming Boulevard, N.E. Albuquerque, New Mexico 87112 (505) 292-1936

July 9, 1986

Dan Hogan
City Hydrologist
Public Works Department
Hydrology Design Unit
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: SAD 214, Unser Boulevard Drainage Plan

Dear Dan:

Enclosed please find six (6) sets of the Preliminary Drainage Analysis Report for Special Assessment District No. 215.

The report addresses recommended drainage solutions for portions of Unser Boulevard from Ladera Drive to Ouray and for 98th Street from Unser Boulevard west for approximately 2155 feet. The enclosed report represents a drainage system which should be acceptable to everyone involved.

If you have any comments or questions concerning this report, please feel free to call.

Sincerely,

GREINER ENGINEERING

D.L. Morehead, P.E. & L.S.
Project Manager

DLM:tw

Enclosure

Job No. 0690586

EXECUTIVE SUMMARY

Major expansion and urbanization is occuring and is expected to continue in West Albuquerque. With this growth comes the need and added pressure for new infrastructure projects. One of these projects is SAD 215, consisting of Unser Boulevard, a 4-lane divided major thoroughfare that extends north from Interstate 40; and 98th Street, which extends 2155 feet west from Unser Boulevard. The City of Albuquerque has authorized the preparation of a drainage analysis report which will accompany the SAD 215 Preliminary Design Package. The purpose of this report is to address three major concerns: major crossing structures, offsite drainage and general roadway drainage, and general roadway drainage. The study includes alternates which should be considered for future developments.

Generally Unser Boulevard extends in a north-south orientation, intercepting flows which originate in the upland areas of the volcano escarpment to the west. The runoff drains east off of the escarpment, where it collects into well defined channels, eventually joining the Rio Grande.

Contained in this report are the recommendations for three major drainage systems. All of the major systems utilize concrete box culverts with one exception; The Ouray system uses a major storm sewer to convey cross drainage. The outfall from Ouray is an interim solution utilizing a drainage ditch within the Ouray right-of-way. The interim ditch is designed to carry existing flows only and is to be replaced by a 60" storm drain when future Ouray Road improvements take place. At that point developed flows can be carried by the Ouray storm sewer.

Solutions to the roadway drainage within the rights-of-way of Unser Boulevard and 98th Street are included in this report. Generally the drainage is carried by median ditches and the roadway itself until picked up by drop inlets which discharge into storm sewers, or concrete box culverts.

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AUTHORITY

PURPOSE

BACKGROUND

CRITERIA

AUTHORITY

The construction of Unser Boulevard from Ladera Drive to immediately north of Ouray, and 98th Street from Unser Boulevard west for approximately 2155 feet will be under the authority of Special Assessment District (SAD) 215, Resolution #3. The contract known as A/E Services Agreement 86-12, dated May 1986 states the design requirements of the project. The Basic Services section, paragraph A-d1, states that a drainage analysis and report is required. For future reference, SAD 215 construction plans are under City Project Number 2803.

PURPOSE

The purpose of this report is to define specific recommendations pertaining to the drainage management associated with and affected by the construction of Unser Boulevard and 98th Street. In particular, the drainage analysis shall consist of the appropriate analysis as provided under A/E Service Agreement 84-67 for Unser Boulevard and additional analysis required for 98th Street. The report will fulfill the following objectives:

1. Compile existing hydrologic information available from existing and proposed reports including the Unser Boulevard drainage analysis report.
2. Develop a drainage plan including the necessary hydrology to accommodate offsite flows. In particular the flows from adjacent properties.
3. Identify existing arroyo/crossings with associated 10-year and 100-year frequency storm parameters for each arroyo/crossing.
4. Coordinate with the City Hydrology Section.
5. Propose a recommended solution for storm water crossings of Unser Boulevard. Only one recommended solution is necessary in this report. Alternates were analyzed in the "Drainage Analysis Report, Unser Boulevard from Ladera Drive to Dellyne Avenue", under A/E Service Agreement 84-67.
6. Prepare a preliminary construction cost estimate for the entire storm drainage improvements to be built under SAD 215. (This would not include the cost of improvements by others, particularly upland diversion berms and ditches, more clarification of this will follow in the report.)

7. Coordinate and secure approvals as necessary from appropriate government agencies, utility companies and any other private agency affected by the proposed construction.

BACKGROUND INFORMATION

A. PHYSICAL CHARACTERISTICS

Unser Boulevard intersects drainage basins whose upland reaches originate as much as seven miles to the west along the ridge that separates the Rio Grande and the Rio Puerco. The basins consist of three major regions: the Upland reaches above the escarpment; the escarpment face itself; and the region immediately below the escarpment. Areas above the escarpment typically make up the majority of the contributing area and consist predominately of sandy, loamy soils with slopes from 0 to 10 percent. The runoff generated is slow with little to moderate hazard due to water erosion.

Due to the flat slopes and soil types these areas have mostly B and C hydrologic ratings. The escarpment face itself consists of rock outcrops with 25 to 45 percent slopes. Runoff rates for the escarpment are high, water erosion tendencies are slight, and the area has a soil rating of "D". This constitutes a very small portion of the contributing drainage area.

The project is located in the area immediately below the escarpment. The soils here are similar to those found in the upland basins, with fine sandy loam soils, and 0 to 15 percent slopes. Runoff is slow with moderate to severe susceptivity to water erosion. These soils are generally of the "A" hydrologic soil group.

Runoff generated typically comes off the escarpment and concentrates into well defined arroyos where it is conveyed to the river. The general lay of the land and the proposed alignment of Unser Boulevard are such that the roadway intersects the basins in a perpendicular manner. These two conditions make Unser Boulevard a man-made block to the natural drainage patterns and because of this situation, roadway cross drainage is a major factor in the design and cost of Unser Boulevard.

B. BACKGROUND REPORTS

Three major systems are crossed by the proposed alignment and two of the systems have been analyzed in previous approved reports. This study does not re-analyze these systems, but rather utilizes the information provided by these reports. The two major systems that currently have been analyzed are:

- The Mirehaven Diversion Channel
- The Ladera Diversion Channel

One major system remains and that is the Ouray system. This system requires both hydrologic and hydraulic analysis which is generated within this report.

The pertinent reports and information associated with each system will be referenced in more detail in their respective areas within the Basin Analysis Section of the report.

CRITERIA AND DATA UTILIZED FOR THE STUDY

A. GENERAL

The data used for developing this report was drawn from both existing reports and detailed analysis provided in this study. In cases where approved reports were available, the criteria and data associated with them was adopted here. The prime sources of information and data were AMAFCA and the City of Albuquerque.

In addition to the existing approved drainage reports there also exists the preliminary drainage analysis report for Unser Boulevard. This report is dated April, 1985, and addresses all the drainage from Ladera Drive to Dellyne Avenue. SAD 215 concerns itself with a portion of Unser Boulevard. This report does not propose two alternatives to the major drainage crossing but instead recommends the alternatives presented in the original Unser Boulevard drainage report. The alternates proposed in the Unser report were approved alternates and were under final design at the time of the initiation of SAD 215.

B. TOPOGRAPHIC DATA

The topographic data used in this study was obtained from orthophotos provided by the City of Albuquerque. In addition to this data detailed topography was provided based on aerial photogrametry specifically for Unser Boulevard and select channels as part of basic services.

C. HYDROLOGY

Hydrologic modeling was accomplished using the Rational Method of Q = CIA, where Q is runoff in cubic feet per second, C is the runoff coefficient and is dimensionless, and A is the area in acres. The rainfall intensity I, is in inches per hour. Runoff volumes are based on the 6 hour, 100-year storm of 2.2 inches. The Rational Method has been used for this analysis in accordance with the City of Albuquerque "Development Process Manual", Volume II.

For areas where hydrology was obtained from other referenced reports, the results and methods are adapted to this study and all such reports are approved final reports. In some instances, flow rates for major drainage channels were given by direction of the City of Albuquerque. These instances will be addressed in their respective sections of the test.

Basin areas, flow rates and drainage structures are shown on the Master Drainage Plan Sheet and in the Hydrology Tables. Three summary tables present the existing, proposed and utlimate hydrology.

Soil classifications are from the "SOIL SURVEY OF BERNALILLO COUNTY AND PARTS OF SANDOVAL AND VALENCIA COUNTIES, NEW MEXICO" by the Soil Conservation Service, Issued June, 1977.

D. HYDRAULICS

The primary source for both hydraulic analysis and design criteria was the Albuquerque Development Process Manual, Volume II. In addition, the New Mexico State Highway Department Drainage Manual was used. Mannings formula was utilized to determine street flow, median and channel capacities.

Drainage within Unser Boulevard and 98th Street rights-of-way will be intercepted by drop inlets and conveyed to the major drainage channels via storm sewers. Design and location of the drop inlets was typically controlled by one over-riding criteria found in the Drainage Ordinance Enactment No. 63-1982. That criteria states that one 12 foot lane in each direction must remain dry under the 10-year event. Calculations supporting the drop inlet design are found in the Appendix under Hydraulics, Street Design and Median Capacities.

Other parameters influenced the location of the drop inlets. The two most obvious are superelevation and vertical curve low points. Wherever superelevation occurs, a drop inlet was located to prevent runoff from sheet flowing from one curb across to the other curb. Drop inlets were located at vertical curve sags and over concrete box culverts.

Analysis and design addressed both the 4-lane divided highway and the 8-lane divided highway ultimate condition. It was found that the spacing location and sizing of the catch basins for the 4-lane section also worked for the 8-lane section. This was due to the fact that increasing the width of drainage increased the hydraulic capacities of the street and the catch basins at a greater rate than the increase in runoff.

MIREHAVEN CHANNEL

LADERA CHANNEL

OURAY CHANNEL

MIREHAVEN CHANNEL

A. GENERAL

Information and data pertaining to the Mirehaven Diversion Channel was obtained from an existing approved report entitled "Engineer's Report on Design and Costs for the Ladera Storm Drainage Diversion and Detention Facility: Upstream Channel Study (100-Year Storm Routine). September 1975, by Denny-Gross and Associates. The Mirehaven system operates as a series of drop structures and detention ponds which discharge into the Ladera Detention system. The section where Unser Boulevard is proposed to cross the Mirehaven carries 1200 cfs for a 100-year frequency flow rate. 5700 cfs

The majority of flow is produced by basins on top of the escarpment and some of the flow is generated by adjacent properties. This report recognizes diversion of larger areas into the Mirehaven channel upstream of Unser Boulevard. This establishes the size and number of drainage facilities required in Unser Boulevard. The upstream offsite improvements are being constructed by others.

B. CROSSING STRUCTURE

Four - 10' x 4' CBC's are proposed for the Mirehaven crossing. The structure is sized based on 1200 cfs, per the Denny-Gross and Associates report. Effects due to diverted flows were not considered to have an effect on the peak flow due to the timing and magnitude of the hydrology. Runoff generated by the diverted flow would peak long before the 1200 cfs peak could occur. Due to the vertical alignment of Unser 5700 cfs

Boulevard, the box culverts will need to set at a lower elevation than the existing channel. This requires some grading of the channel along with the removal of an existing drop structure. A concrete improved inlet design will be used to reduce earthwork and improve the inlet characteristics of the culverts.

C. OFFSITE DRAINAGE AMAFCA Approval

This study recognizes a side ditch and berm to divert flows from the upland reaches of Basins A1, A2 and C2 to the Mirehaven Channel. A total of 107.6 acres of contributing area will be diverted. The berms are designed to accommodate undeveloped conditions resulting in 120 cfs of diverted flow.

Berm by others ?

The remaining runoff reaching Unser Boulevard will be intercepted by a drainage ditch and will be carried to a rundown which would, in turn, discharge into the Mirehaven channel. Area B1 is serviced by the ditch. This area will be able to discharge developed flows.

The diversion berms and ditches are designed to carry existing flows. At such time as development occurs, the berms and ditches will be removed and replaced with drainage facilities (i.e., streets, storm sewers, etc.). These facilities will be designed to discharge storm runoff in the same general locations as the proposed plan. In areas where drainage ditches and berms discharge into SAD 215 storm sewers, the storm sewer is designed to carry developed flow. The "C" values

used for determining runoff rates where selected based on estimated values for future development. (See the Summary Hydrology tables for the "C" values used.)

The locations and size of the offsite improvements was agreed to by the City of Albuquerque and the appropriate property owners during planning sessions. A more detailed description of these improvements is provided in Exhibits I and II. The costs for design and construction of the above improvements will be borne by others and not the City of Albuquerque.

LADERA CHANNEL

A. GENERAL

The Ladera Channel is similar to the Mirehaven Channel in that it carries runoff to the Ladera Detention area. The proposed easement for the Ladera Channel is slightly North of the existing arroyo. An approved report exists for Ladera and is entitled "Engineer's Report on Design and Costs for the Ladera Storm Drainage Diversion and Detention Facility: Upstream Channel Study (100-Year Storm Routine)", September, 1975, by Denny-Gross and Associates. A flow of 750 cfs was obtained from this report and will be used for the design analysis of the crossing structure.

224 cfs Easterling

B. CROSSING STRUCTURE

The proposed crossing structure consists of three - 10' x 4' concrete box culverts. Upstream grading will be required to divert the existing channel to the proposed CBC location. The diversion was required to straighten the channel resulting in a more desirable overall alignment. The upstream diversion is temporary and will be removed when the channel is improved upstream. Channel improvement will occur when the adjacent land is developed. Due to the difference in grade resulting from the relocation of the channel and the limitations of the vertical alignment, the structure will need a gabion drop structure upstream. In adddition, some downstream grading and slope protection will also be needed.

where ?

when
when
who

C. OFFSITE DRAINAGE

The system provided by others utilize side ditches and berms to divert drainage to either the Ladera Channel or to the 98th Street storm sewer. Drainage from Basin C1 would be diverted to a drop inlet at 98th Street. Drainage from Basins D and C3 would be diverted to the Ladera Channel directly. The 98th Street storm sewer is sized to carry developed right-of-way flows which are collected at the intersection of 98th Street and Unser Boulevard and collect developed flows from Basin B2.

D. 98TH STREET DRAINAGE

Planned improvements for 98th Street include a 4-lane divided roadway with a 106 foot Right-of-Way. A storm sewer will collect runoff from within the right-of-way of 98th Street only. The storm sewer will be located in the median at 98th Street and begins at Station 20+00 and connects to the 48 in. storm drain within the Unser Boulevard right-of-way. The beginning location of the storm sewer is in this case dependant on the DPM design criteria for the 10-year event. The criteria states that one 12 foot dry lane in each direction must be maintained during the 10-year storm event. Station 20+00 is where this criteria is exceeded.

Drop inlets located adjacent to the 98th Street and Unser Boulevard intersection receive offsite runoff from Basins B2 and C1. Although these systems are designed to accept fully developed flows, the inlets are sized to pick up only the existing runoff. When development of these basins occur, either storm sewers will be extended at these locations or additional drop inlets will need to be built. The connector pipes and remaining outfall system will be designed to carry the future developed runoff.

OURAY SYSTEM

A. GENERAL

Hydrology for the Ouray system was generated by this report. Basins E, G and H will all drain to the proposed Ouray system under the ultimate conditions, however, the phasing of SAD 215 and the remainder of Unser Boulevard has created a situation where only the runoff from Basin E will be facilitated by the Ouray system at this time. This condition will change when the remainder of Unser Boulevard is built.

The proposed design for SAD 215 will be to build the ultimate storm sewer directly under Unser Boulevard and Ouray Road.

B. OUTFALL SYSTEM

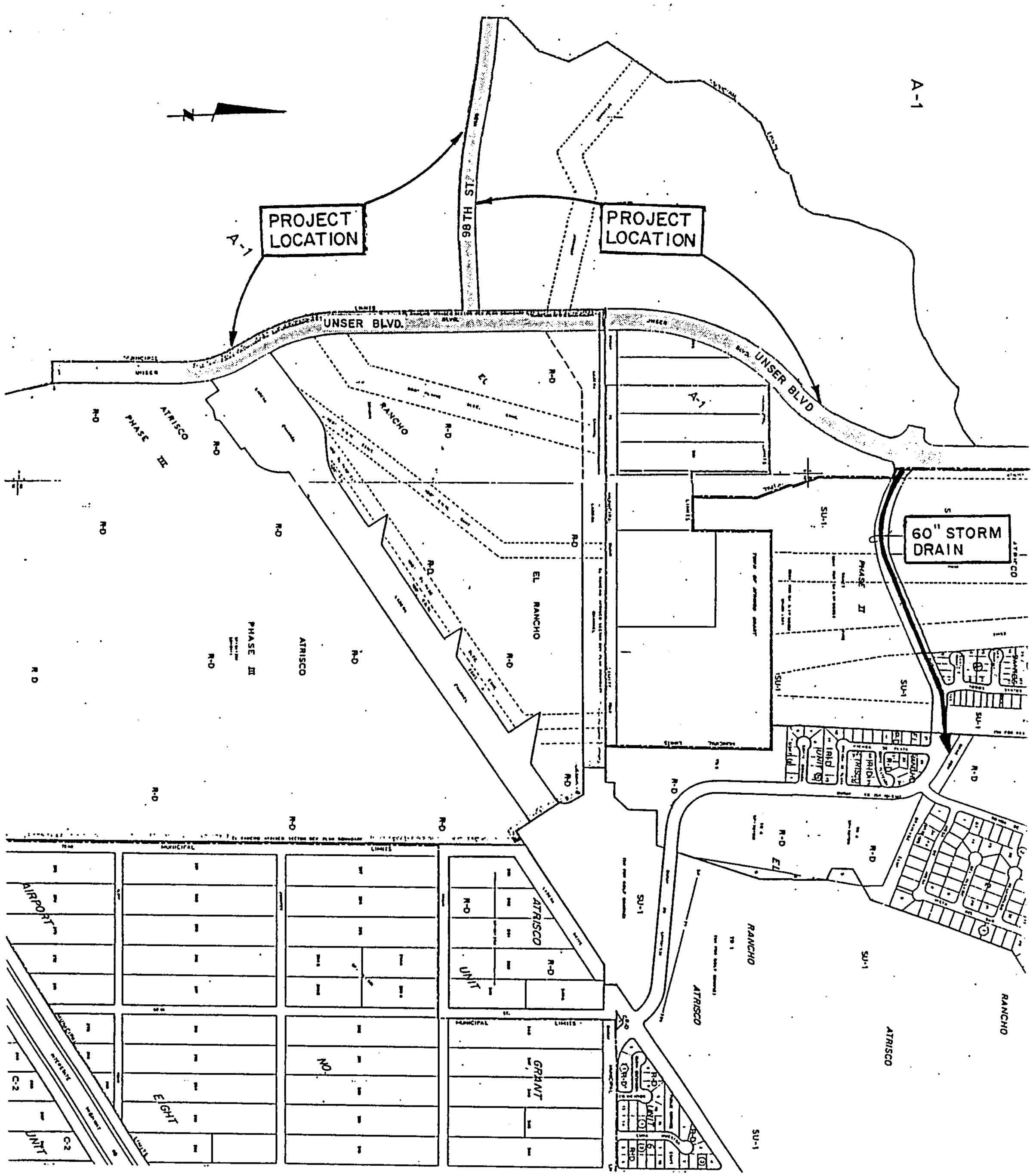
Construction of Unser Boulevard has required diverting drainage to central collection points. In the case of the Mirehaven channel and the Ladera Channel, these systems already exist. The case of the Ouray system however is a different situation. Drainage will be relocated from natural small water courses to the right-of-way of Ouray. Currently no storm drain facilities exist. A 60" RCP storm drain is proposed to realign the drainage course. This infrastructure is designed to carry the flows from Basins E, G and H along with the developed flows from the Unser Boulevard right-of-way. The system will carry the runoff from the collection points in Unser Boulevard through Ouray Road back to the original drainage course located approximately 2200 feet east of Unser Boulevard. The pipe is to be located on the north side of the Ouray Road alignment.

Outfall from the 60" RCP is to be into an existing AMAFCA channel which is part of the Ladera Detention facility. The exact location and detail design of the 60" RCP and the outfall into the channel will be determined during the following design phase of this project. At that time the extent of utility or drainage easement needs will be determined. A plan view of the Ouray system is provided as an Exhibit.

C. OFFSITE DRAINAGE

As mentioned, three basins discharge to the Ouray system, E, G and H. For construction of SAD 215 only Basin E offsite drainage is of concern. The drainage from Basins G and H have been calculated and the outfall system is designed to handle these flows but the offsite improvements need not be discussed here.

Runoff originating from Basin E will be collected at one central location at the Ouray and Unser Boulevard intersection. Drainage is diverted north via a berm parallel to Unser Boulevard outside of the right-of-way. The drainage patterns are a result of meetings with the appropriate land owners and are intended to be consistant with proposed future drainage improvements for Basin E. A more detailed description of these improvements is provided in Exhibit I. The inlets would be sized for the existing undeveloped conditions. However, the downstream capacity of the pipes will carry the developed flows. This will provide the capability for extension of the system into Basin E for fully developed conditions. It is assumed that the unnamed channel between the Laderia Detention Facility and the 60" outfall will carry the proposed undeveloped flows.



LOCATION MAP

ZONE ATLAS MAPS
G-9,10 H-9,10
N.T.S.

FIGURE I

DRAINAGE COVENANT

FOR

LAURELWOOD II JOINT VENTURE

DRAINAGE COVENANT

THIS COVENANT made this _____ day of _____, 1986, by and between the City of Albuquerque, a municipal corporation, (City) and LAURELWOOD II JOINT VENTURE (Owner, which term includes successors and assigns.)

RECITAL

The Owner is owner of certain real property located North of 98th Street and west of Unser Boulevard in Albuquerque, New Mexico, (the Property) and more particularly described as follows:

Tract "A", El Rancho Atrisco Phase IV .

Pursuant to City ordinances, regulations, and other applicable laws, the Owner is required to install and/or maintain certain drainage facilities on the Property, and the parties wish to provide for an agreement as to the obligations and responsibilities for same.

DESCRIPTION OF FACILITIES

The following facilities are to be constructed and/or maintained by the owner:

1. A diversion berm and swale running south along Unser Boulevard approximately 400 feet long as shown on Exhibit I for Basin C-1.

2. A diversion berm and swale running south along Unser Boulevard approximately 450 feet long as shown on Exhibit I for Basin D.

3. A diversion berm and swale running north along Unser Boulevard approximately 1750 feet long and a diversion berm and swale running south along Unser Boulevard approximately 100 feet long to the same location of termination as shown on Exhibit I for Basin E-1.

4. Dedication of and easement for the relocation of the Laderia Channel as shown on Exhibit I.

CONSTRUCTION OF DRAINAGE FACILITIES

The Owner shall construct the drainage facilities in accordance with standards, plans, and specifications prescribed and approved by the City.

MAINTENANCE OF FACILITIES

The Owner shall, at his cost in accordance with the standards, plans, and specifications prescribed by the City, maintain said drainage facility. The City shall have the right to enter periodically upon the Property to inspect the drainage facility.

FAILURE TO COMPLY AND LIEN

In the event that the Owner shall fail to construct the drainage facility in accordance with standards, plans, and specifications prescribed and approved by the City or fail to adequately maintain said facilities, the City shall give the Owner notice in writing to construct, correct, or maintain said facilities, and if the Owner fails to comply therewith within _____ days, the City may enter upon said property to perform the necessary construction or maintenance. The cost of the City's performing such construction or maintenance shall be paid by the Owner. In the event the Owner fails to pay said cost within thirty (30) days after being filled for same, the City may file a lien against the Property.

LIABILITY

The City shall not be liable for any damages to the Owner resulting from its construction, modification, or maintenance of said facilities.

NOTICE

The written notice provided for herein shall be accomplished by mailing same to:

LAURELWOOD II JOINT VENTURE
2400 Comanche N.E.
Albuquerque, New Mexico 87107

The Owner may change said adress by giving written notice, certified mail, return receipt requested, to the City Engineer, City/County Building, One Civic Plaza, Albuquerque, New Mexico 87103.

INDEMNIFICATION AND HOLD HARMLESS

The Owner agrees to defend, indemnify, and hold harmless, the City, its officials, agents and employees from and against any and all claims, actions, suits, or proceedings of any kind brought against said parties for or on account of any matter arising from the drainage facility provided for herein or the Owner's failure to construct, maintain, or modify the drainage facility under this Covenant.

COVENANT RUNNING WITH THE PROPERTY

The obligation of the Owner set forth herein shall be binding upon the Owner, his heirs, and assigns, and the property of the Owner as described herein and will run with said property until released by the City.

OWNER	CITY OF ALBUQUERQUE, NEW MEXICO
_____	_____
	City Engineer

ATTEST:

_____ _____

City Clerk Chief Administrative Officer

REVIEWED BY:

_____ _____

Assistant City Attorney City Attorney

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this _____ day of _____ , 19____, by_____ of _____.

_____

Notary Public

My Commission Expires:

_____

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this _____ day of _____ , 19____, by_____, Chief Administrative Officer of the City of Albuquerque.

_____

Notary Public

My Commission Expires:

_____

DRAINAGE COVENANT

FOR

WESTLAND DEVELOPMENT CO.

WESTLAND DEVELOPMENT CO., INC.
401 Coors Blvd. N.W., Albuquerque, New Mexico 87105
Phone (505) 831-9600

August 6, 1986

RECEIVED
AUG 8 1986
GREINER

Mr. Billy Goolsby
Civil Engineer, Hydrology
City of Albuquerque
Public Works Department
123 Central N.W.
Albuquerque, NM 87103

RE: SAD 215 Drainage Improvements

Dear Mr. Goolsby:

In accordance with our meeting with Steve Boberg, Greiner, and your self regarding temporary drainage improvements for SAD 215, attached is a copy of the draft Drainage Covenant. I have included as exhibits a legal for the property on which the improvements will rest, and location of the improvements, runoff rates, and typical cross-section for the swale and berm. I have also sent a copy of the covenant for AMAFCA's concurrence. We will appreciate your review and response to the covenant. Please call Sal Alvarez or Leroy Chavez at (505) 831-9600 for any questions.

Sincerely,

Gil E. Cordova
President & Chief Executive Officer

cc: Steve Boberg, Hydrology
City of Albuquerque
Rick Beltramo, Greiner Engineering

Enclosures

GEC/bd
SADD805S

DRAINAGE COVENANT

THIS COVENANT made this _____ day of _____, 1986, by and between the City of Albuquerque, a municipal corporation, (hereinafter "City") and the Westland Development Co., Inc., a New Mexico Corporation, (hereinafter "Owner", which term includes successors and assigns).

RECITAL.

The Landowner is owner of certain real property located in the northwest quadrant of Albuquerque, New Mexico, near the intersection of the extensions of Unser Boulevard and 98th Street (hereinafter "the Property") and more particularly described in Exhibit I (2 Sheets).

Pursuant to City ordinances, regulations, and other applicable laws, the Owner is required to install and maintain certain drainage facilities on the Property, and the parties wish to provide an agreement setting forth the obligations and responsibilities for the installation and maintenance of said drainage facilities.

DESCRIPTION OF FACILITIES.

The following drainage facilities are to be constructed and maintained by the Owner:

Diversion berm and swales as shown in Exhibit II (2 sheets).

CONSTRUCTION OF DRAINAGE FACILITIES.

The Owner shall construct the drainage facilities simultaneous with the construction of improvements on the City project entitled, Special Assessment District 215, and in accordance with standards, plans, and specifications prescribed and approved by the City.

MAINTENANCE OF FACILITIES.

The Owner shall maintain said drainage facilities at its cost and in accordance with the standards, plans, and specifications prescribed by the City. The City shall have the right to enter periodically upon the Property to inspect the drainage facilities.

FAILURE TO COMPLY AND LIEN.

In the event that the Owner fails to construct the drainage facilities in accordance with standards, plans and specifications prescribed and approved by the City or fails to adequately maintain said facilities, the City shall give the owner notice in writing to construct, correct, or maintain said facilities, and if the Owner fails to comply therewith within 30 days, the City may enter upon said property to perform the necessary construction or maintenance. In the event the Owner fails to pay said cost within thirty (30) days after being billed for game, the City may file a lien against the Property.

LIABILITY.

The City shall not be liable for any damages to the Owner

resulting from its construction, modification, or maintenance of said facilities.

NOTICE.

The written notice provided for herein shall be accomplished by mailing same to:

Westland Development Co., Inc.
401 Coors Blvd., NW
Albuquerque, NM 87105

The Owner may change said address by giving written notice, certified mail, return receipt requested, to the City Engineer, City Hall, at 505 Marquette Street N.W., Albuquerque, New Mexico, 87103.

INDEMNIFICATION AND HOLD HARMLESS.

The Owner shall defend, indemnify, and hold harmless, the City, its officials, agents and employees from and against any and all claims, actions, suits, or proceedings of any kind brought against said parties for or on account of any matter arising from the drainage facilities provided for herein or the Owner's failure to construct, maintain, or modify the drainage facilities under this Covenant.

COVENANT RUNNING WITH THE PROPERTY.

The obligations of the Owner set forth herein shall be binding upon the Owner, his heirs, and assigns, and the property of the Owner as described herein and shall run with said property until released by the City.

OWNER

By: _____

Title: _____

REVIEWED BY THE LEGAL DEPARTMENT:

CITY OF ALBUQUERQUE

_____
Assistant City Attorney

_____
Chief Administrative Officer

ACKNOWLEDGEMENTS

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this _____ day of _____, 1986, by Gil E. Cordova, President of Westland Development Co., Inc., a New Mexico Corporation, on behalf of said Corporation.

_____
Notary Public

My Commission Expires:

_____

That certain parcel of land situate within projected Sections 9 and 16, Township 10 North, Range 2 East, of the New Mexico Principal Meridian, within the Town of Atrisco Land Grant, Bernalillo County, New Mexico, lying south of 98th Street N.W., west of Unser Boulevard N.W., and north of the easements for the Ladera Storm Drainage, Diversion and Detention Facility of the Albuquerque Metropolitan Arroyo Flood Control Authority (A.M.A.F.C.A.), and being more particularly described as follows:

BEGINNING at the most southerly point on "El Rancho Atrisco Phase V", as filed for Public Record in the Office of the Bernalillo County Clerk on March 29, 1984, in Volume C-23, Folio 139; whence, for a tie, the New Mexico Highway and Albuquerque City Survey Monument "I-40-19", being a brass cap found in place, bears S 15° 13' 25" E, 5288.30 feet;

Thence, S 00° 13' 59" E, 667.29 feet, following the west right-of-way line of said Unser Boulevard N.W., as shown and designated on the plat entitled "El Rancho Atrisco Phase III", as filed for Public Record in the Office of the Bernalillo County Clerk on December 8, 1981, in Volume C-19, Folio 39; to a Point of Curvature (PC);

Thence, southernly, 763.88 feet along the arc of a curve to the left (said arc having a radius of 1478.00 feet and a central angle of 29° 36' 45") continuing along said west right-of-way line to a Point of Reverse Curvature (PRC);

Thence, southernly, 703.54 feet along the arc of a curve to the right (said arc having a radius of 1322.00 feet and a central angle of 30° 29' 29") continuing along said west right-of-way line to a Point On Curve (POC);

Thence, N 89° 21' 15" W, 50.00 feet radially inward to a Point on Curve (POC);

Thence, northernly, 676.93 feet along the arc of a curve to the left (said curve being concentric with the last above said curve and having a radius of 1272.00 feet and a central angle of 30° 29' 29") to a Point of Reverse Curvature (PRC);

Thence, northwesternly, 46.61 feet along the arc of a curve to the right (said curve being concentric with the first above said curve and having a radius of 1528.00 feet and a central angle of 1° 44' 52") to the north boundary of said A.M.A.F.C.A. easements;

Thence, following said north A.M.A.F.C.A. easement lines for the next thirteen (13) courses:

S 56° 43' 03" W, 909.40 feet to a Point of Curvature (PC);

Thence, southwesternly, 165.44 feet along the arc of a curve to the right (said arc having a radius of 463.58 feet and a central angle of 20° 26' 51") to a Point of Reverse Curvature (PRC);

Thence, southwesternly, 107.89 feet along the arc of a curve to the left (said arc having a radius of 291.25 feet and a central angle of 21° 13' 27") to a Point On Curve (POC);

Thence, N 56° 50' 58" W, 84.52 feet;
Thence, S 56° 43' 03" W, 25.00 feet;
Thence, N 33° 16' 57" W, 45.00 feet;
Thence, S 56° 43' 03" W, 30.00 feet;
Thence, S 33° 16' 57" E, 45.00 feet;
Thence, S 56° 43' 03" W, 25.00 feet;
Thence, S 48° 39' 02" E, 95.89 feet to a Point on Curve (POC);

Thence, southwesternly, 9.99 feet along the arc of a curve to the left (said curve being concentric with the last above said curve and said arc having a radius of 291.25 feet, a central angle of 1° 57' 57", and a chord which bears S 37° 15' 10" W, a distance of 9.99 feet) to a Point of Reverse Curvature (PRC);

Thence, southwesternly 165.44 feet along the arc of a curve to the right (said arc having a radius of 463.58 feet and a central angle of 20° 26' 51") to a Point of Tangency (PT);

Thence, S 56° 43' 03" W, 797.76 feet;

Thence, N 08° 19' 34" W, 2831.94 feet to a Point On Curve (POC) on the south right-of-way line of said 98th Street N.W.;

Thence, easternly, 432.08 feet along the arc of a curve to the right (said arc having a radius of 4546.13 feet, a central angle of 5° 26' 44" and a chord which bears S 83° 15' 22" E, a distance of 431.91 feet) along said south right-of-way line of 98th Street N.W. to a Point of Tangency (PT);

Thence, following said south right-of-way line of 98th Street N.W. for the next three (3) courses:

S 80° 32' 00" E, 450.00 feet to a Point of Curvature (PC);

Thence easternly, 802.94 feet along the arc of a curve to the left (said arc having a radius of 3855.16 feet and a central angle of 11° 56' 00") to a Point of Tangency (PT);

Thence N 87° 32' 00" E, 431.22 feet to a Point of Curvature (PC);

Thence, southeasternly, 64.39 feet along the arc of a curve to the right (said arc having a radius of 40.00 feet and a central angle of 92° 14' 01") around the southwest return of said 98th Street N.W. to said Unser Boulevard N.W., to a Point of Tangency (PT) being the POINT OF BEGINNING of the parcel of land herein described.

The above delineated parcel of land contains 97.8056 acres, more or less.

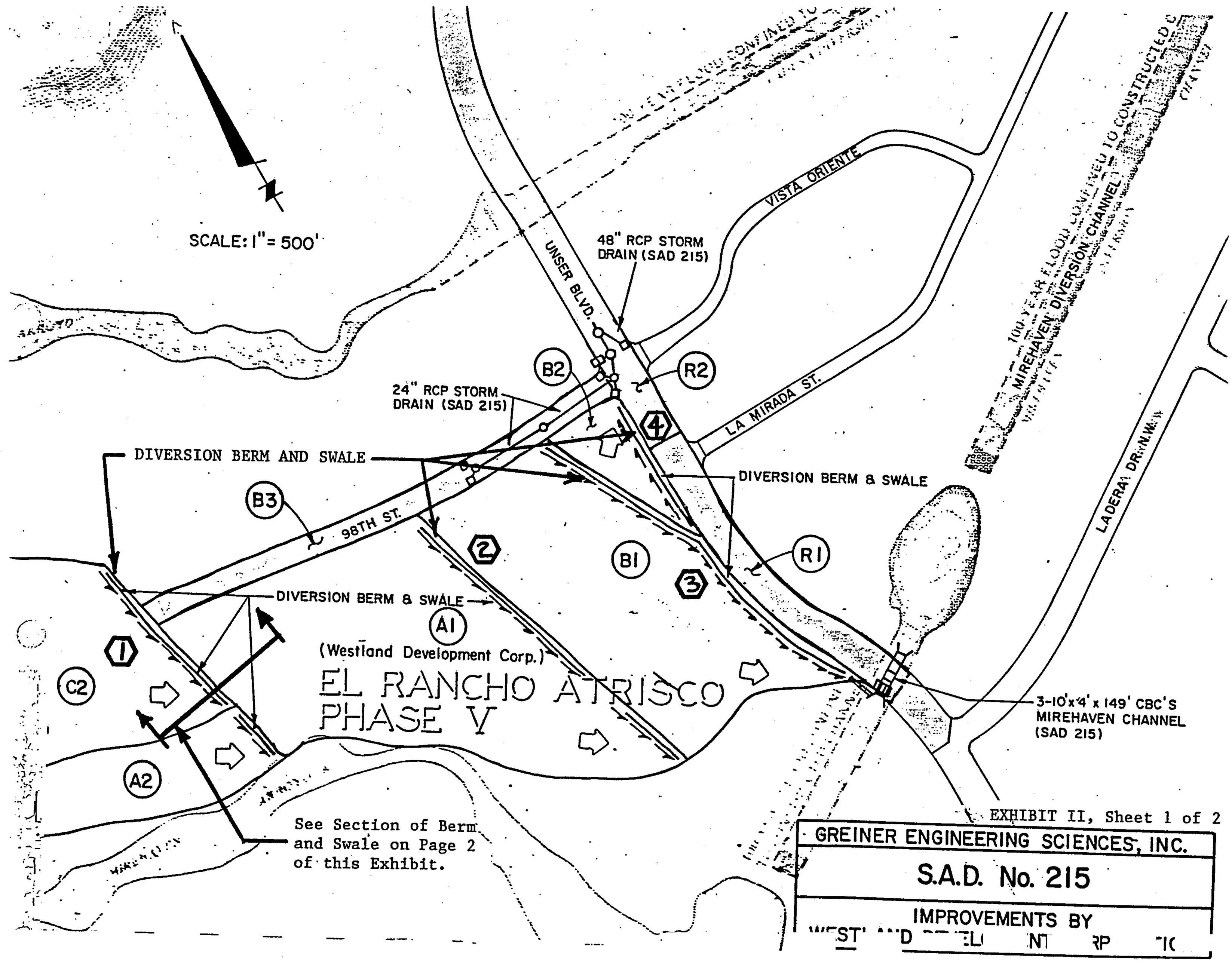


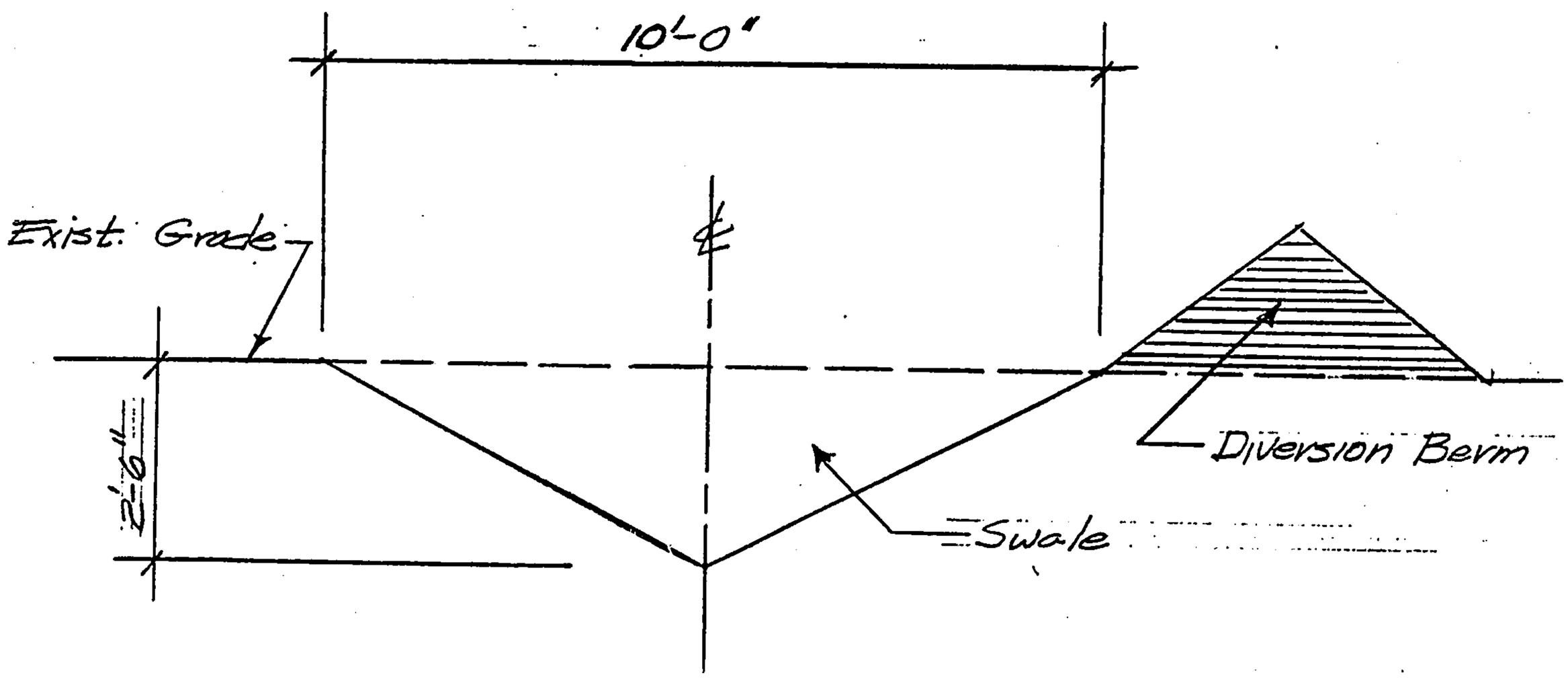
EXHIBIT II, Sheet 1 of 2

TABLE OF DRAINAGE AREAS AND FLOWS *

BERM AND SWALE	DRAIN AREAS	FLOW RATE (Q100)
1	C2 and A2	65 cfs
2	A1	52 cfs
3	B1	41 cfs
4	B2	6 cfs

DPM criteria

* From Drainage Analysis Report SAD 215, July, 1986, prepared by Greiner Engineering



SECTION THRU BERM AND SWALE (TYPICAL)
N.T.S.

APPENDIX

HYDROLOGY PROPOSED CONDITIONS computer file SAD214.PRO

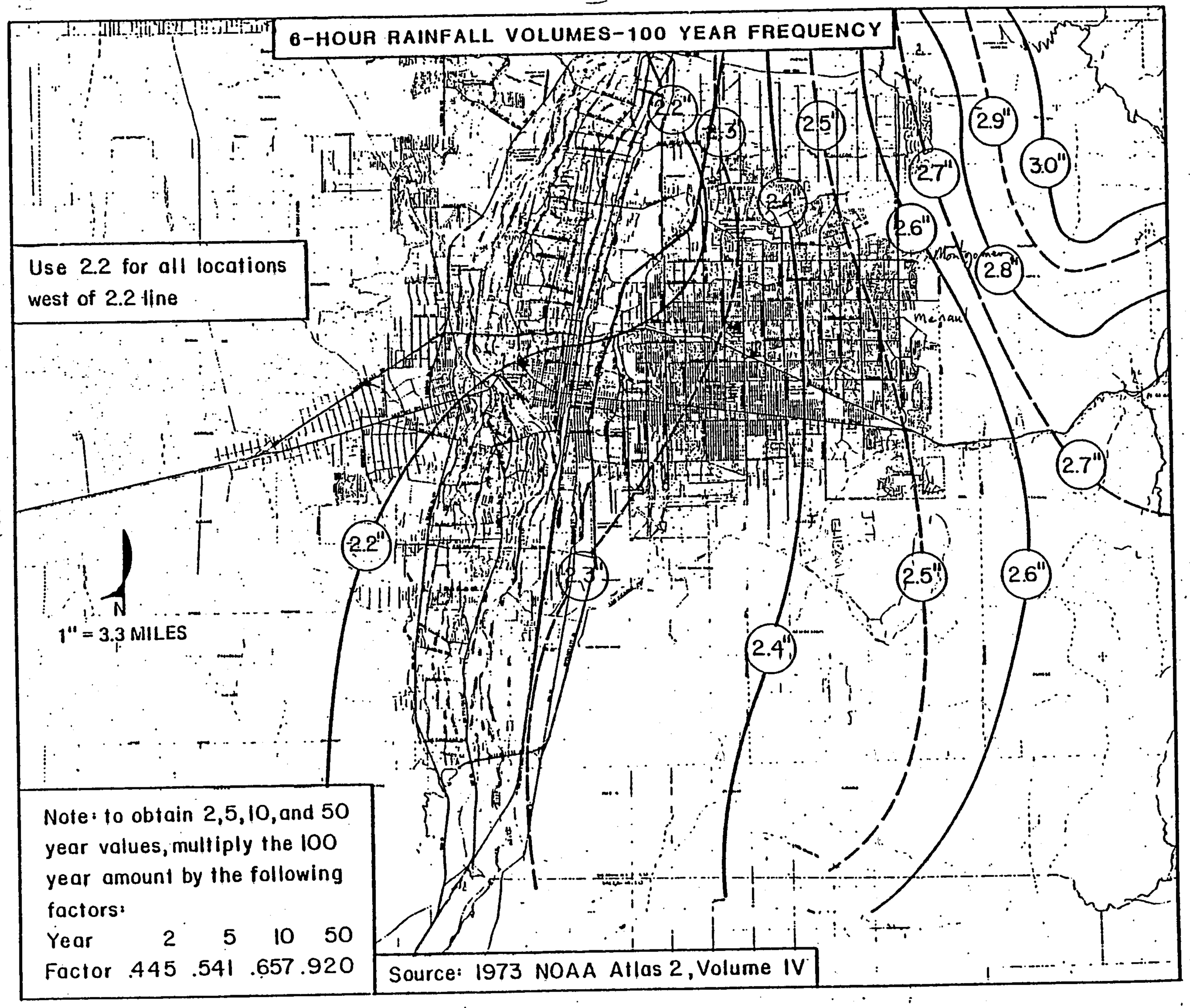
BASIN	AREA (ac)	SOIL TYPE	% IMP.	RUNOFF COEF."c"	CXA	Tc (min)	I (in/hr)	Q100 (cfs)	Q10 (cfs)
A1	39.74	B	0	.34	13.51	14.3	3.87	52	34
A2	3.00	A	0	.16	.48				
	7.60	B	0	.34	2.58				
	---				---				
	10.60				3.06	10.0	4.65	14	9
B1	18.39	B	30	.48	8.83	10.0	4.65	41	27
B2	2.03	B	60	.62	1.26	10.0	4.65	6	4
B3	5.35	B	100	.95	5.08	13.2	4.04	21	14
C1	16.51	B	40	.52	8.58	13.1	4.05	35	23
C2	38.20	A	0	.16	6.11				
	19.10	B	0	.34	6.49				
	---				---				
	57.30				12.61	13.1	4.05	51	34
D	26.34	A	0	.16	4.21	10.0	4.65	20	13
E	22.00	C	0	.51	11.22				
	23.00	D	0	.59	13.57				
	62.58	A	0	.16	10.01				
	---				---				
	107.58				34.80	33.3	2.52	88	58
R1	5.72	B	100	.95	5.40	10	4.65	26	17
R2	4.76	A	100	.95	4.52	10	4.65	21	14
R3	7.87	A	100	.95	7.48	15	3.72	28	18
OURAY	2.07	A	100	.95	1.96	12	4.23	9	6
E,R3, OURAY	117.52	-	-	.38	44.24	33	2.52	111	73
B2,B3, C1,R2	28.65	-	-	.68	19.44	13	4.05	78	52

HYDROLOGY ULTIMATE CONDITIONS computer file SAD214.ULT

BASIN	AREA (ac)	SOIL TYPE	% IMP.	RUNOFF COEF."c"	CXA	Tc (min)	I (in/hr)	Q100 (cfs)	Q10 (cfs)
A1	39.74	B	30	.48	19.07	14.3	3.87	74	48
A2	3.00	A	0	.16	.48				
	7.60	B	0	.34	2.58				
	---				---				
	10.60				3.06	10.0	4.65	14	9
B1	18.39	B	30	.48	8.83	10.0	4.65	41	27
B2	2.03	B	60	.62	1.26	10.0	4.65	6	4
B3	5.35	B	100	.95	5.08	13.2	4.04	21	14
C1	16.51	B	40	.52	8.58	13.1	4.05	35	23
C2	21.70	A	70	.62	13.45				
	4.20	B	60	.62	2.10				
	---				---				
	25.90				15.55	13.10	4.05	63	41
D	26.343	A	65	.52	13.70	10.0	4.65	64	42
E	22.00	C	0	.51	11.22				
	23.00	D	0	.59	13.57				
	62.58	A	30	.31	19.40				
	---				---				
	107.58				44.19	33.3	2.52	111	74
G	163	C	0	.51	83.13	66.7	1.77	147	97
H	4.53	C	0	.51	2.312				
	8.24	D	0	.59	4.859				
	9.63	A	30	.31	2.985				
	---				---				
	22.40				10.16	10	4.65	47	31
R1	5.72	B	100	.95	5.40	10	4.65	26	17
R2	4.76	A	100	.95	4.52	10	4.65	21	14
R3	7.87	A	100	.95	7.48	15	3.72	28	18
OURAY	2.07	A	100	.95	1.96	12	4.23	9	6
E,R3, H,G	300.85	-	-	.48	144.96	67	1.77	256	168
E,R3, H,G, OURAY	302.92	-	-	.49	146.92	67	1.77	260	168
B2,B3, C1,R2	28.65	-	-	.68	19.44	13	4.05	78	52

HYDROLOGY EXISTING CONDITIONS computer file SAD214.EXT

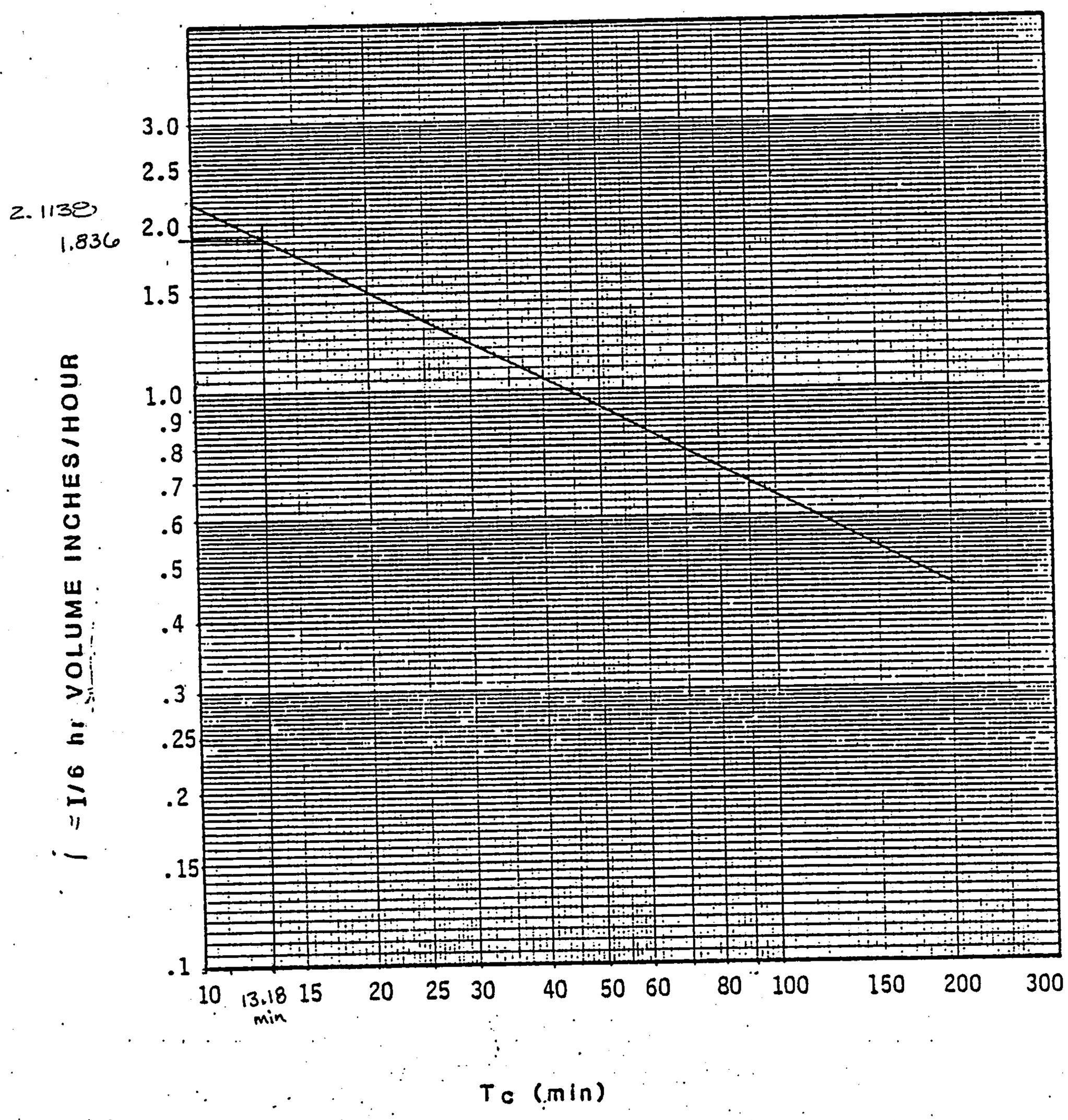
BASIN	AREA (ac)	SOIL TYPE	% IMP.	RUNOFF COEF."c"	CXA	Tc (min)	I (in/hr)	Q100 (cfs)	Q10 (cfs)
A1	39.74	B	0	.34	13.51	14.3	3.87	52	34
A2	3.00	A	0	.16	.48				
	7.60	B	0	.34	2.58				
	---				---				
	10.60				3.06	10.0	4.65	14	9
B1	18.39	B	0	.34	6.25	10.0	4.65	29	19
B2	2.03	B	0	.34	0.69	10.0	4.65	3	2
B3	5.35	B	0	.34	1.82	13.2	4.04	7	5
C1	16.51	B	0	.34	5.61	13.1	4.05	23	15
C2	21.70	A	0	.16	3.47				
	4.20	B	0	.34	1.43				
	---				---				
	25.90				4.89	13.10	4.05	20	13
D	26.34	A	0	.16	4.21	10.0	4.65	20	13
E	22.00	C	0	.51	11.22				
	23.00	D	0	.59	13.57				
	62.58	A	0	.16	10.01				
	---				---				
	107.58				34.80	33.3	2.52	88	58
G	163	C	0	.51	83.13	67	1.77	147	97
H	4.53	C	0	.51	2.31				
	8.24	D	0	.59	4.86				
	9.63	A	0	.16	1.54				
	---				---				
	22.40				8.71	10	4.65	40	27
R1	5.72	B	0	.34	1.94	10	4.65	9	6
R2	4.76	A	0	.16	0.76	10	4.65	4	2
R3	7.87	A	0	.16	1.26	15	3.72	5	3
OURAY	2.07	A	0	.16	0.33	12	4.23	2	1
E,R3, OURAY	117.52	-	-	.31	36.39	33	2.52	92	60
B2,B3, C1,R2	28.65	-	-	.31	8.88	13	4.05	36	24


6-HOUR RAINFALL VOLUMES-100 YEAR FREQUENCY
Use 2.2 for all locations west of 2.2 line
2.2"
2.3
2.5"
2.9"
3.0"
2.7"
2.4
2.6"
2.8"
2.7"
2.2"
2.3"
2.5"
2.6"
2.4"
N
1" = 3.3 MILES
Note: to obtain 2,5,10,and 50 year values, multiply the 100 year amount by the following factors:
Year 2 5 10 50
Factor .445 .541 .657 .920
Source: 1973 NOAA Atlas 2, Volume IV

DIMENSIONLESS RAINFALL INTENSITIES

$I = (6\text{-hr. rain})\,6.84\,t_c^{-0.51}$

$I = (1.45'')(6.84\,(13.18^{-.51})$



note: To get actual intensities, multiply rainfall volume from plate D-1 by value from curve. Use reduction factors on Plate D-1 for other than 100-yr.

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PROJECT Unser Blvd.
JOB NUMBER 0690586 SHEET 1 OF 7
CALCULATED BY JMartin DATE 7/7/86
CHECKED BY [illegible] DATE 7/7/86

SUMMARY TABLE

PROPOSED 4-LANE SECTION
ALLOWABLE DEPTH = 0.28 ft.

NORTHBOUND (based on 0.0029 cfs/lin-ft)

S (ft/ft)	.002	.004	.006	.008	.010	.012	.014	.016	.018	.020
Q (cfs)	2.0	2.9	3.5	4.1	4.6	5.0	5.4	5.8	6.1	6.4
L (ft)	690	1000	1207	1414	1586	1724	1862	2000	2103	2207
Q_{CB} (cfs)	1.2	1.5	1.6	1.7	1.8	2.0	2.3	2.5	2.7	2.9

S = Proposed slope of road (in ft/ft)

Q = Street capacity (in cfs) leaving one 12' open lane, using Manning's eq.

L = Maximum allowable spacing of catch basins (in ft)

Q_{CB} = Catch basin capacity (in cfs) for a single type "C" catch basin, per DPM Plate 22.3 D-5

SOUTHBOUND (based on 0.0029 cfs/lin-ft)

S (ft/ft)	.002	.004	.006	.008	.010	.012	.014	.016	.018	.020
Q (cfs)	2.0	2.9	3.5	4.1	4.6	5.0	5.4	5.8	6.1	6.4
L (ft)	690	1000	1207	1414	1586	1724	1862	2000	2103	2207
Q_{CB} (cfs)	1.2	1.5	1.6	1.7	1.8	2.0	2.3	2.5	2.7	2.9

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PROJECT Unser Blvd
JOB NUMBER 0690586 SHEET 2 OF 7
CALCULATED BY [illegible] DATE 7/7/86
CHECKED BY [illegible] DATE 7/7/86

SUMMARY TABLE

FUTURE 8-LANE SECTION
ALLOWABLE DEPTH = 0.67 ft

NORTHBOUND (based on 0.0044 cfs/in-ft)

S (ft/ft)	.002	.004	.006	.008	.010	.012	.014	.016	.018	.020
Q (cfs)	20.9	29.5	36.2	41.7	46.7	51.1	55.2	59.0	62.6	66.0
L (ft)	4750	6705	8227	9477	10614	11614	12545	13409	14227	15000
Q_{CB} (cfs)	7.2	7.6	8.0	8.5	9.1	9.7	10.3	10.9	11.6	12.5

S = proposed slope of road (in ft/ft)

Q = street capacity (in cfs) leaving one 12' open lane, using Manning's eq

L = Maximum allowable spacing of catch basins (in ft)

Q_{CB} = catch basin capacity (in cfs) for a single type "C" catch basin, per DPM Plate 22.3 D-5

SOUTHBOUND (based on 0.0041 cfs/in-ft)

S (ft/ft)	.002	.004	.006	.008	.010	.012	.014	.016	.018	.020
Q (cfs)	20.9	29.5	36.2	41.7	46.7	51.1	55.2	59.0	62.6	66.0
L (ft)	5098	7195	8829	10171	11390	12463	13463	14390	15268	16098
Q_{CB} (cfs)	7.2	7.6	8.0	8.5	9.1	9.7	10.3	10.9	11.6	12.5

Note: Street flows for the 8-lane section are approximately double those for the 4-lane section, yet the street capacities and the catch basin capacities increase by more than double. Therefore, the 4-lane storm sewer system will also be adequate for the ultimate design.

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PROJECT Unser Blvd
JOB NUMBER 0690586 SHEET 3 OF 7
CALCULATED BY J McGinn DATE 7/3/86
CHECKED BY [illegible] DATE 7/7/86

SUMMARY TABLE

PROPOSED 4-LANE MEDIAN
ALLOWABLE DEPTH = 1.45'
(based on 0.0638 cfs/lin-ft)

S (ft/ft)	.002	.004	.006	.008	.010	.012	.014	.016	.018	.020
Q (cfs)	75.1	106.2	130.1	150.2	168.0	184.0	198.7	212.4	225.3	237.5
L (ft)	19763	27947	34237	39526	44210	48421	52289	55895	59289	62500

S = proposed slope of road (in ft/ft)

Q = median capacity (in cfs) using Manning's eq

L = maximum allowable spacing of catch basins (in ft.)

FUTURE 8-LANE MEDIAN
ALLOWABLE DEPTH = 0.4'
(based on 0.0012 cfs/lin-ft.)

S (ft/ft)	.002	.004	.006	.008	.010	.012	.014	.016	.018	.020
Q (cfs)	2.4	3.4	4.2	4.8	5.4	5.9	6.4	6.9	7.3	7.7
L (ft)	2000	2833	3500	4000	4500	4917	5333	5750	6083	6417

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PROJECT Unser Blvd.
JOB NUMBER 0690586 SHEET 4 OF 7
CALCULATED BY JMcLin DATE 7/8/86
CHECKED BY [illegible] DATE 7/7/86

STREET HYDRAULICS

CALC. RUNOFF ON ROADWAY, 4-LANE DEVELOPED (NORTHBOUND)

(RUNOFF PICKED UP BY STREET D.I.'S ONLY)

W = 44' (½ Street + berm + bike lane)

A = 44 × 1'/43560 ft²/ac = 0.0010

$Q_{100} = C_i A = (.95) \times (2.2\ in/hr \times 6.84(10)^{-.51}) \times .0010$

$Q_{100} = 0.0044$ cfs/lin-ft $Q_{10} = Q_{100} \times .657 = 0.0029$ cfs/lin-ft

CALC. RUNOFF 8-LANES — FULLY DEVELOPED (NORTHBOUND)

W = 65' (½ Street + berm + bike lane)

A = 65' × 1'/43560 ft²/ac = 0.0015

$Q_{100} = C_i A = (.95) \times (2.2\ in/hr \times 6.84(10)^{-.51}) \times .0015$

$Q_{100} = 0.0066$ cfs/lin-ft $Q_{10} = Q_{100} \times .657 = 0.0044$ cfs/lin-ft

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PROJECT Unser Blvd
JOB NUMBER 0690586 SHEET 5 OF 7
CALCULATED BY J.M. Lin DATE 7/7/86
CHECKED BY [illegible] DATE 7/7/86

STREET HYDRAULICS

CALC. RUNOFF ON ROADWAY, 4 LANES DEVELOPED (SOUTHBOUND)

W = 42' (½ street + berm + sidewalk)
A = 42' x 1'/43560 ft²/ac = 0.0010
$Q_{100} = CiA = (.95) \times (2.2\ in/hr \times 6.84(10)^{-.51}) \times .0010$
$Q_{100} = 0.0044$ cfs/lin-ft $Q_{10} = Q_{100} \times .657 = 0.0029$ cfs/lin-ft

CALC RUNOFF 8 LANES - FULLY DEVELOPED (SOUTHBOUND)

W = 63' (½ street + berm + sidewalk)
A = 63' x 1'/43560 ft²/ac = 0.0014
$Q_{100} = CiA = (.95) \times (2.2\ in/hr \times 6.84(10)^{-.51}) \times .0014$
$Q_{100} = 0.0062$ cfs/lin-ft $Q_{10} = Q_{100} \times .657 = 0.0041$ cfs/lin-ft

CALC RUNOFF FROM MEDIAN - 4 LANE SECTION

W = 58'
A = 58' x 1'/43560 ft²/ac = 0.0013
$Q_{100} = CiA = (.95) \times (2.2\ in/hr \times 6.84(10)^{-.51}) \times .0013$
$Q_{100} = 0.0057$ cfs/lin-ft $Q_{10} = Q_{100} \times .657 = 0.0038$ cfs/lin-ft

CALC RUNOFF FROM MEDIAN - 8 LANE - FULLY DEVELOPED

W = 16'
A = 16' x 1'/43560 ft²/ac = 0.0004
$Q_{100} = CiA = (.95) \times (2.2\ in/hr \times 6.84(10)^{-.51}) \times .0004$
$Q_{100} = 0.0018$ cfs/lin-ft $Q_{10} = Q_{100} \times .657 = 0.0012$ cfs/lin-ft

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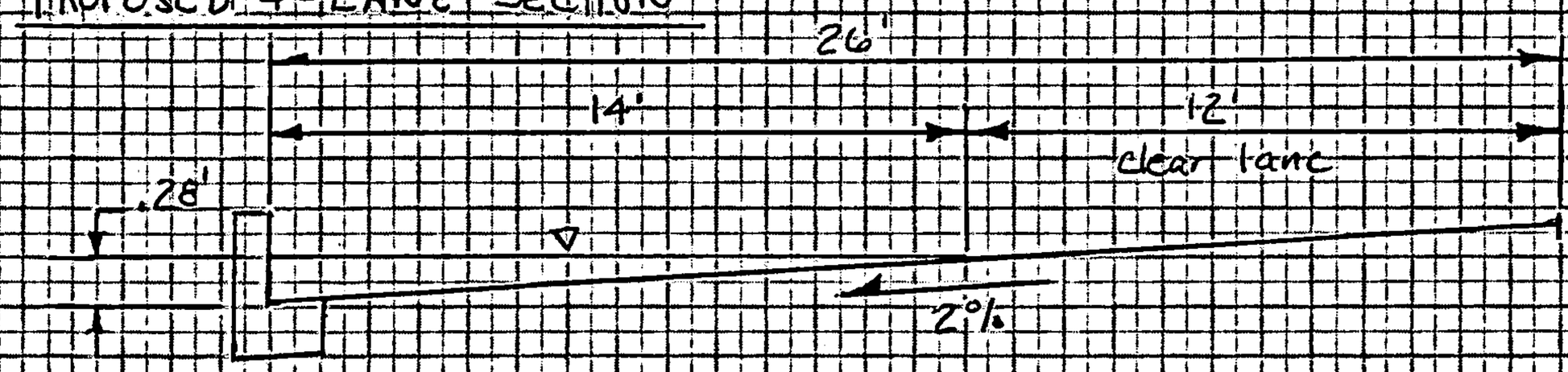
PROJECT Unser Blvd.
JOB NUMBER 0690586 SHEET 6 OF 7
CALCULATED BY JMcLin DATE 7/3/86
CHECKED BY [illegible] DATE 7/7/86

STREET CAPACITIES

PROPOSED 4-LANE SECTION



Manning's equation

$$Q = \frac{1.486}{n} A R_H^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{.017}(1.96)(0.266) S^{1/2}$$

$$Q = 45.57\, S^{1/2}$$

Value for Streets per DPM Table 22.3 B=1

$n = .017$

$A = \frac{1}{2}(14')(.28') = 1.96\ ft^2$

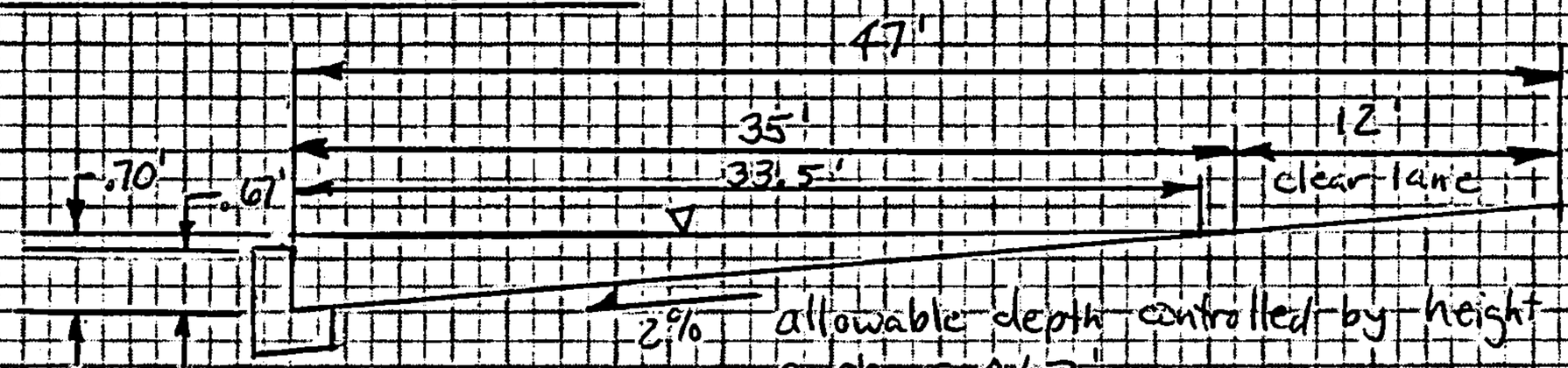
$R_H = \frac{A}{W_P}$

$W_P = (14^2 + .28^2)^{1/2} + .28 = 14.283\ ft$

$R_H^{2/3} = \left(\frac{1.96\ ft^2}{14.283 ft}\right)^{2/3} = 0.2660$

S = Slope of street

FUTURE 8-LANE SECTION



allowable depth controlled by height of curb = 0.67'

$\frac{.67'}{.02\ ft/ft} = 33.5'$

Manning's equation

$$Q = \frac{1.486}{n} A R_H^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{.017}(11.22)(.4759) S^{1/2}$$

$$Q = 466.74\, S^{1/2}$$

Value for streets per DPM Table 22.3 B=1

$n = .017$

$A = \frac{1}{2}(33.5)(.67) = 11.22\ ft^2$

$R_H = \frac{A}{W_P}$

$W_P = (33.5^2 + .67^2)^{1/2} + .67 = 34.177\ ft$

$R_H^{2/3} = \left(\frac{11.22}{34.177}\right)^{2/3} = 0.4759$

S = Slope of Street

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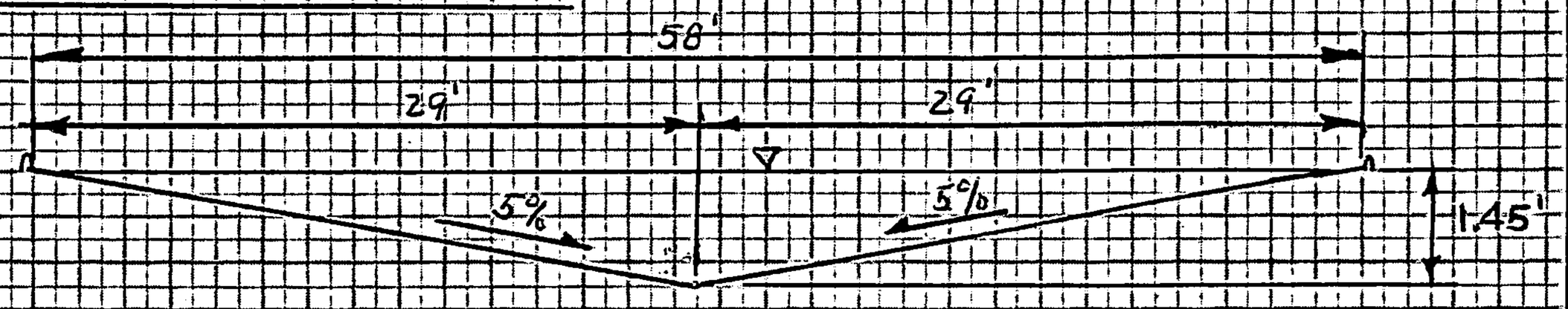
PROJECT Unser Blvd.
JOB NUMBER 0690586 SHEET 7 OF 7
CALCULATED BY J McLin DATE 7/3/86
CHECKED BY [illegible] DATE 7/7/86

MEDIAN CAPACITIES

PROPOSED 4-LANE MEDIAN



Manning's equation

$$Q = \frac{1.486}{n} A R_H^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{.030}(42.05)\left(\frac{42.05}{58.072}\right)^{2/3} S^{1/2}$$

$$Q = 1679.56\, S^{1/2}$$

$n = .030$ Value for Earth-lined channels (Smooth) per DPM Table 22.3 B-1

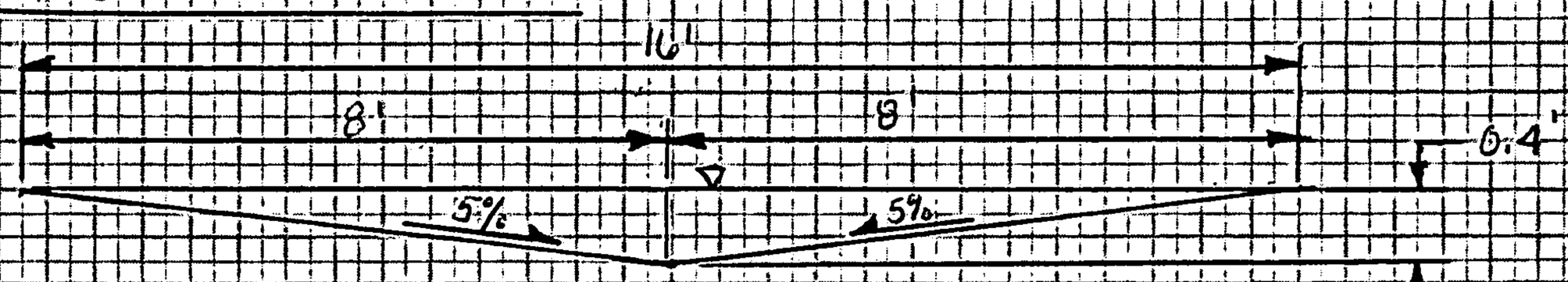
$A = (29')(1.45') = 42.05\ ft^2$

$R_H = \frac{A}{W_P}$

$W_P = 2(29^2 + 1.45^2)^{1/2} = 58.072$

S = Slope of street

FUTURE 8-LANE MEDIAN



Mannings equation

$$Q = \frac{1.486}{n} A R_H^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{.030}(3.2)\left(\frac{3.2}{16.02}\right)^{2/3} S^{1/2}$$

$$Q = 54.16\, S^{1/2}$$

$n = 0.30$ Value for earth-lined channel (smooth) per DPM Table 22.3 B-1

$A = (8')(.4') = 3.2\ ft^2$

$R_H = \frac{A}{W_P}$

$W_P = 2(8^2 + .4^2)^{1/2} = 16.02$

S = Slope of street

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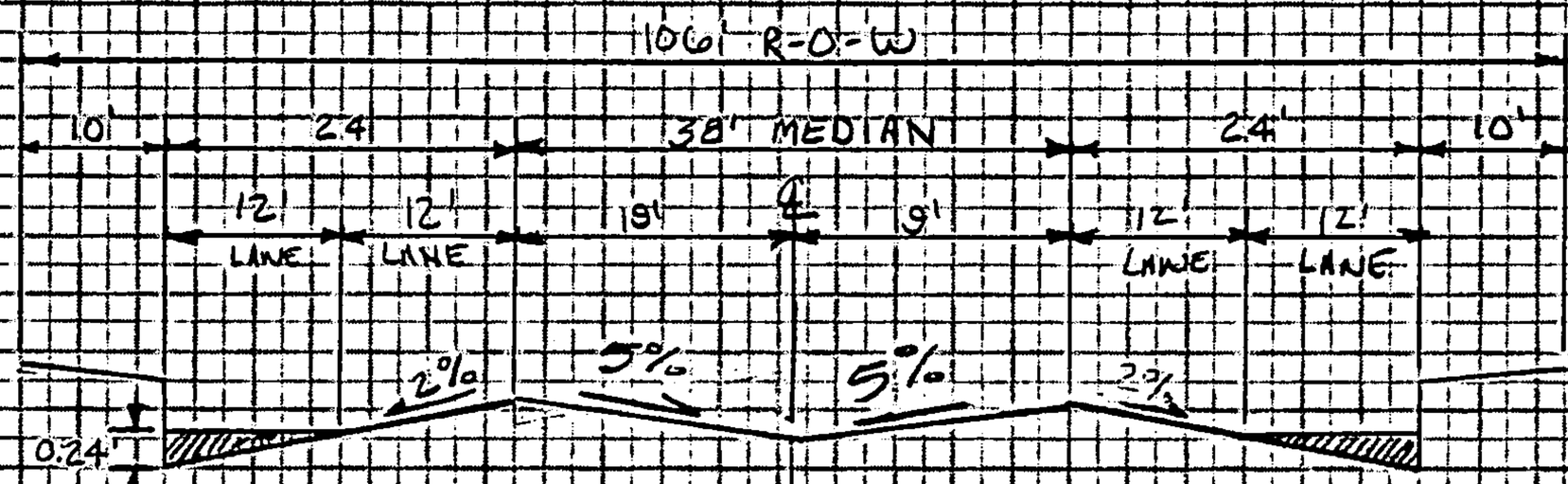
PROJECT SAD 215
JOB NUMBER 06905866 SHEET 1 OF 3
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____

98TH St. Drainage

Typical Section



Street Capacity

In 10yr flood - one free lane each side

depth of water at gutter

$12' \times 0.02'/FT = 0.24' = \text{depth}$

By Mannings Equ.

$$\frac{Q}{2} = \frac{1.486}{n} A R_H^{2/3} S^{1/2} \qquad n = .017 \quad S = .025'/ft$$

$$Q = \frac{2 \times 1.486}{.017} (.24 \times 12 \times 1/2) \left(\frac{.24 \times 12 \times 1/2}{12 + .24'}\right)^{2/3} (.0236)^{1/2} = 9.3 \text{ cfs}$$

9.3 cfs < Q10 = 13.5 cfs St. Drain required. NO

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PROJECT SAD 215
JOB NUMBER 0690586 SHEET 2 OF 3
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____

98TH St. Drainage

$$T_c = 0.0078 \frac{L^{0.77}}{S^{0.385}}$$

T_c = time of concentration (min)

L = length (feet)

S = slope (′/ft)

Slope = 0.02′/ft

Length = 2200 ft

$$T_c = 0.0078 \frac{(2200)^{0.77}}{(0.02)^{0.385}} = 13.18 \text{ min or } 0.22 \text{ hr.}$$

Rainfall Volume

See 6-hr Rainfall Volumes - 100yr frequency

$I_{100} = 2.2''$

$I_{10} = 2.2 \times 0.657 = 1.45''$

i = Rainfall intensity in inches/hr

See Dimensionless Rainfall Intensities Plate 22.2 D-2

$i_{100} = 4.04$ in/hr

$i_{10} = 2.66$ in/hr

Total Area of Road R-O-W + median ROW = 106′

$$\frac{106' \times 2200'}{43560} = 5.35 \text{ ac}$$

$Q = CiA$ $C = 0.95$ $i_{10} = 2.66$ in/hr $i_{100} = 4.04$ in/hr

$Q_{100} = 0.95 \times 4.04 \times 5.35 = 20.5$ cfs

$Q_{10} = 0.95 \times 2.66 \times 5.35 = 13.5$ cfs

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PROJECT SAD 215
JOB NUMBER 06905860 SHEET 3 OF 3
CALCULATED BY [illegible] DATE 6/18/86
CHECKED BY _____ DATE _____

Calc 100YR depth

$Q_{100} = 20.5$ cfs, ⇒ $D = 0.42$ ft << .87 allowable

LOCATE BEGINNING OF STORM DRAIN

- Dio controls, locate point where runoff exceeds criteria.

ALLOWABLE = 9.3 cfs (full section)

Runoff yield for 98th st = 13.5 cfs / 2200 ft (full section)

= 0.0061 cfs/Lin ft.

9.3 cfs / .0061 cfs/LF = 1515 ft

BEGIN ST. SEWER @ sta 5+00 + 15+00

= 20+00

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PROJECT Unser Blvd. - Mirehaven Channel
JOB NUMBER 0690455 SHEET 1 OF 2
CALCULATED BY J. HART DATE 11/23/85
CHECKED BY _____ DATE _____

$Q_{100} = 1200$ cfs 4 - 10' x 4' x 149'

$Q_{100/barrel} = 300$ cfs $S_o = 0.005$ $n = 0.013$

$TW = 93.5 - 89.78 = 3.72$

$d_c = 3.03$ $V_c = 9.89$ fps
$d_n = 2.60$ $V_n = 11.55$ fps

Try Type II

$$HW = TW + \frac{V_{TW}^2}{2g} + h_e + h_f - S_o L$$

$TW = 3.72'$ $S_f = .0015$ d = 3.93
$V_{TW} = 8.06$ fps .0020 3.59
.0018 3.73

$$h_e = K_e\left(\frac{V_{TW}^2}{2g}\right)$$

$K_e = .4$ reduction Factor Approach Velocity
$V = 0.5\ V_a$

$h_e = .40$

$h_f = S_f L = (.0018)(149) = .27$

$S_o L = (.005)(149) = .75$

$HW = 3.72 + 1.01 + 0.4 + .27 - .75 = 4.65$

$\frac{4.65}{4.00} = 1.16 \leq 1.2D$

$\therefore$ HW = 4.65' & Outlet Velocity = 8.06 fps into a standing pool @ Elev. 93.5

Outlet Channel 60' Bottom grouted riprap
n = .045 z = 2:1 S = .01
$Y_n = 2.91$
$V_n = 6.28$

Assume 10yr ½ 100yr $Q_{10} = 600$ cfs
S = .01
$Y_n = 1.93$
$V_n = 4.87$

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PROJECT Unser - Mirehaven Channel
JOB NUMBER 0690455 SHEET 2 OF 2
CALCULATED BY J. Hart DATE 11/23/05
CHECKED BY _____ DATE _____

Existing Channel W = 108 Z = 2:1 S = .0016

grouted riprap channel is 2' ± below existing channel
∴ assume existing channel carries flow
in excess of 600 cfs

Q = 600 cfs W = 108' Z = 2:1 S = .0016
n = .03

Y_n = 1.85'
V_n = 2.91 fps

@ drop 91.2 + 1.85 = 93.05 < 93.5 T.W.

∴ this section will work &
provide adequate channel protection
when a much lower pool exists
down stream.

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PROJECT Unsen / Ladera Channel
JOB NUMBER 0690455 SHEET 1 OF 2
CALCULATED BY J Hart DATE 10/29/85
CHECKED BY DATE

$Q = 250$ cfs $w = 10'$, $z = 0$, $n = .013$, $S = .0147\%$

$y_n = 1.59'$ $V_n = 15.71$ fps

$y_c = 2.69'$ $V_c = 9.30$ fps

S2 profile in box assume critical depth @ entrance

direct step method $\alpha = 1.1$ $E_1 = 4.18$

d_2	ΔL	ΣL	V fps
2.4	8.6		
2.0	49.1		
1.8	75.2	132.9	
1.75	36.2	169.1	14.3
1.70	53.1		

change n value w/ "ribs"

n	y_n	V_n	y_c	V_c	R	h	S
.02	2.13	11.8	2.69	9.3			
.025	2.48	10.1			1.66	.5'	1.9'
.030						.67	2.88'

$h/R = .3$

$\frac{h}{R} = .8$ / $h = .3$ //

$\frac{S}{h} = 3$ / $S =$ //

Inside Box

(w/ Bump) → $n = .03$ $y_n = 2.48$ $V_n = 10.1$ fps S.3 Profile

direct step method $\alpha = 1.1$

$E_1 = 5.19$

d_2	ΔL	ΣL	V
1.8			
2.0	25.1		12.5
2.2	29.3		11.4
2.4	42.7		10.4

8" high every 3'

use ribs last 50' of box

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PROJECT Unser / Ladera Channel
JOB NUMBER D690455 SHEET 2 OF –
CALCULATED BY J. HART DATE 10/29/85
CHECKED BY _____ DATE _____

Q = ~~250~~ 750 cfs W = 60' Z = 2 n = .03 S = .0016

y_n = 2.98 V_n = 3.82
y_c = 1.66 V_c = 7.13

Q = 750 cfs W = 30' Z = 2 n = .025 S = .0016
y_n = 3.91 V_n = 5.07
y_c = ~~3.91~~ 2.54 V_c = ~~5.07~~ 8.43

assume channel depth at box outlet is 2.2' V = 11.4 fps

		d_2	ℓ	ΣL	V
~~ε_1 = 3.88~~		~~2.2~~	—	—	(11.4)
ε_1 = 3.88		2.2			
		2.3	6.5		
		2.4	5.12		
		2.5	3.45		
Trapezoid	c	2.54	0.8'	15.9'	
jump occurs		2.6	.6		
		2.7	(-1)		

model outlet assume rectangular channel
Q = 750 cfs n = .025 (use ribs) or grouted riprap
S = 0.0016 W = 30'

	Q	W	Z	n	S	y_n	V_n	y_c	V_c
rect.	750	30	0	.025	.0016	4.56	5.48	2.69	9.29
(trap.	750	30	2	.025	.0016	3.91	5.07	2.54	8.43)

		d_2	ℓ	ΣL	V
	(rect.)				
ε_1 = 4.42		2.2	—	—	
		2.4	13.2		
		2.6	8.8		
		2.7	2.3	24.3	
jump occurs		2.8	0.6		
		2.85	−0.4		

∴ Use ribs in first 25' w/ concrete bottom, use grouted riprap (n = .03) for next 65' total length protection 3 x width of culvert exit.

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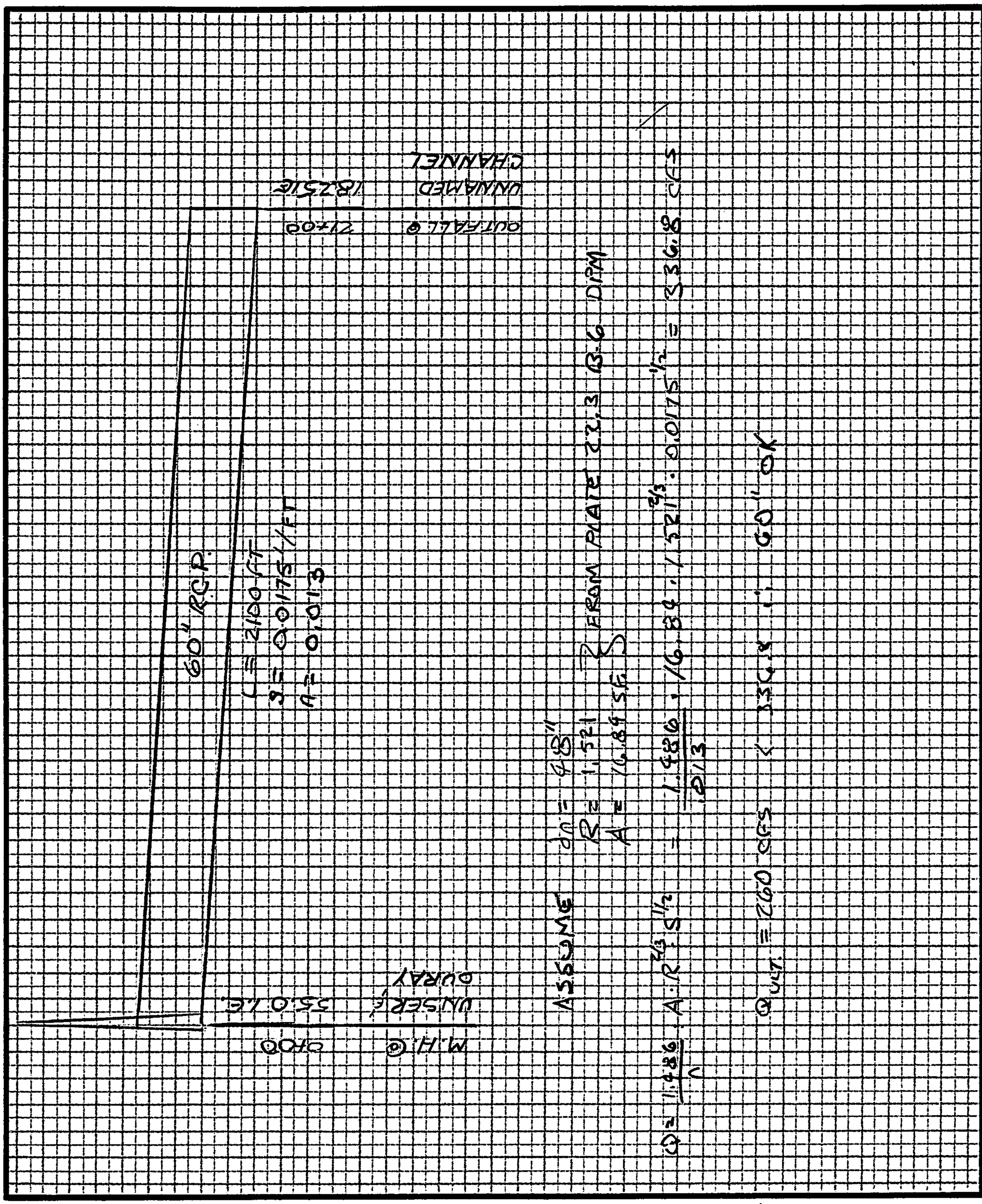
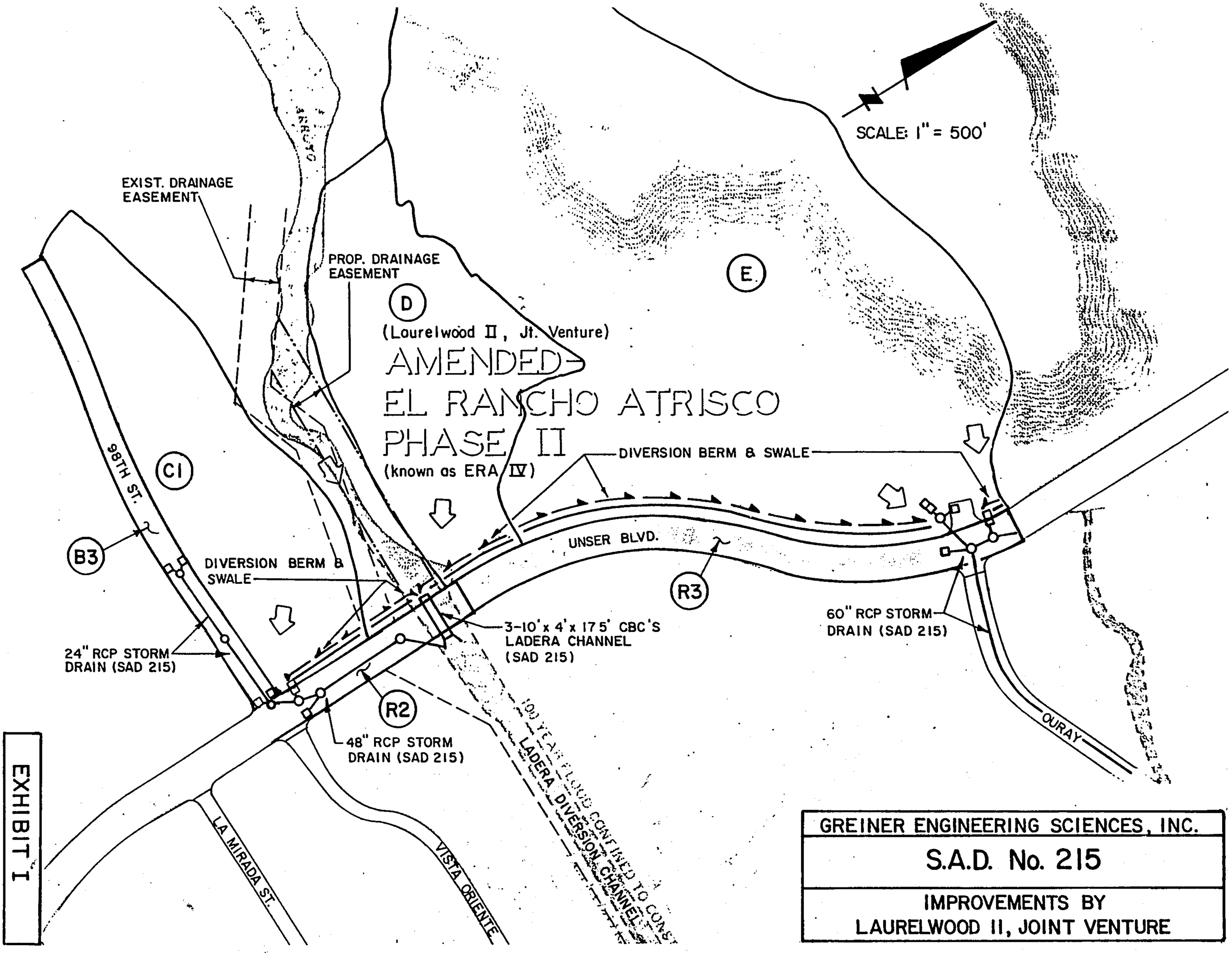
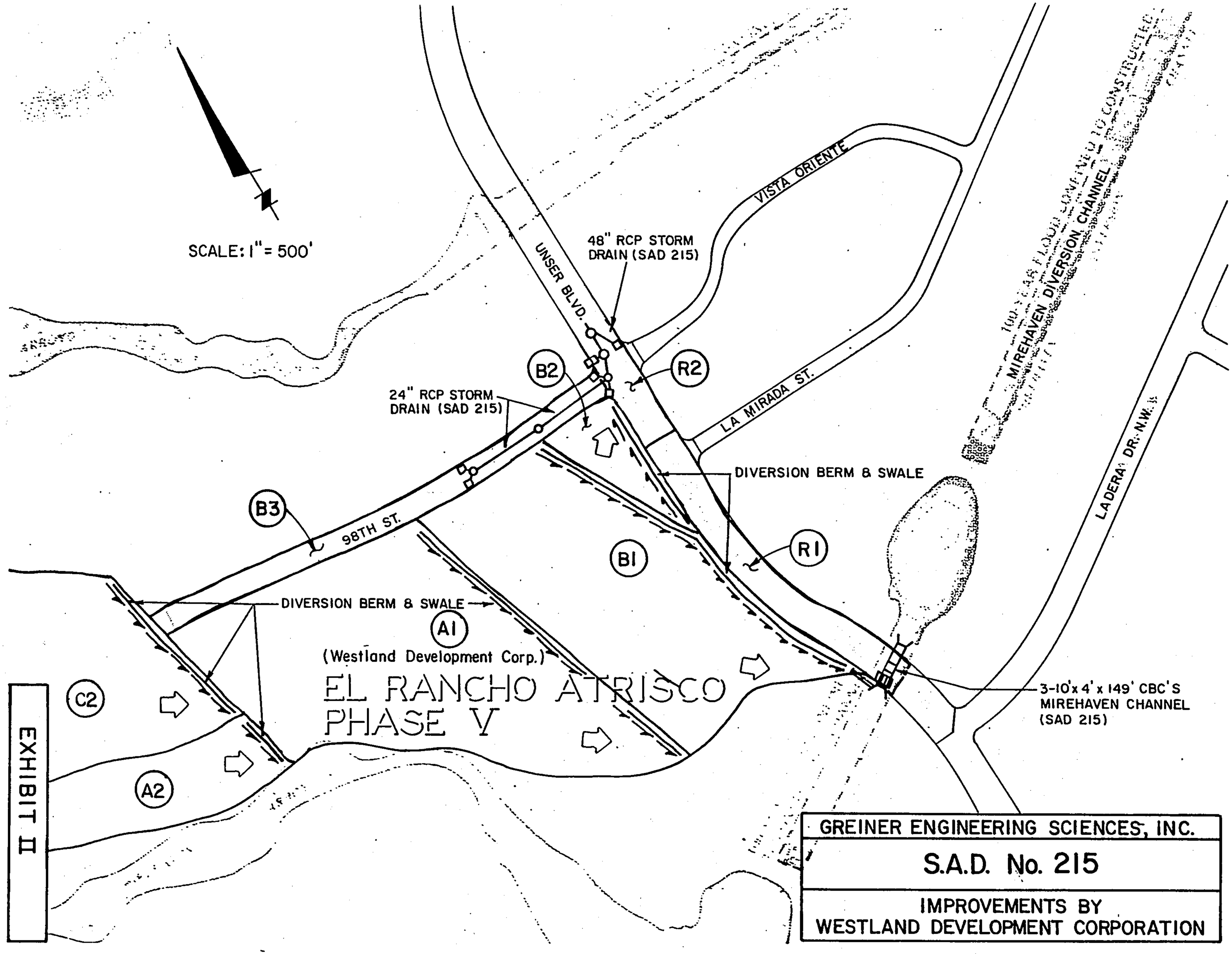
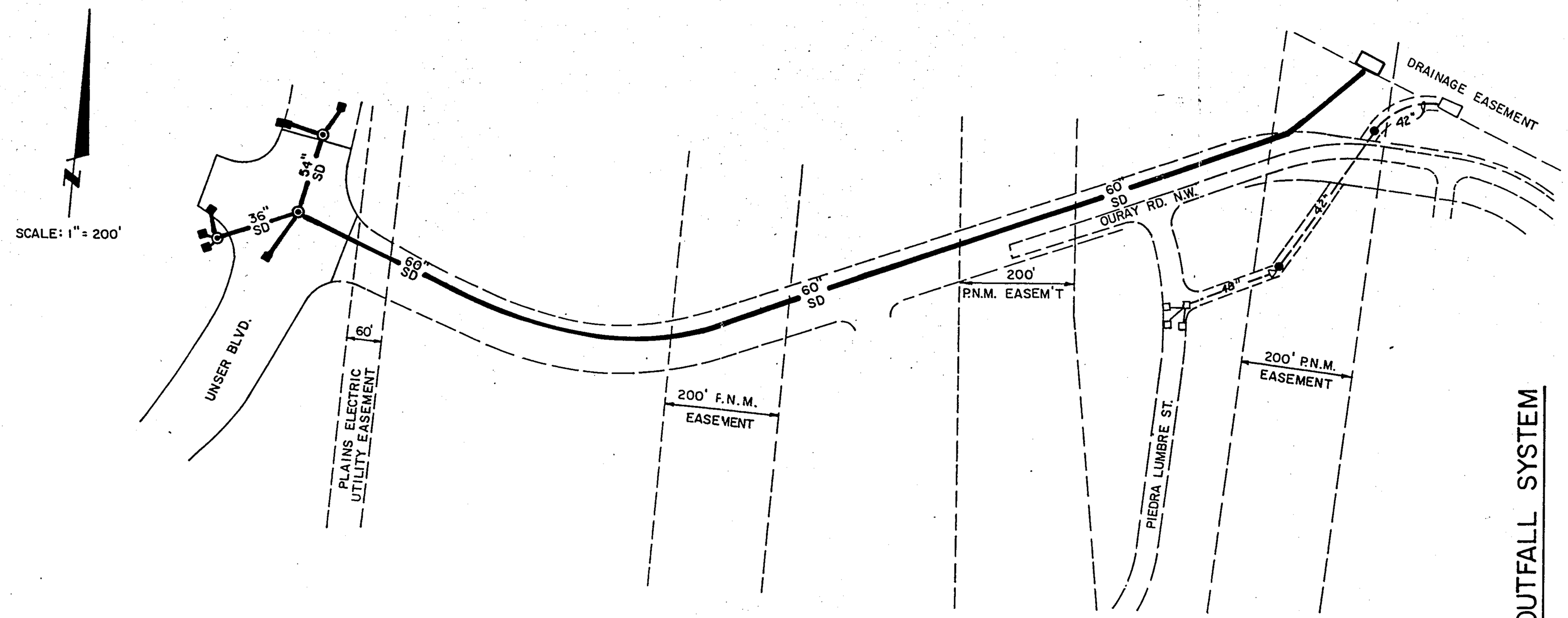
PROJECT SAD 215 OURAY
JOB NUMBER 06905860 SHEET 1 OF
CALCULATED BY JBLOCK DATE 8/12/86
CHECKED BY DATE



EXHIBITS

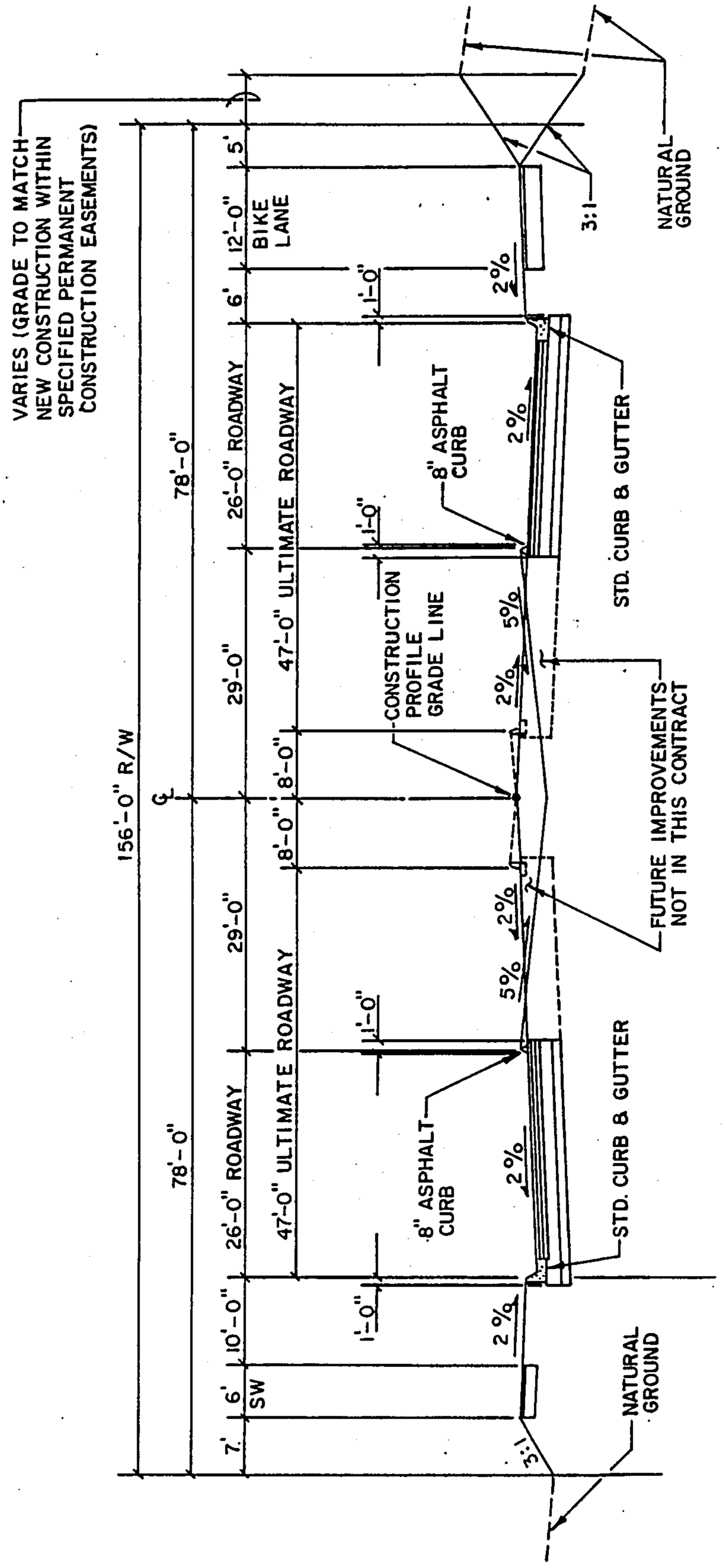

SCALE: 1" = 500'
EXIST. DRAINAGE EASEMENT
PROP. DRAINAGE EASEMENT
D
(Laurelwood II, Jt. Venture)
E
AMENDED
EL RANCHO ATRISCO
PHASE II
(known as ERA IV)
DIVERSION BERM & SWALE
98TH ST.
C1
B3
DIVERSION BERM & SWALE
UNSER BLVD.
R3
3-10' x 4' x 175' CBC'S
LADERA CHANNEL
(SAD 215)
60" RCP STORM DRAIN (SAD 215)
24" RCP STORM DRAIN (SAD 215)
R2
48" RCP STORM DRAIN (SAD 215)
100 YEAR FLOOD CONFINED TO CONST
LADERA DIVERSION CHANNEL
OURAY
LA MIRADA ST.
VISTA ORIENTE
EXHIBIT I
GREINER ENGINEERING SCIENCES, INC.
S.A.D. No. 215
IMPROVEMENTS BY
LAURELWOOD II, JOINT VENTURE


SCALE: 1" = 500'
UNSER BLVD.
48" RCP STORM DRAIN (SAD 215)
VISTA ORIENTE
MIREHAVEN DIVERSION CHANNEL
B2
R2
24" RCP STORM DRAIN (SAD 215)
LA MIRADA ST.
DIVERSION BERM & SWALE
LADERA DR. N.W.
B3
98TH ST.
B1
R1
DIVERSION BERM & SWALE
A1
(Westland Development Corp.)
EL RANCHO ATRISCO
PHASE V
C2
A2
3-10'x 4' x 149' CBC'S
MIREHAVEN CHANNEL
(SAD 215)
EXHIBIT II
GREINER ENGINEERING SCIENCES, INC.
S.A.D. No. 215
IMPROVEMENTS BY
WESTLAND DEVELOPMENT CORPORATION



OURAY OUTFALL SYSTEM

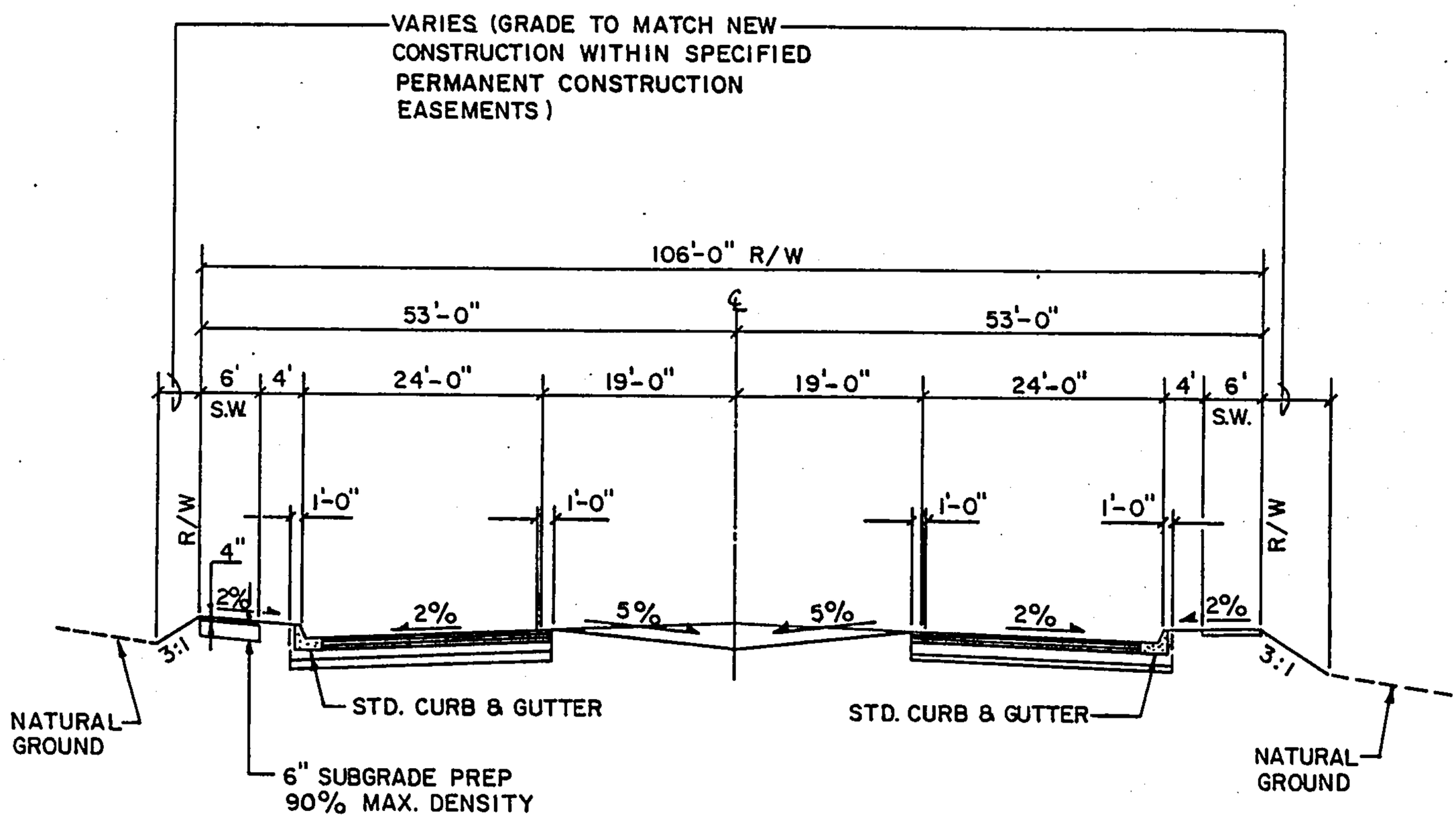
EXHIBIT III



TYPICAL SECTION FOR UNSER BLVD. W/ BIKE LANE

N.T.S.

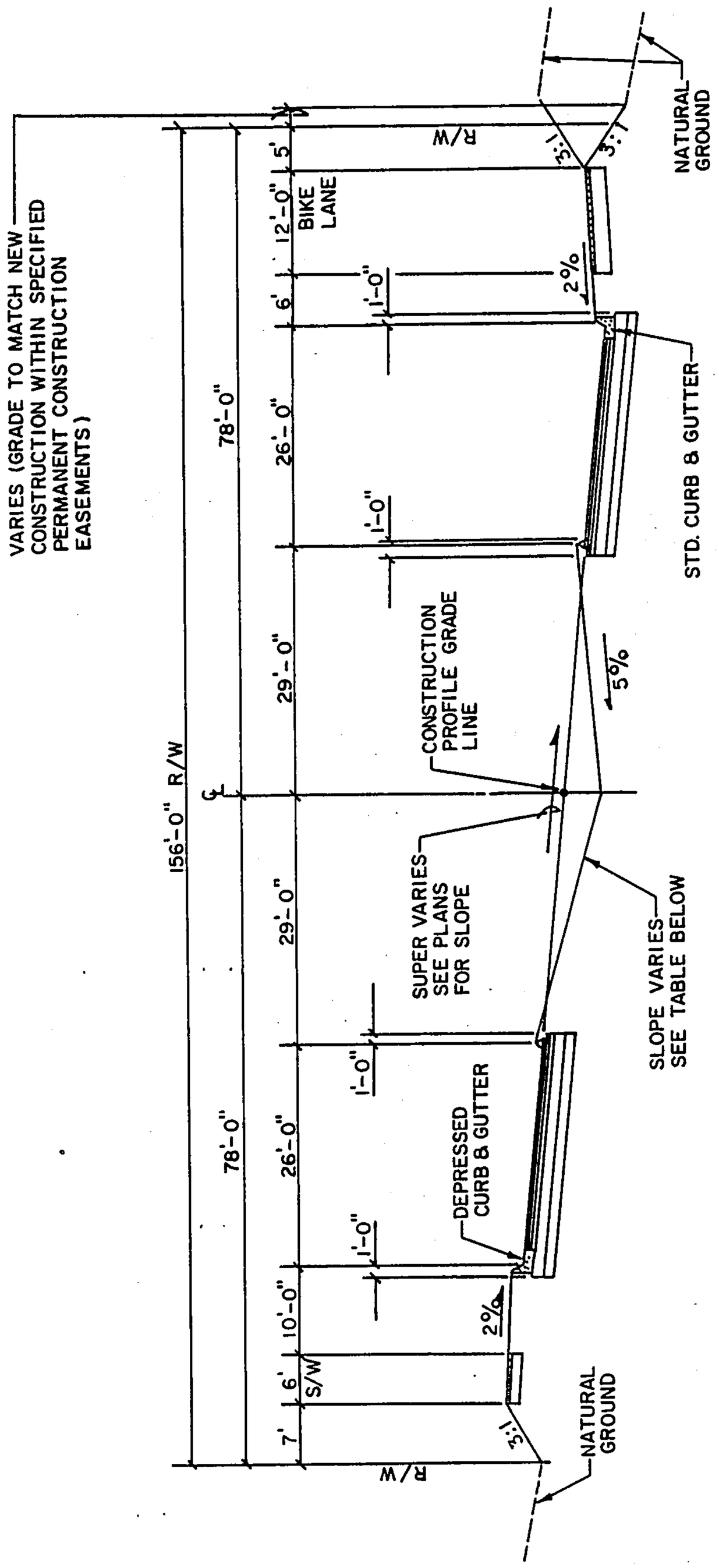
EXHIBIT IV



TYPICAL SECTION FOR 98th STREET

N.T.S.

EXHIBIT V

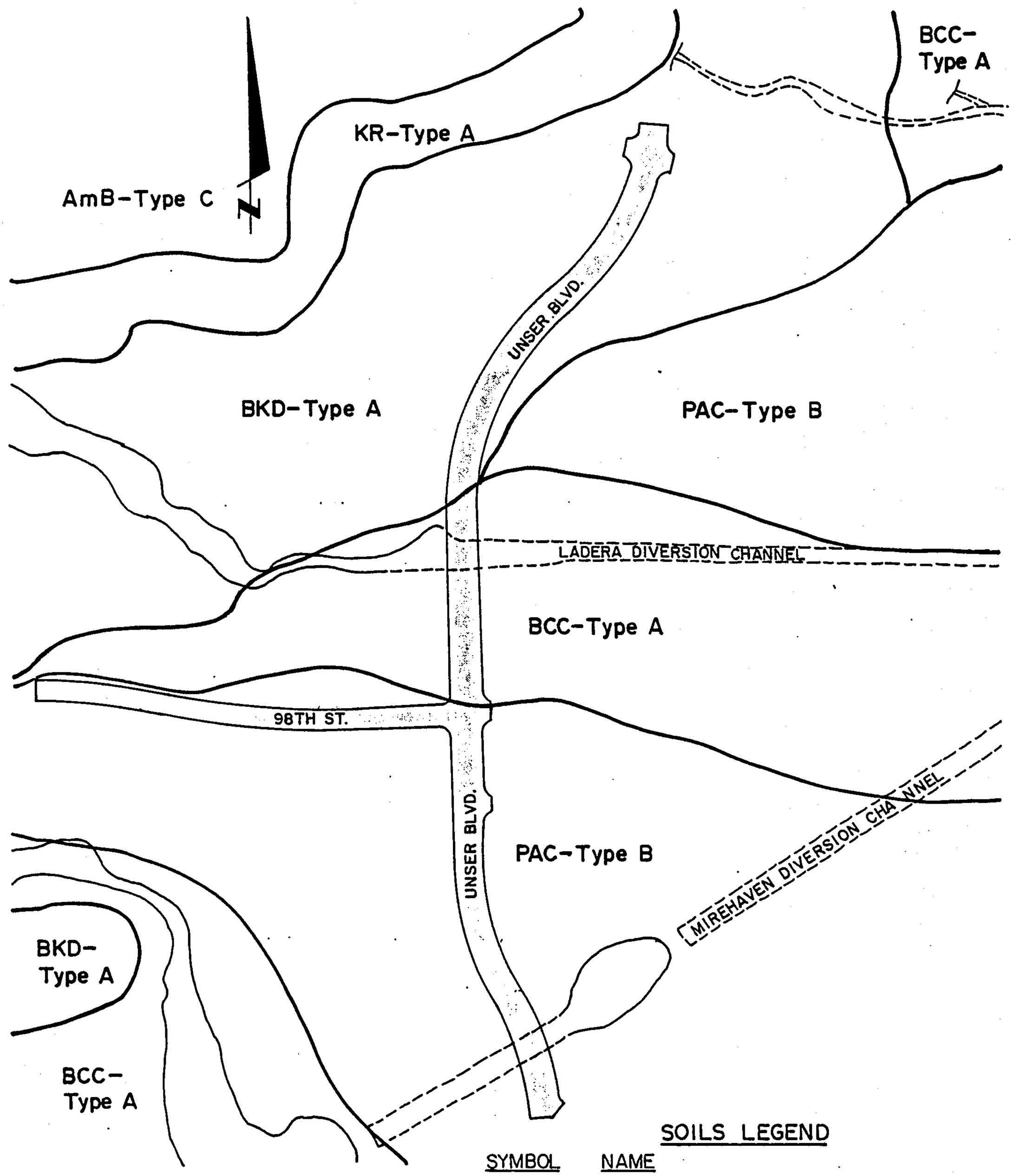


SUPERELEVATION	SLOPE
4%	13%
3%	11%
2%	9%

TYPICAL SECTION FOR UNSER BLVD. W/ SUPERELEVATION

N.T.S.

EXHIBIT VI



SOILS LEGEND

SYMBOL	NAME
AmB	Alemeda sandy loam, 0 to 5 percent slopes
BCC	Bluepoint loamy fine sand, 1 to 9 percent slopes
BKD	Bluepoint-Kokan association, hilly
KR	Kokan-Rock outcrop association
PAC	Pajarito loamy fine sand, 1 to 9 percent slopes

SCS SOILS MAP

N.T.S.

EXHIBIT VII

GREINER ENGINEERING SCIENCES, INC.
2601 Wyoming Blvd., N.E., Suite F
Albuquerque, New Mexico 87112
(505) 292-1936
Formerly MSM Consultants, Inc.
A Greiner Engineering, Inc. Company

TRANSMITTAL

TO: City of Albuquerque
Public Works Dept - Hydrology
ATTN: Billy Goolsby

DATE: 17 Dec 86
RE: SAD 215 - Ouray Rd Storm Drain
JOB NO.

WE ARE SENDING THE FOLLOWING ☐ ATTACHED, ☐ UNDER SEPARATE COVER, VIA

☐ PRINTS ☒ COPY OF LETTER ☐ CHANGE ORDER ☐ SPECIFICATIONS
☐ ESTIMATES ☐ PROPOSAL ☐ REPORTS ☐

NO. OF COPIES	DATED	DESCRIPTION
		Billy Goolsby
		Enclosed are copies of the comment responses on the project noted above.
		The corrected planset was submitted yesterday, 16 Dec 86

THESE ARE TRANSMITTED:
☒ FOR YOUR USE ☐ FOR REVIEW AND COMMENT
☐ FOR APPROVAL ☐ AS REQUESTED

REMARKS:

RECEIVED DEC 18 1986 HYDROLOGY SECTION

CC:

GREINER ENGINEERING SCIENCES, INC.
Rick Beltramo

Greiner

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

December 17, 1986

RECEIVED
DEC 18 1986
HYDROLOGY SECTION

Mr. Jessie Ortiz
Project Engineer
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

SUBJECT: SAD 215 - Ouray Storm Drain From Unser Boulevard to Ronda De Lechusas (Project No. 3093)

Dear Mr. Ortiz:

Attached are responses to comments from the Engineering Division of the Public Works Department for the project listed above. Responses are written on the comment sheets or plan set whenever possible. More detailed responses are listed on the attached comment response sheet.

If you have any questions, please call me.

Sincerely,

GREINER ENGINEERING

Rick Beltramo, P.E.
Project Engineer

RB:tw

Attachments: Comments & Responses

cc: Steve Boberg, Project Engineer, Utility Design Section
Billy Goolsby, City Hydrologist, Hydrology Section

Job No. 0690585

SAD 215

OUBAY STORM DRAIN

RECEIVED
DEC 18 1986
HYDROLOGY SECTION

DEC. 2, 1986

PREPARED BY: JESSIE ORTIZ

GENERAL COMMENTS:

PAGE Nº	COMMENT Nº	INSTRUCTION
	1	ROW & EASEMENTS MUST BE ESTABLISHED PRIOR TO ADVERTISEMENT OF PROJECT. - SEE COMMENT RESPONSE NO. 14
	2	ESTIMATED CONTRACT TIME IN CALENDAR DAYS FOR CONSTRUCTION OF PROJECT MUST BE REVIEWED AND APPROVED BY THE PUBLIC WORKS DEPARTMENT (PWD) PRIOR TO SUBMITTAL OF CHECK SET OF PLANS. DONE - IN SPECS.
	3	LIQUIDATED DAMAGES AMOUNT MUST BE COORDINATED W/ THE PWD PRIOR TO SUBMITTAL OF PLANS. DONE IN SPECS.
	4	A FINAL DETAIL COST ESTIMATE W/ QUANTITY TAKE-OFF COMPUTATIONS MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE PWD PRIOR TO SUBMITTAL OF PLANS. DONE

HYDROLOGY COMMENTS:

REFER TO STEVE BOBERG'S MARK UPS FOR APPLICABLE COMMENTS. SEE PLAN SET DONE

* PLEASE RETURN MARKED UP PLANS W/ VERIFICATION OF INCLUSION OF COMMENTS.

DESIGN REVIEW COMMENTS:

ADDRESS ALL COMMENTS PREPARED BY JOE LUEHRING.

* PLEASE RETURN A COPY OF COMMENT SHEET W/ VERIFICATION OF INCLUSION OF COMMENTS. DONE

TRAFFIC COMMENTS:

REFER TO DAVE HARMON'S NOTE AND ADDRESS COMMENT.

DONE

IF YOU HAVE ANY QUESTIONS CONTACT ME @ 768-2766

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

November 25, 1986
DATE

RECEIVED
DEC 18 1986
HYDROLOGY SECTION

CITY ENGINEERS PROJECT NO. 3093

STANDARD REVIEW COMMENT SHEET

SHEET 1 of 2

TO: Jessie Ortiz, Engineering Group/Transportation
(USER DEPT./DIVISION)

Joe L.

FROM: Joe Luehring, Engineering Group/Design Review
(REVIEWER/REVIEW DEPT./DIVISION)

PROJECT: SAD 215 - Ouray Road Storm Drain

PROJECT DESCRIPTION TYPE: [ ]Report/Study. [X]Plans, [X]Specs, [ ] Est.
STATUS: [ ]Prel, [X]Final, [ ]Check

PAGE NO.	COM NO.	COMMENTS	USER DEPT. A/D REMARK
		SPECS	
	1.	Comment No.'s 2, 3, 4, 5, 6, 11, 12 and 14 from other SAD 215 Project also apply to this project.	DONE
BP-1	2.	Recommend deleting current bid item No.'s and replace with consecutive numbering beginning at 1. Last line should read "BASE BID - TOTAL OF BID ITEMS 1 - ?".	DONE
STS	3.	Need to number all STS pages.	DONE
STS	4.	Need to add seeding spec and bid item, if necessary. If not needed, then delete Note 15 on Sheet 1 of plan set.	DONE
		PLANS	
Gen	5.	Need to add AMAFCA to approval block.	AMAFCA DOES NOT FEEL THEIR APPROVAL IS NECESSARY
Gen	6.	Need drainage analysis and calculations to review. These are typically submitted at/or before preliminary plan phase.	-DONE- SUBMITTED ON 11/25/86
Gen	7.	Are any stub outs needed to property boundaries to accommodate anticipated off-site developed flows?	NO - STUB-OUTS TO BE BUILT IF & WHEN OFF-SITE IS DEVELOPED.
Gen	8.	Need to call out class of pipe throughout plan set.	DONE
Gen	9.	Why isn't paving, water and sanitary sewer service provided along Ouray Road as part of this SAD?	SAD 215 IS ONLY FOR IMPROVEMENTS NEEDED FOR UNSER BLVD.
2	9.	Call out cap removal at Station 1+50 on plans.	-DONE
2	10.	Curvilinear pipe is not called out in bid proposal. If curvilinear storm sewer is to be achieved by joint deflection, this needs to be called out.	-BEVELED PIPE IS CALLED OUT

PROJECT: SAD 215 - Ouray Road Storm Drain

REVIEWER/DATE: November 25, 1986

PAGE NO.	COM NO.	COMMENTS	USER DEPT. A/D REMARK
2	11.	If roadway centerline is used for stationing, then manholes and all other features called out need to have an offset distance, especially where the storm sewer line does not parallel the roadway centerline.	DONE
2,4	12.	What is meant by "begin beveled pipe"? Is this a separate bid item?	YES
3	13.	Is shoring needed to protect existing 12" waterline?	-NO - SEE ATACHED SKETCH & NOTE
3	14.	Need drainage easement or right-of-way where pipe enters private property near Station 20+00.	- SEE ATTACHED RESPONSE
2,3	15.	Need to show proposed grade of Ouray Road on profile.	- SEE ATTACHED RESPONSE
3	16.	Why do flows increase at Station 13+55? Is a stub-out needed at this manhole?	- SEE ATTACHED RESPONSE
3	17.	Need to show existing 42" storm drain line on profile adjacent to 60" pipe outlet.	- DONE
4,5	18.	Need more detail for outlet structure. Why are we building a pond at outlet?	-POND IS REMOVED SEE ATTACHEED RESPONSE
5	19.	Need to list bottom and top of footing elevations on plans.	-DONE

cc: James N. Hicks, Principal Engineer/Design Section
Andre Houle, D.R.C. Chairman/Design Review Section
Reading File

JDL/ns

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE 11-19-86 (Date) REF. NO.

TO: Distribution

FROM: Terri Martin, Master Scheduler Phone #768-2561

SUBJECT: Notice of D.R.C. Meeting: Project No. 3093

Project Name: SAD 215 - OURAY STORM DRAIN FROM UNSER BLVD TO RONDA DE LECHUSAS

Scheduled for review and comment by the D.R.C. on 11/25/86 at 2:30, in Room 324 (LARGE) of the City Hall Building.

The project is scheduled for:

/ / Review of Schematic Design
/ / Review of Preliminary Plans
/ / Review of Analysis Report
/X/ Review of Final Plans
/ / Approval & Sign-off of Plans
/ / _____

The attached package includes:

/ / Report
/X/ Plans
/X/ Specifications
/ / Cost Estimate

Indicated below are the Departments/Divisions that have received project documents and are requested to attend. Attendance is mandatory for all regular D.R.C. members as well as the user Department Representative. It will be the project managers responsiblity to notify consulting engineering firms of date and time of scheduled meeting.

	NAME	TITLE		NAME	TITLE
/ /	Andre Houle	D.R.C. Chairman	/X/	Joe Luehring	Design Review
/X/	Dave Harmon	Traffic Design	/ /	Albert Letzkus	Traffic Operations
(-specs) /X/	Sergio Miranda	Street Maint.	/ /	Dave Parks	Transportation
/X/	Bill Westmoreland	Utility Dev.	/X/	Dan Hogan	Asst Util Eng Hydro.
/X/	Fred Aguirre	Hydrology	/X/	Russell Givler	Construction Eng.
/X/	Sandy Zuschlag	Parks & Rec.	/ /	Bob Gurule	Aviation Department
/ /	Bob Gill	Aviation Dept.	/ /	Joe DellaLonga	City Architect
/ /	Fred Malone	Env. Health	/X/	Lee Lunsford	SAD Services
/X/	Pat McDonald	Legal Depart. (Specs only)			

TM/ns
(ID4672E)

Transp. Dev.
What is the grade of the road way that has been paved adjacent to the storm drain? This needs to be shown on the plan.
Dw.H 11/25/86 DR86-314

DONE

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

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(Specs) /X/	Sergio Miranda	Street Maint.	/ /	Dave Parks	Transportation
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/ /	Fred Malone	Env. Health	/X/	Lee Lunsford	SAD Services
/X/	Pat McDonald	Legal Depart. (Specs only)			

TM/ns
(ID4672E)

No comment at this time

Original signed

SAD 11/21/86

OK

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

11/25/86
DATE

CITY ENGINEERS PROJECT NO. 2803

REVIEW COMMENT SHEET

SHEET 1 OF 2

TO: Jesse Ortiz / Transportation
(USER DEPT./DIVISION)

FROM: Westmoreland /Water-Liquid Waste/ Public Works Department
(REVIEWER/REVIEW DEPT./DIVISION)

PROJECT: SAD 215

PROJECT DESCRIPTION TYPE: [ ] Report/Study, [X] Plans, [X] Specs, [ ] Est.
STATUS: [ ] Pre, [ ] Review [ ] Final

RESPONSE

[~~No comments on Nov 30 & 32~~]

SHEET NO.	COMMENT NO.	COMMENT	Y/N	REMARKS
SPECS	1.	No Comments		
6	2.	I have some concern		
		over the effect of		
		construction (compacting, etc.)		
		on the existing 18" CCyl		
		water line under the		
		proposed culvert. The		
		contractor should be		
		alerted to the breakage		
		potential and perhaps		
		joint restraints will be		
		necessary.		
8	3.	Locate the casing pipe		
		closer to the 30" W.L.		

cc: Houle
Luehring
Hogrefe

OK

0718A/REV. 10/03/86

SAD 215 OURAY ROAD STORM DRAIN

Project No. 3093

COMMENT RESPONSE SHEET

Page No.	Com. No.	
3	13	Shoring of waterline is unnecessary. As shown on attached sketch trench will support the waterline. In actual field conditions soil will be 80% compacted and a steeper slope than shown will probably be used.
3	14	A portion of the pipe is within PNM easement and is now under review at PNM. We anticipate no problems with this approval. Remaining pipe is within the Ouray Road Right-of-Way.
2,3	15	There are no approved grades for the unpaved portion of Ouray Road. The existing pavement has been shown on this submittal. For design purpopes it was assumed the proposed grade will follow existing pavement and existing ground within ± 2 feet.

COMMENT RESPONSE SHEET

Page No.	Com. No.	
3	16	Stub-out locations are unknown. For design purposes our "best guess" at where off-site flows would enter the line was at the downstream property lines.
4,5	18	The pond was to act as an energy dissipator but has been removed. See plan for new design.

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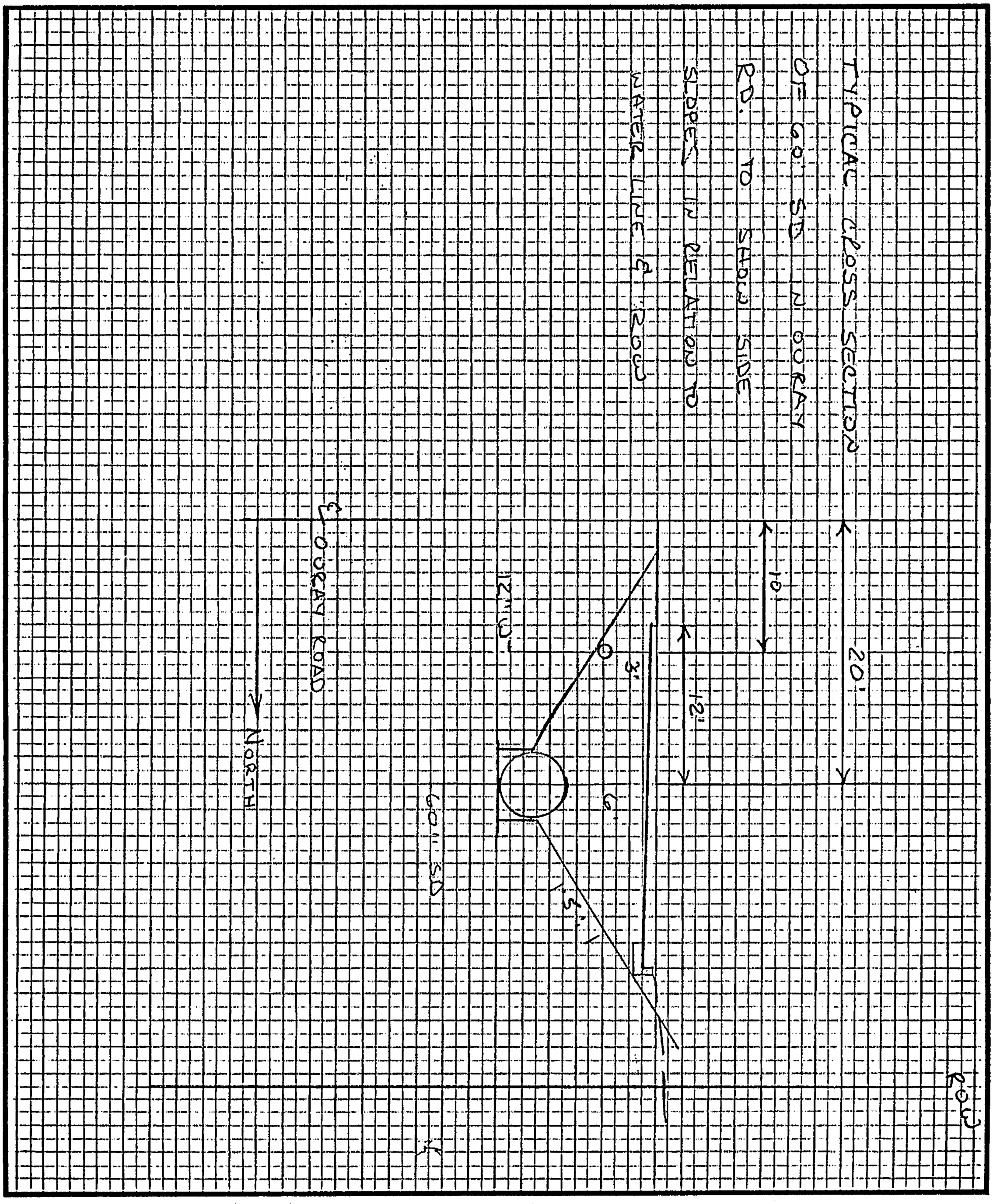
☐ ALBUQUERQUE, NEW MEXICO
☐ KEMMERER, WYOMING

COMMENT RESPONSE SHEET

PROJECT SAO 215 OURAY RD. -3093
JOB NUMBER 0690585 SHEET 3 OF 3
CALCULATED BY Sheila DATE 10 Nov 86
CHECKED BY _____ DATE _____



per comment No. 13 Sheet No. 3

Greiner

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

November 24, 1986

Mr. Jesse Ortiz
Engineering Division
Public Works Department
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Addendum to SAD 215 Ouray Storm Drain from Unser Boulevard to Ronda de Lechusas

Dear Mr. Ortiz:

We are sending you an addendum to the "Preliminary Design Information" for Special Assessment District No. 215, dated August 18, 1986. An addendum is necessary due to the inclusion of the storm drain outfall system within the Ouray Road right-of-way. The 60 inch storm drain was added to SAD 215 subsequent to the Preliminary Design Information Report.

If you have any questions regarding this addendum, please call.

Sincerely,

GREINER ENGINEERING

Rick Beltramo

Rick Beltramo, P.E.
Project Engineer

RB:tw

Enclosures

cc: Steve Boberg, Project Engineer, Utility Design Section
Lee Lunsford, Special Assessment Engineer
Billy Goolsby, City Hydrologist, Hydrology Section

Job No. 0690585

FIRST ADDENDUM

TO

PRELIMINARY DESIGN INFORMATION

SPECIALL ASSESSMENT DISTRICT

NUMBER 215

INTRODUCTION

The section of Unser Boulevard from Ladera Drive to Ouray Road including 98th Street is to be improved under Special Assessment District No. 215. These improvements include paving, storm drainage and utilities. As part of the storm drainage, a storm sewer outfall system has been added. The storm drain is located within the Ouray right-of-way, starting at Unser Boulevard heading east approximately 2200 ft. and outfalling to an existing channel.

Following are the design concepts for the Ouray Storm Drain System.

DESIGN REQUIREMENTS

A meeting was held with City of Albuquerque Hydrology Section to determine the design requirements the Ouray Storm Drain would have to meet. As a result of meetings and subsequent follow-up telephone conversations the following items were agreed upon.

1. The City of Albuquerque will allow full developed discharge from El Rancho Atrisco Tracts 4X, 6X, and 7X. The outfall to the Ouray System will include almost this entire area. The only exceptions are a part of Unser Boulevard right-of-way which crosses the northwest corner of the basin and the section of land west of it. The other exception is the 200 foot PNM easement at the far east edge of the property which drains directly to the City of Albuquerque drainage channel. Design of the Ouray System is to be such that it can accommodate the full developed runoff plus the offsite flows from the west.

2. The Master Plan covering the area, entitled Drainage Plan for Volcano Business Park for Westland Development company, will be used.

3. Flows from Tracts 4X, 6X and 7X will be determined by the Rational Method based on masterplanned land use and densities. A conservative approach will be taken in order to insure adequate downstream capacity for the full developed outfall. The analysis will not serve as a drainage report for Tracts 4X, 6X and 7X, but only to properly size the Ouray Storm Drain. Future development of Tracts 4X, 6X and 7X will require the proper submittals and reviews at the appropriate time. The hydrological calculations will be submitted for review along with the design calculations for the hydraulics. This information will be presented as an addendum to the SAD 215 Drainage Report.

4. Off-Site Flows emptying into the system from Unser Boulevard and Ouray have been determined in the "SAD 215 Drainage Report".

5. The Ouray System will be designed to carry the above mentioned flows. No stub outs will be provided for drainage from Tracts 4X, 6X and 7X. The necessary storm drain improvements needed to drain these parcels will be designed and constructed at the appropriate times. These improvements will be the owner's responsibility.

6. The City owned and maintained channel at the eastern end of the SAD 215 project will be an acceptable outfall for the storm drain system. No channel design hydrology or hydraulics is available. The downstream capacity of the channel will be analyzed. The capacity of the five 42 inch culverts under Ronda de Lechusas will also be analyzed since these may be the controlling structures in the system. Hydraulics analysis concerning the structure outlet to the channel will also be necessary.

HYDROLOGY

Based on the above items a drainage report was prepared to determine flows to the Ouray System and was submitted to the City Hydrology Section as "First Addendum to Drainage Analysis Report Special Assessment District No. 215/Unser Boulevard and 98th Street". Results are summarized in Exhibit 2 of that report. The 100-year storm design flow to the Ouray Storm Drain is 360 cfs. A 60 inch reinforced concrete pipe was necessary to carry this flow. The 100-year storm design flow to the City owned and maintained channel is 430 cfs.

DESIGN DETAILS

The 60 inch pipe will be located within the Ouray Road right-of-way 20 feet north of centerline. The north side of the street was choosen because the south side has an existing arterial pavement section. The 20 foot dimension was selected because this would locate the storm drain in the division of the proposed future two lane section. A waterline is also located within the right-of-way, 10 feet north of centerline. This design will place the storm drain 10 feet away from the waterline. This will be far enough to allow construction of the storm drain without distrubing the waterline and will contain the fill slopes within the right-of-way of Ouray.

Beveled pipe will be used for curvilinear sections of pipe. The deflection required for each of the two curves encountered are too great for standard pipe. An extra manhole was considered but this option would not work due to space requirements. The beveled pipe option was also found to be cost effective.

The controlling factors in the pipe slope were the manhole in Unser Boulevard at the upstream end and the existing City drainage channel at the downstream end. The slope out of the channel is fairly flat, 0.47%. This was necessary because of existing topography and the required 4 foot cover at the preceeding manhole. This does place the pipe in pressure flow for a majority of the reach. A straight slope of 1.97% was used from the manhole just upstream of the channel to the beginning of the line at Unser Boulevard. With the slope of 1.97% the pipe unseals approximately 230 feet downstream of Unser Boulevard.

The pipe approximately follows existing ground with a minimum cover of 6 feet. It was assumed the future roadway will follow existing ground within ± 2 feet.

The last section of 60 inch pipe approximately parallels an existing 42 inch pipe which empties into the drainage channel. The 42 inch pipe carries the runoff from Volcano Business Park, a development south of Ouray Road. The 42 inch had insufficient capacity to carry the extra flow from the Ouray System so it was not possible to interconnect the two systems.

A rip rap outlet will be constructed at the pipe outlet in the existing drainage channel. This structure will be 150 feet long and includes a rip rap energy dissipator. A three foot deep basin will be formed by dropping at a 2ft:1V slope from the pipe outlet then flat approximately 25 feet where the slope will go back up at at 2ft:1V slope for three vertical feet. See the attached sketch, Exhibit 1. As shown on the sketch, the flow is heading directly for the opposite side of the channel. To protect the channel side slope rip rap will be placed. The rip rap will cover the entire width of the channel. Along the north side a 1 to 1 side slope will be used. The steeper side slope will help in redirecting the flow. The design of the energy dissipator is based on the Federal Highway Administration (FHWA) Hydraulic Design Circular No. 14. This method offers the most economic and maintanence solution to the outfall problems.

APPENDIX

Design Calculations

Exhibit A, Rip Rap Energy Dissipator

Engineer's Estimate

Greiner Engineering

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- ☐ ALBUQUERQUE, NEW MEXICO
- ☐ KEMMERER, WYOMING

PROJECT SAD 215 OUTLET
JOB NUMBER 10.405.85 SHEET 2 OF 2
CALCULATED BY JB DATE 11/7/86
CHECKED BY _____ DATE _____

DAC CHANNEL DESIGN

TRAP. CHANNEL SECTION - from as-built
W=25' S=0.0070 ft/ft SS=3:1 (n=0.030) d=3.75'
Q=1117 cfs V=8.2 fps dc=3.4 ft V=9.24 fps
dn>dc ∴ subcritical flow

DAC CHANNEL CHARACTERISTICS BASED ON DESIGN FLOW:
Q100=1130 cfs (See Hydrology Calcs)
dn=(4.22) V=(6.73) dc=1.83 ft V_c=7.23
dn>dc ∴ subcritical flow

DAC CHARACTERISTICS OF CULVERTS
6 - 42" x 53' Pipe culverts
Max. depth behind culvert = 6 ft
INLET CONTROL Q=550 x 6 = 450 cfs
OUTLET CONTROL H_o=2.23 HW=6 LS_o=85 x .007 = 0.60
(Headwater Depth) (135 cfs)
H_o = HW + h_s - LS_o
6 = H + 2.23 - .6
H = 4.37 ∴ Q = 115 cfs
(Q_TOT = 5 x 115 = 575 cfs)
H_o = 2.61 ⇒ H = 4.00 Q = 110
H_o = 2.5 ⇒ H = 4.10 Q = 110
INLET CONTROL GOVERNS WITH 550 cfs > 130 cfs
No over-topping occurs for the 100yr storm.

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- ☐ KEMMERER, WYOMING

PROJECT SAD 215, Ouray
JOB NUMBER 06305 85 SHEET 2 OF 2
CALCULATED BY JB DATE 11/10/86
CHECKED BY _____ DATE _____

Sec. Depth Required for Design Flow

Q = 430 cfs 430/5 = 86 cfs per culvert

Inlet Control Depth HW = 1.55 × 3.5 = 5.43 ft

Outlet Control Depth HO = H + Ho − LS₀
= 2.2 + 2.03 − .6
↑ from nomograph
HO = 3.83 ft

Tailwater Depth = 3.5 ft

EXHIBIT 2

HYDROLOGY — PROPOSED CONDITIONS

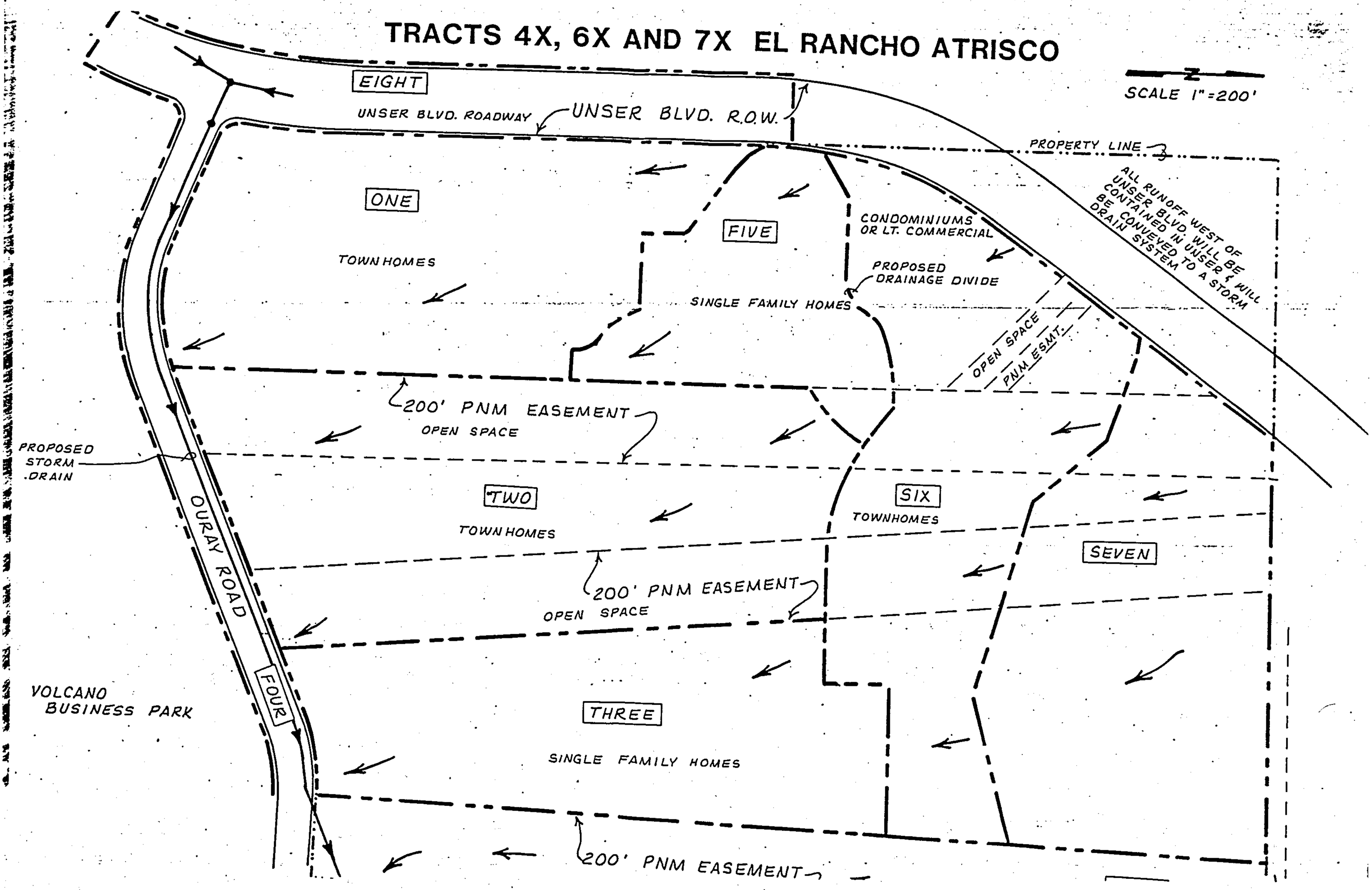
BASIN	AREA AC.	RUNOFF COEF. C	C x A	Tc min.	I100 in./hr.	Q10 cfs	Q100 cfs	COMMENTS
ONE	15.69	0.75	11.77	8.8	4.77	37	56	TOWNHOMES
TWO	7.73	0.75	5.80					TOWNHOMES
	13.86	0.30	4.16					OPEN SPACE
	21.59		9.96	9.8	4.77	31	47	
THREE	13.80	0.50	6.90	11.9	4.36	20	30	SINGLE FAMILY
FOUR	3.90	0.95	3.71	2.0	4.77	12	18	OURAY ROAD RIGHT OF WAY
FIVE	6.95	0.50	3.48	10	4.77	11	17	SINGLE FAMILY
SIX	7.58	0.75	5.68					TOWNHOMES
	5.48	0.30	1.64					OPEN SPACE
	3.44	0.80	2.75					CONDOMINIUMS OR COMMERCIAL
	16.50		10.07	10	4.77	32	48	
SEVEN	4.60	0.30	1.38					PNM EASEMENT AND OPEN SPACE
	11.21	0.75	8.41					TOWNHOMES AND SINGLE FAMILY
	15.81		9.79	10	4.77	31	47	
EIGHT	12.90	0.95	12.26	10	4.77	39	58	UNSER BLVD. RIGHT OF WAY
E*	107.60	0.41	44.19	33.3	2.52	74	111	WEST OF UNSER BLVD.
G*	163.00	0.51	83.13	66.7	1.77	97	147	WEST OF UNSER BLVD.
H*	22.40	0.45	10.16	10	4.65	31	47	WEST OF UNSER BLVD.
TOTAL	384.33		205.42	68.7	1.74	236	357	TOTAL AREA DRAINING TO OURAY ROAD STORM DRAAIN
TOTAL TO CHANNEL	10.93	0.30	3.28					AREA NINE - PNM EASEMENT/OPEN SPACE
	47.20	0.75	37.29					VOLCANO BUSINESS PARK **
	458.27		245.99	68.7	1.74	283	428	TOTAL AREA DRAINING TO C.O.A. CHANNEL - INCLUDES ALL OF ABOVE

* SEE DRAINAGE REPORT FOR S.A.D. 215 UNSER BLVD. AND 98TH STREET

** DRAINAGE AREAS AND "C" VALUES WERE OBTAINED FROM THE DRAINAGE PLAN FOR VOLCANO BUSINESS PARK

INFORMATION FOR THIS TABLE WAS OBTAINED FROM THE DRAINAGE REPORT FOR TRACTS 4X, 6X AND 7X EL RANCHO ATRISCO EXCEPT WHERE NOTED

TRACTS 4X, 6X AND 7X EL RANCHO ATRISCO



$h_v = \frac{V^2}{2g}$

$S_f = \left(\frac{Q}{K}\right)^2$

SUMMARY OF HYDRAULIC CALCULATIONS

CLOSED CONDUIT

BY: S Dell
DATE: 12 Nov 86
SHEET: 1 OF: 1

PROJECT: SAD 215 - Ouray Rd S.D.
LINE: Ouray Rd.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STATION	STRUCT	D	Q	A	V	K	S_f	L	Δ	JUNCTION D	JUNCTION θ	Len × S_f h_f	LOSSES h_b	h_j	h_{mh}	h_t	h_{misc}	Σ	E.G.	h_v	H.G.
													how much bend?								
21+47	outlet	~~60"~~	~~360~~	~~19.635~~	~~18.33~~	~~2604~~	~~.0191~~					assume	no	exit	losses				25.47	5.22	20.25
		60"	360	19.635	18.33	2604	.0191	367	21°49'			7.01	.53					7.54	25.47	5.22	20.25
17+80	MH														.261			.261	33.01	5.22	27.79
		60"	360	19.635	18.33	2604	.0191	425				8.12						8.12	33.27	5.22	28.05
13+55	MH														.261			.26	41.39	5.22	36.17
		60"	300	19.635	15.28	2604	.0133	450				5.97						5.97	41.65	5.22	36.43
9+05	MH														.18			.18	47.62	3.62	44.00
		60"	300	19.635	15.28	2604	.0133	450	41°			5.97	.49					6.46	47.80	3.62	44.18
4+55	MH														.18			.18	54.26	3.62	50.64
		60"	265	19.635	13.50	2604	.0104	456.5				4.75						4.75	54.44	3.62	50.82
0-01.49	MH																		59.19	2.83	56.36

← .85' depth of 60" pipe
100 yr wsel = 18.2 in Channel

— line goes to non-pressure flow
— MH & unser

Inv. El = 16.00

REMARKS:

MANNING'S n: _____

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☐ ALBUQUERQUE, NEW MEXICO
☐ KEMMERER, WYOMING

PROJECT [illegible]
JOB NUMBER [illegible] SHEET 1 OF 5
CALCULATED BY [illegible] DATE [illegible]
CHECKED BY _____ DATE _____

1) DETERMINE Y_o & V_o

$Q/D^{2.5} = 360/5^{2.5} = 6.44 = y_c$ $1/\sqrt{F_r}$

$T_w/D = 2.22/5 = 0.444$ 2.8 .562

$Y_o/D = Y_c > 5'$ Fig III-5

USE $Y_o = .85D = 4.25'$

$T_w/Y_o = 2.22/4.25 = 0.52$ 2.8 < 0.15 [OK]

Base Area = (Table III-2)

$d/D = .415$ $d = 4.25$ $A_o/D^2 = .715$ 17.79 $\Rightarrow A_o = 17.97$ ft²

Velocity at Brink $V_o = Q/A_o = 360/17.97 = 20.04$ fps 20.24

$V_o = \boxed{20.24}$ fps

2) DETERMINE Y_E

$Y_E = (A/2)^{1/2} = (17.97/2)^{1/2} = 3.00$ ft 2.98

3) DETERMINE F_E

$F_E = V_o/[g Y_E]^{1/2} = \boxed{20.24}/(32.2 \times 3)^{1/2} = 2.02$ ✓

4) SELECT d_{50}/Y_E

Try $1/4 = d_{50}$ $d_{50}/Y_E = 1/3 = .333$
Fig XI-2 $h_s/Y_E = 1.15$ $h_s = 1.15 \times 3 = 3.45$
note h_s too small (<5) for $h_s = 5.0$ ft

Try 1.5 ft $= d_{50}$ $d_{50}/Y_E = 1.5/3 = 0.50$
$h_s/Y_E = 1.35$ $h_s = 4.05$

Try 2 ft $= d_{50}$ $d_{50}/Y_E = 2/3 = .667$
$h_s/Y_E = 1.55$ $h_s = 4.65$

Check $T \le \frac{h_s}{d_{50}} = \frac{4.05}{2} = 2.03 \le 4$ [OK]

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☐ ALBUQUERQUE, NEW MEXICO
☐ KEMMERER, WYOMING

PROJECT OURAY S.D.
JOB NUMBER [illegible] SHEET 2 OF 5
CALCULATED BY [illegible] DATE 11/8/86
CHECKED BY _____ DATE _____

5) Dissipator

$L_5 = (10)(h_2) = 10 \times 4 = 40$ ft

or

$L_5 = (3)(W_5) = 3 \times 5 = 15$ ft use 40 ft = L_5

$L_5 = 15 h_5 = 15 \times 4 = 60$ ft or

$L_5 = 4 W_5 = 4 \times 5 = 20$ ft use $L_5 = 60$ ft

$d_{50} = 2$ ft stone

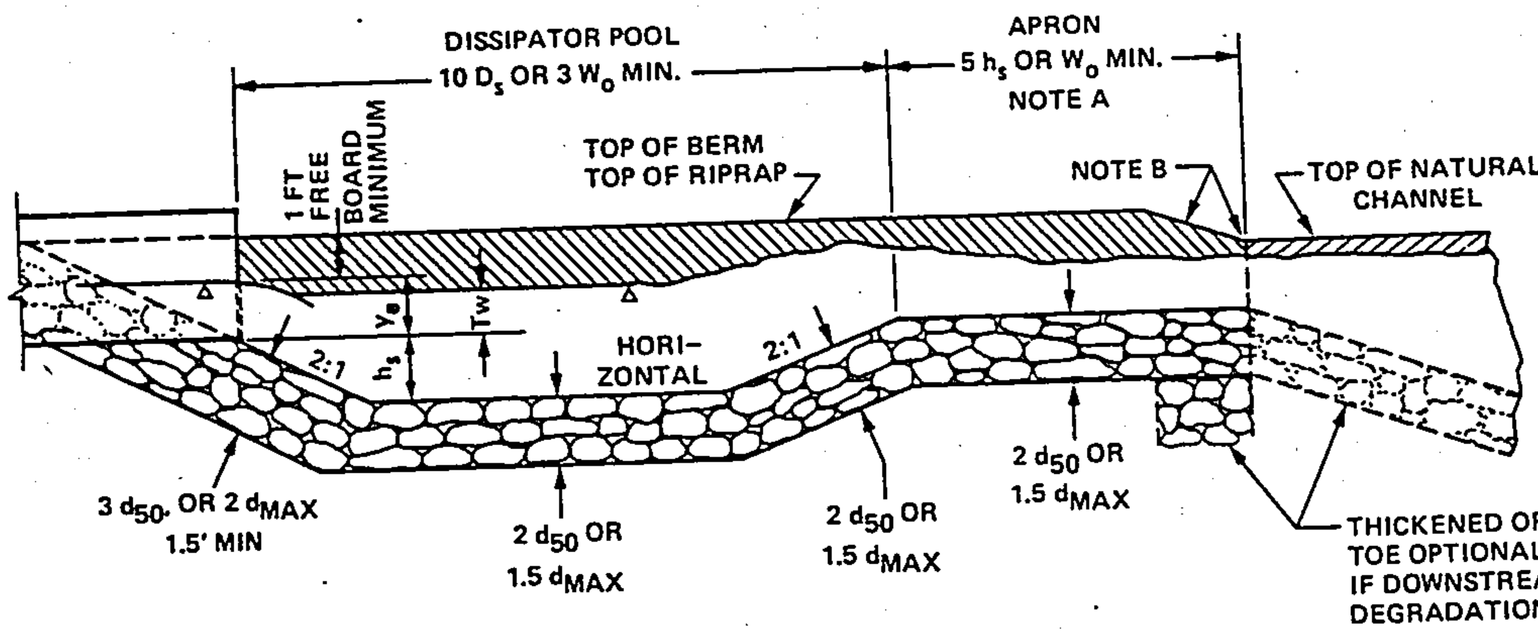
Design based on dumped rip-rap.

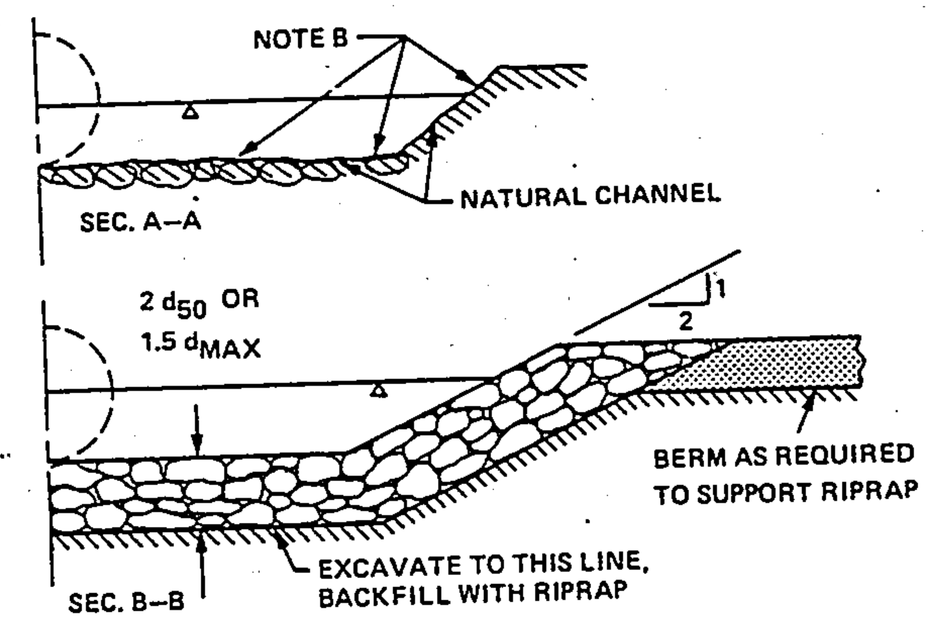
Design values can be reduced for protected rip-rap such as wire tied and or grouted.

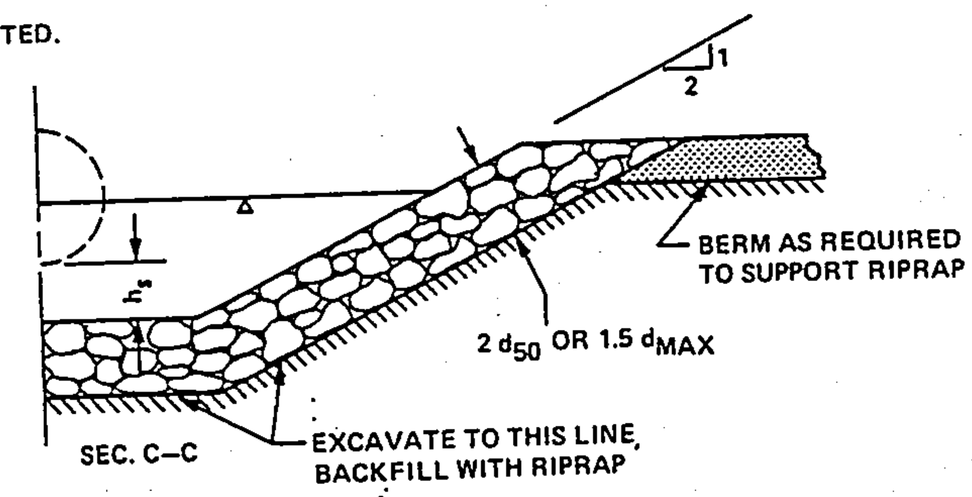
Use grouted Rip Rap with a 3 ft basin depth.

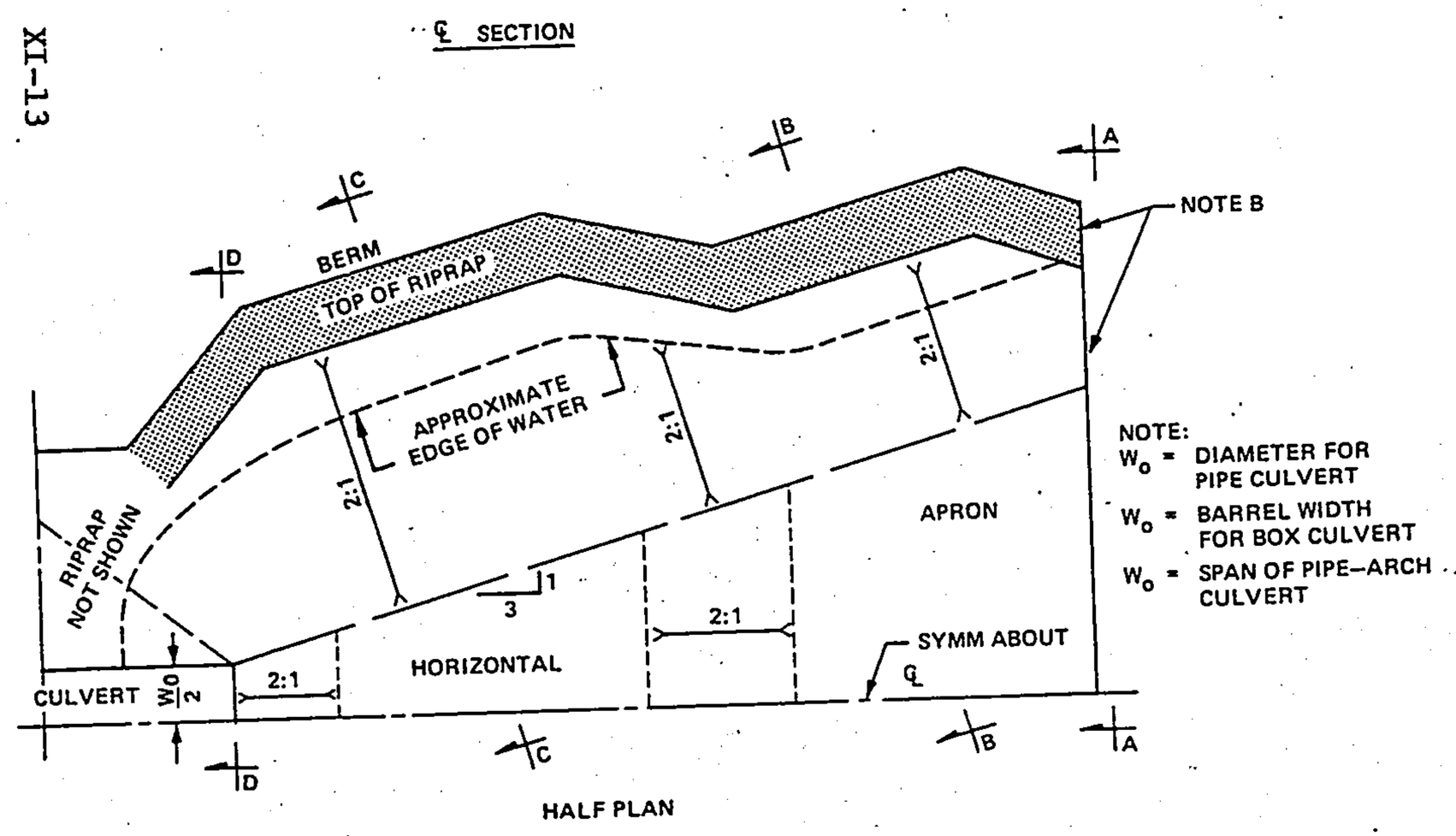
NOTE A – IF EXIT VELOCITY OF BASIN IS SPECIFIED, EXTEND BASIN AS REQUIRED TO OBTAIN SUFFICIENT CROSS–SECTIONAL AREA AT SECTION A–A SUCH THAT Q_{des}/(CROSS SECTION AREA AT SEC. A–A) = SPECIFIED EXIT VELOCITY.

NOTE B – WARP BASIN TO CONFORM TO NATURAL STREAM CHANNEL. TOP OF RIPRAP IN FLOOR OF BASIN SHOULD BE AT THE SAME ELEVATION OR LOWER THAN NATURAL CHANNEL BOTTOM AT SEC. A–A.









NOTE:
W_o = DIAMETER FOR PIPE CULVERT
W_o = BARREL WIDTH FOR BOX CULVERT
W_o = SPAN OF PIPE–ARCH CULVERT

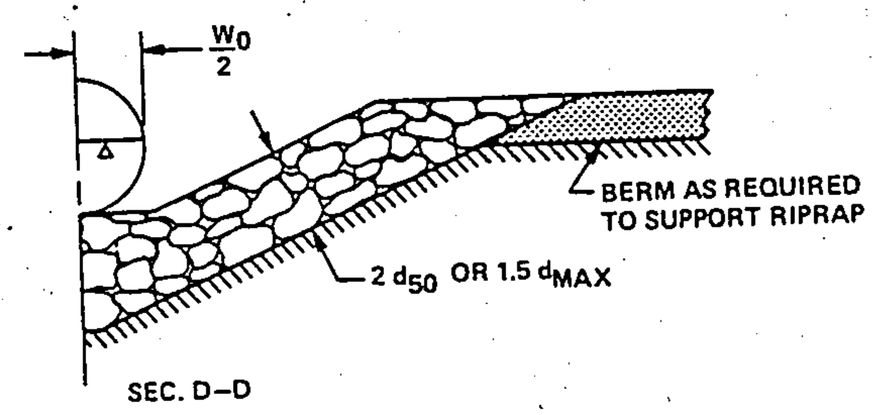


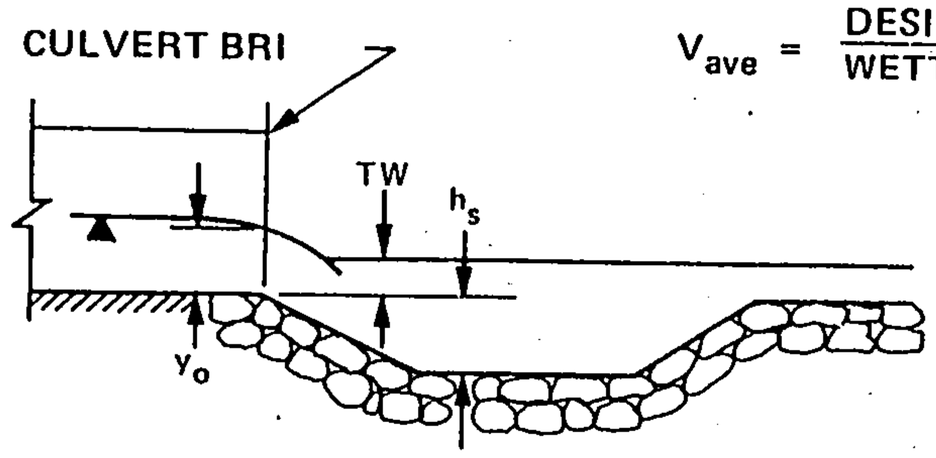
FIGURE X1–1. DETAILS OF RIPRAPPED CULVERT ENERGY BASIN

TABLE XII-I DISSIPATOR LIMITATIONS

DISSIPATOR TYPE	Froude number Fr	Allowable Debris			Tailwater TW	Special Considerati
		Silt Sand	Boulders	Floating		
Free Hydraulic Jump	>1	H	H	H	Required	
CSU Rigid Boundary	<3	M	L	M	-	
Tumbling Flow	>1	M	L	L	-	$4<S_o<25$
Increased Resistance	-	M	L	L	-	Check Outlet Control HW
USBR Type II	4 to 14	M	L	M	Required	
USBR Type III	4.5 to 17	M	L	M	Required	
USBR Type IV	2.5 to 4.5	M	L	M	Required	
SAF	1.7 to 17	M	L	M	Required	
Contra Cost	<3	H	M	M	<0.5D	
Hook	1.8 to .3	H	M	M	-	
USBR Type VI	-	M	L	L	Desirable	Q<400 cfs, V<50 fps
Forest Service	-	M	L	L	Desirable	D<36 inch
Drop Structure	<1	H	L	M	Required	Drop< 15ft.
Manifold	-	M	N	N	Desirable	
Corps Stilling Well	-	M	L	N	Desirable	
Riprap	<3	H	H	H	-	

Note:
N=none
L=low
M=moderate
H=heavy

4/5



$$V_{ave} = \frac{\text{DESIGN DISCH}}{\text{WETTED AREA AT BRINK OF CULVERT}} \quad \frac{E-Q}{}$$

d_{50} = THE MEDIAN SIZE OF ROCK BY WEIGHT. ROUNDED ROCK OR ANGULAR ROCK.

Y_e = EQUIVALENT BRINK DEPTH

= BRINK DEPTH FOR BOX CULVERT

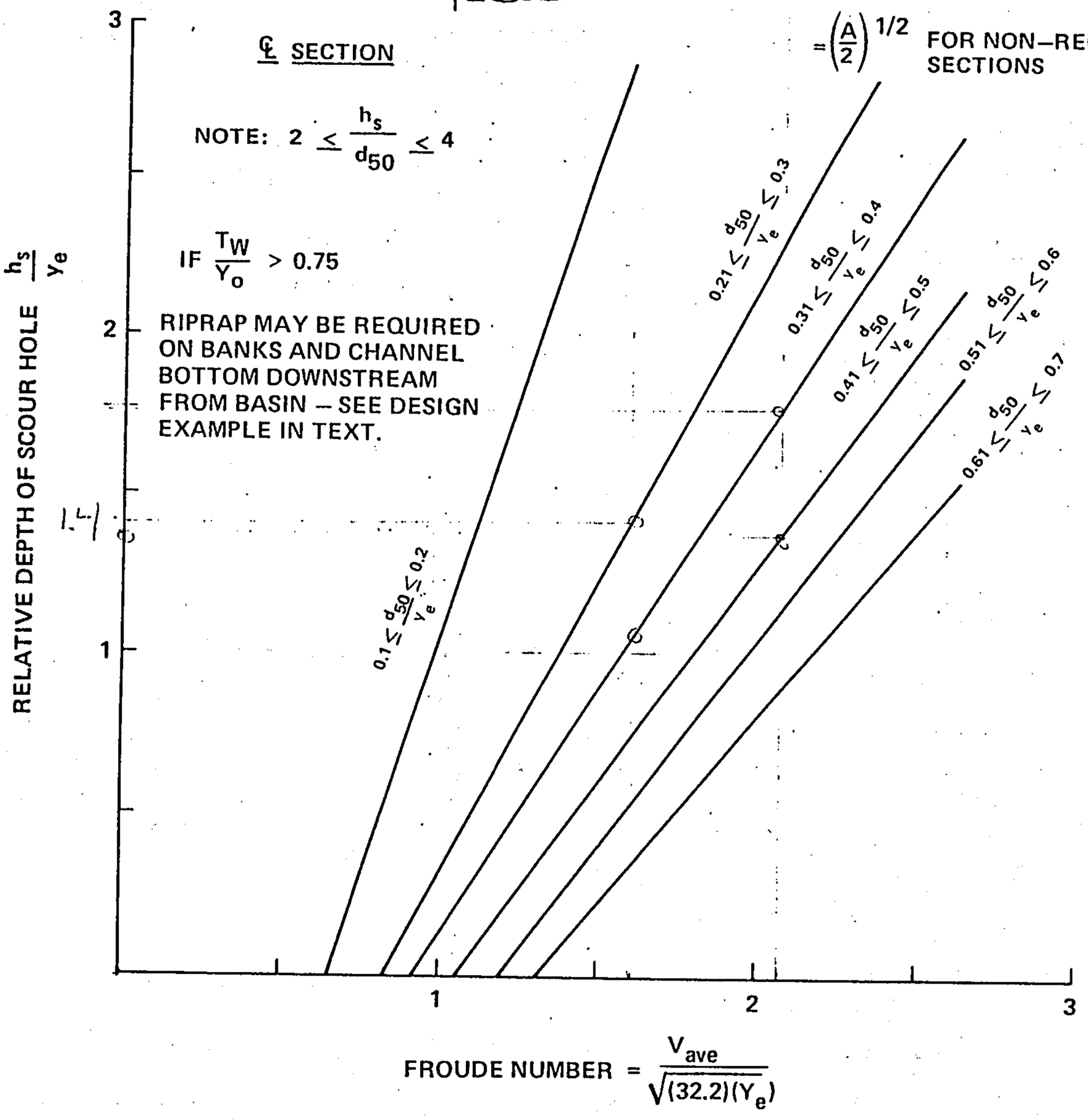
$= \left(\frac{A}{2}\right)^{1/2}$ FOR NON–RECTANGULAR SECTIONS

℄ SECTION

NOTE: $2 \leq \frac{h_s}{d_{50}} \leq 4$

IF $\frac{T_W}{Y_o} > 0.75$

RIPRAP MAY BE REQUIRED ON BANKS AND CHANNEL BOTTOM DOWNSTREAM FROM BASIN – SEE DESIGN EXAMPLE IN TEXT.



$$\text{FROUDE NUMBER} = \frac{V_{ave}}{\sqrt{(32.2)(Y_e)}}$$

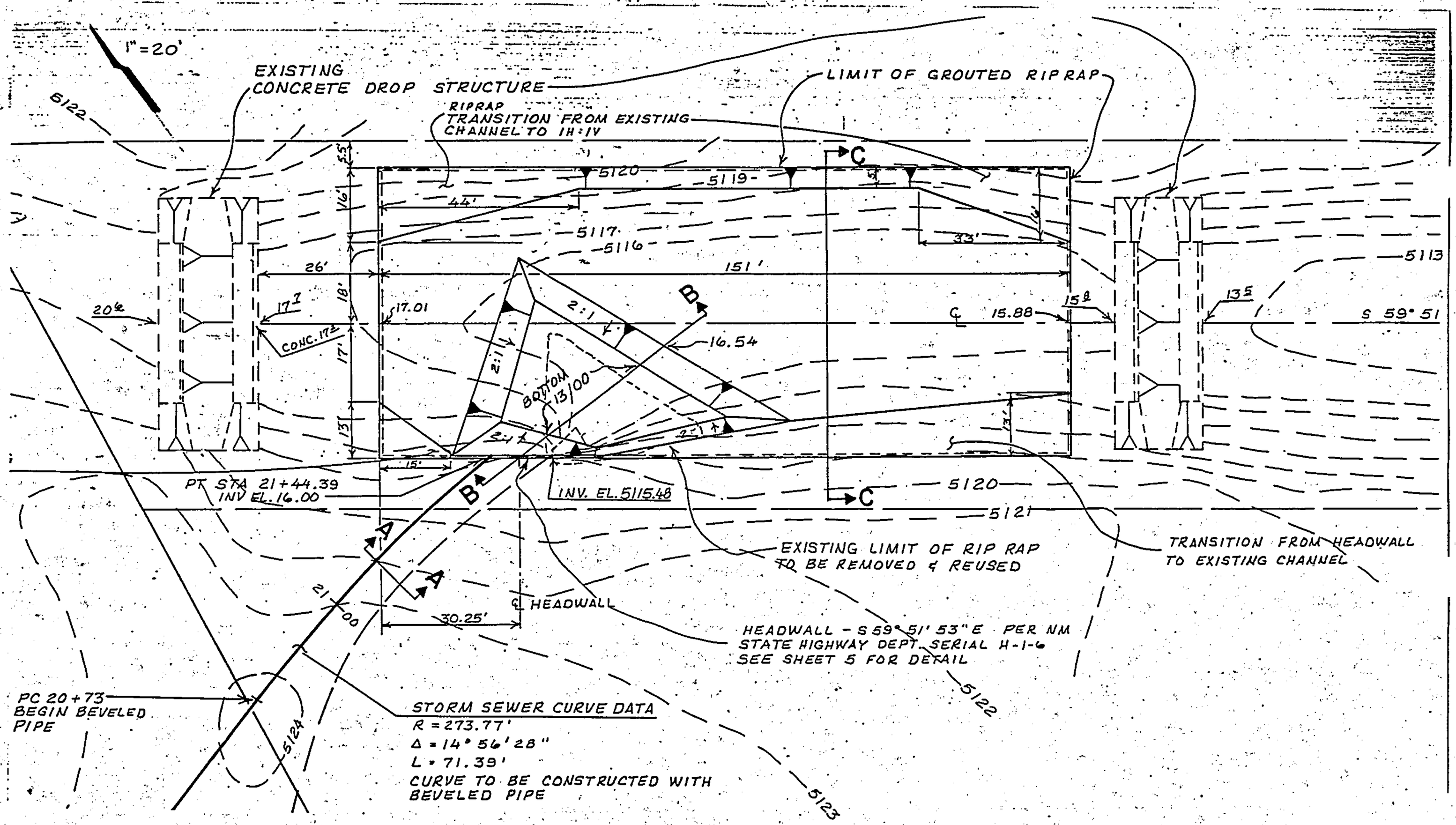
FIGURE X1–2. RELATIVE DEPTH OF SCOUR HOLE VERSUS FROUDE NUMBER AT BRINK OF CULVERT WITH RELATIVE SIZE OF RIPRAP AS A THIRD VARIABLE

$\frac{h_s}{Y_e} = 1.4$

$h_s = 1.4 \times 4.5$

3.0

EXHIBIT 1


1" = 20'
EXISTING CONCRETE DROP STRUCTURE
LIMIT OF GROUTED RIPRAP
RIPRAP TRANSITION FROM EXISTING CHANNEL TO 1H:1V
5122
5120
5119
5117
5116
5113
44'
33'
26'
151'
16'
18'
17'
13'
5.5'
20.62
17.7
CONC. 17.2
17.01
2:1
16.54
BOTTOM 13.00
15.88
15.8
13.5
S 59° 51
PT STA 21+44.39
INV EL. 16.00
INV. EL. 5115.48
15'
30.25'
HEADWALL
21.00
5124
5123
EXISTING LIMIT OF RIP RAP TO BE REMOVED & REUSED
TRANSITION FROM HEADWALL TO EXISTING CHANNEL
HEADWALL - S 59° 51' 53" E PER NM STATE HIGHWAY DEPT. SERIAL H-1-6 SEE SHEET 5 FOR DETAIL
PC 20+73 BEGIN BEVELED PIPE
STORM SEWER CURVE DATA
R = 273.77'
Δ = 14° 56' 28"
L = 71.39'
CURVE TO BE CONSTRUCTED WITH BEVELED PIPE

SPECIAL ASSESSMENT DISTRICT NO. 215
OURAY STORM DRAIN FROM UNSER BOULEVARD TO RONDA DE LECHUSAS
PROJECT NO. 3093

ENGINEER'S ESTIMATE

ITEM NO	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
K- 7	60" RCP, Class III, complete in place, in trench.	LF	2100.00	94.00	197400.00
K- 26	Portland Cement Reinforced Conc. for headwalls, retaining walls and general usage, in place.	CY	10.50	307.14	3224.97
K- 30	Grouted riprap, complete in place	CY	600.00	90.00	54000.00
K- 36	Trenching, backfilling, and compaction for 42" and over pipe, 8' to 14' trench depth.	LF	2100.00	18.04	37884.00
K- 44	4' Dia. Type "C" or "E" MH, 10' to 14' depth.	EA	4.00	1165.00	4660.00
K- 45	Type "C" or "E" 8' Dia. MH, cost to be added to the price of 4' Dia. MH of corresponding depth.	VF	48.00	180.00	8640.00
K- 46	Removal and replacement of wire-enclosed or grouted riprap	CY	70.00	35.00	2450.00
K- 47	Removal and disposal of concrete drainage structure	CY	1.00	41.91	41.91
K- 48	Crushed gravel base course 6" thick, complete in place	SY	1200.00	3.61	4332.00

ITEM NO	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	AMOUNT
K- 49	Excavation, backfill and compaction used in construction of earthen channels	CY	240.00	3.20	768.00
K- 50	Excavation, backfill, and compaction used in construction of structures(headwall)	CY	135.00	7.71	1040.85

SUBTOTAL OF BID ITEMS	$314,441.73
20% CONTINGENCY	$62,888.35
TOTAL	$377,330.08

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

11/21/86
DATE

PLANNING & PROGRAMMING

/___/ Comments received
/___/ N.A.

CITY ENGINEERS PROJECT NO. 3093

STANDARD REVIEW COMMENT SHEET

SHEET _____ OF _____

TO: Joe: Andre Houte / Greiner Eng. /CHAIRMAN DRC - APPLICANT
(USER DEPT./DIVISION)

FROM: Billy Goolsby /HYDROLOGY/ENGINEERING
(REVIEWER/REVIEW DEPT./DIVISION)

PROJECT: SAD 215 Ouray Storm Drain Facility

PROJECT DESCRIPTION STATUS: ☐ Pre-design, ☐ Prel., ☒ Final

FOR REVIEWER DEPT/DIVISION			FOR USER DEPT.	
PAGE NO.	COM. NO.	COMMENT	A/D	REMARK
		I have not been provided any of the background information relating to this project nor, have I received any design hydraulic calculations to verify the adequecy of this system. Consequenty, I cannot provide any comments or approvals for the above referenced request.		

Greiner

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

November 20, 1986

RECEIVED
NOV 25 1986
HYDROLOGY SECTION

Mr. Billy Goolsby
City of Albuquerque
Hydrology Section
P. O. Box 1293
Albuquerque, NM 87103

Dear Mr. Goolsby:

This letter is to confirm the results of our meeting on October 13, 1986 and subsequent conversations to determine the design criteria for the proposed storm drain system to be built in the Ouray Road right of way under contract of SAD 215. The meeting was attended by yourself, Rick Beltramo and Sheila Dell of Greiner Engineering Sciences, Inc.

Following are the items agreed to:

1. The City of Albuquerque will allow full developed discharge from El Rancho Atrisco Tracts 4X, 6X, and 7X. The outfall to the Ouray system will include almost this entire area. The only exceptions are a part of Unser Blvd. right-of-way which crosses the northwest corner of the basin and the section of land west of it. The other exception is the 200 foot PNM easement at the far east edge of the property which drains directly to the City of Albuquerque drainage channel. Design of the Ouray system is to be such that it can accommodate the full developed runoff plus the offsite flows from the west.

2. The Master Plan covering the area, entitled Drainage Plan for Volcano Business Park for Westland Development company, will be used.

3. Flows from Tracts 4X, 6X and 7X will be determined by the Rational Method based on masterplanned land use and densities. A conservative approach will be taken in order to insure adequate downstream capacity for the full developed outfall. The analysis will not serve as a drainage report for Tracts 4X, 6X and 7X, but only to properly size the Ouray storm drain. Future development of Tracts 4X, 6X and 7X will require the proper submittals and reviews at the appropriate time. The hydrological calculations will be submitted for review along with the design calculations for the hydraulics. This information will be presented as an addendum to the SAD 215 Drainage Report.

4. Off-Site Flows emptying into the system from Unser Boulevard and Ouray have been determined in the "SAD 215 Drainage Report".

5. The Ouray system will be designed to carry the above mentioned flows. No stub outs will be provided for drainage from Tracts 4X, 6X and 7X. The necessary storm drain improvements needed to drain these parcels will be designed and constructed at the appropriate times. These improvements will be the owner's responsibility.

Greiner

6. The City owned and maintained channel at the eastern end of the SAD 215 project will be an acceptable outfall for the storm drain system. No channel design hydrology or hydraulics is available. The downstream capacity of the channel will be analysed. The capacity of the five 42 inch culverts under Ronda de Lechusas will also be analysed since these will be the controlling structure in the system. Hydraulics concerning the structure outlet to the channel will be necessary as well.

Attached is the addendum to the "SAD 215 Drainage Report". The data presented is based on conditions stated in this letter. As you know the design of SAD 215 and Ouray are on tight schedules. At this time we have submitted the design of the storm drain to the City Engineering section based on the information stated. If you have any questions, additions or disagree with any of the information provided in this letter, please call. A timely response would be greatly appreciated.

Sincerely,

GREINER ENGINEERING

Rick Beltramo

Rick Beltramo
Project Engineer

Enclosures: First Addendum to "Drainage Analysis Report. Special Assessment District No. 215/Unser Boulevard and 98th Street"

cc: Lee Lunsford, Special Assessment Engineering
Steve Boberg, Project Engineer, Utility Design Section
Jesse Ortiz, Project Engineer, Transportation Section

RB:kw

Greiner

FIRST ADDENDUM TO

"DRAINAGE ANALYSIS REPORT - SPECIAL ASSESSMENT

DISTRICT NO. 215/UNSER BOULEVARD & 98TH STREET

OURAY ROAD STORM DRAIN HYDROLOGY

Following is a discussion of the method used to calculate the design flow for the Ouray Road Storm Drain. It was necessary to determine a developed flow rate in order to design size the storm drain system. Runoff is intercepted into the system from 2 major sources. The largest source is the offsite flow from areas west of, and including Unser Boulevard. These flow rates are taken from the "Drainage Analysis Report for SAD 215 Unser Boulevard and 98th Street". A large tract of land to the north constitutes the second major source of runoff to the system. Detailed development plans have not been made for this property; however, a conceptual drainage report has been done titled "Drainage Report for Tracts 4X, 6X and 7X, El Rancho Atrisco". The property south of Ouray is drained by an internal storm drain system and no runoff drains to the Ouray system.

Hydrology is based on the Rational Method. While this method is somewhat rough, it is also conservative. This is necessary due to the assumptions that are required at this time.

Greiner

1. Plate 2 from the El Rancho Atrisco Drainage Report was used as a base map. Drainage areas were revised to allow approxmiately 39.3 acres more (Areas 5, 6 and 7) to drain south to the storm drain than were considered in the El Rancho Atrisco Report. This means that almost the entire area, Tracts 4X, 6X and 7X, will be draining to the Ouray Road Storm Drain System. The only exceptions are a portion of land in the northwest corner of the basin, which includes a part of Unser Blvd., and a triangular section of land west of Unser Blvd. The other exception is the 200 foot PNM easement at the far east edge of the property. The 200 foot easement drains directly into the City of Albuquerque drainage channel. See attached Exhibit 1 for revised areas.

   This is a conservative approach since it is very likely some flow in Areas 6 and 7 will actually drain north to the Rinconada Channel in the developed condition. However it is possible they will drain to the Ouray system and this design accounts for this occurance. Inclusion of these flows did not raise the need for a larger diameter storm drain.

2. "C" values were determined from land use as described in the El Rancho Atrisco Report and the City's most recent "C" value guidelines.

3. Offsite flows from the west were obtained from the Drainage Analysis Report for SAD 215 Unser Boulevard and 98th Street.

4. Time of Concentration was calculated by adding the Time of Concentration of the longest offsite basin, 66.7 minutes, to the Time of Concentration along Ouray Road, 2 minutes, resulting in 68.7 minutes.

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5. All areas were then added, a composite C was determined, and the 100 year- and 10 year-flows were calculated using Mannings equation. One flowrate was determined for the entire storm drain drainage basin. This will be used to design the storm drain line.

6. The outfall for the Ouray System is the City drainage channel as shown on Exhibit 1. The total capacity of the channel was determined from as-built drawings to be 1,117 cfs at a velocity of 8.2 fps. The revised inflow to the channel was determined to be 430 cfs after full development. This includes the Ouray System, the PNM easement, and the development south of Ouray called Volcano Business Park and it is well within the capacity of the channel.

There are five 42" x 85' pipe culverts built under Ronda de Lechusas Street which are the controlling structures in the system. The culvert capacity is 550 cfs, therefore the culverts are able to carry the 100 year flow of 430 cfs. The street section over the culverts is built as a dip section. In the event that the culverts fail or a storm flow greater than the 550 cfs occur, the street would function as an overflow weir. Therefore, the storm runoff would be confined to the streets and channel easement. In any event, surrounding properties will not be subject to flood damage.

Greiner

Attached are the design calculations regarding channel capacities and the culvert capacities.

Design flow information has been compiled in the attached table, Exhibit 2.

EXHIBIT 2

HYDROLOGY — PROPOSED CONDITIONS

BASIN	AREA AC.	RUNOFF COEF. C	C x A	Tc min.	I100 in./hr.	Q10 cfs	Q100 cfs	COMMENTS
ONE	15.69	0.75	11.77	8.8	4.77	37	56	TOWNHOMES
TWO	7.73	0.75	5.80					TOWNHOMES
	13.86	0.30	4.16					OPEN SPACE
	21.59		9.96	9.8	4.77	31	47	
THREE	13.80	0.50	6.90	11.9	4.36	20	30	SINGLE FAMILY
FOUR	3.90	0.95	3.71	2.0	4.77	12	18	OURAY ROAD RIGHT OF WAY
FIVE	6.95	0.50	3.48	10	4.77	11	17	SINGLE FAMILY
SIX	7.58	0.75	5.68					TOWNHOMES
	5.48	0.30	1.64					OPEN SPACE
	3.44	0.80	2.75					CONDOMINIUMS OR COMMERCIAL
	16.50		10.07	10	4.77	32	48	
SEVEN	4.60	0.30	1.38					PNM EASEMENT AND OPEN SPACE
	11.21	0.75	8.41					TOWNHOMES AND SINGLE FAMILY
	15.81		9.79	10	4.77	31	47	
EIGHT	12.90	0.95	12.26	10	4.77	39	58	UNSER BLVD. RIGHT OF WAY
E*	107.60	0.41	44.19	33.3	2.52	74	111	WEST OF UNSER BLVD.
G*	163.00	0.51	83.13	66.7	1.77	97	147	WEST OF UNSER BLVD.
H*	22.40	0.45	10.16	10	4.65	31	47	WEST OF UNSER BLVD.
TOTAL	~~384.33~~ 400.14		205.42	68.7	1.74	236	357	TOTAL AREA DRAINING TO OURAY ROAD STORM DRAAIN
TOTAL TO CHANNEL	10.93	0.30	3.28					AREA NINE - PNM EASEMENT/OPEN SPACE
	47.20	0.75	37.29					VOLCANO BUSINESS PARK **
	458.27		245.99	68.7	1.74	283	428	TOTAL AREA DRAINING TO C.O.A. CHANNEL - INCLUDES ALL OF ABOVE

* SEE DRAINAGE REPORT FOR S.A.D. 215 UNSER BLVD. AND 98TH STREET

** DRAINAGE AREAS AND "C" VALUES WERE OBTAINED FROM THE DRAINAGE PLAN FOR VOLCANO BUSINESS PARK

INFORMATION FOR THIS TABLE WAS OBTAINED FROM THE DRAINAGE REPORT FOR TRACTS 4X, 6X AND 7X EL RANCHO ATRISCO EXCEPT WHERE NOTED

Greiner Engineering

- ☐ DENVER, COLORADO
- ☐ COLORADO SPRINGS, COLORADO
- ☑ ALBUQUERQUE, NEW MEXICO
- ☐ KEMMERER, WYOMING

PROJECT SAD 215 OUTFALL
JOB NUMBER 10.40585 SHEET 2 OF 2
CALCULATED BY JB DATE 11/7/86
CHECKED BY _____ DATE _____

INC. CHARACTER OF DRAINAGE CHANNEL:

TRAP. CHANNEL SECTION - FROM AS-BUILTS

W = 25', S = 0.00104 ft/ft SS = 3:1 n = 0.035 d = 3.75'

Q = 1117 cfs V = 8.2 fps dc = 2.4 ft V = 9.24 fps

dn > dc ∴ subcritical flow.

INC. CHANNEL CHARACTERISTICS BASED ON DESIGN FLOW.

Q100 = 430 cfs (from Hydrology Calcs)

dn = 2.22 V = 6.13 dc = 1.83 ft Vc = 7.23

dn > dc ∴ subcritical flow

INC. CAPACITY OF CULVERTS:

6 - 42" x 85' Pipe culverts

Max. depth before overtopping road = 6 ft

INLET CONTROL Q = 50 x 6 = 450 cfs

OUTLET CONTROL (Inertial process) Ho = 2.23' (430 cfs) HW = 6 LSo = 85 x .007 = 0.60

Hw = H + Ho - LSo

6 = H + 2.23 - .6

H = 4.37 ⇒ Q = 115 cfs

Qtot = 5 x 115 = 575 cfs

Ho = 2.6 ⇒ H = 4.00 Q = 110

Ho = 2.5 ⇒ H = 4.10 Q = 110

INLET CONTROL GOVERNS with 550 cfs > 430 cfs

No over-topping occurs for the 100yr storm

Greiner Engineering

☐ DENVER, COLORADO
☐ COLORADO SPRINGS, COLORADO
☐ ALBUQUERQUE, NEW MEXICO
☐ KEMMERER, WYOMING

PROJECT SAD 215 OVERAY
JOB NUMBER 06305885 SHEET 2 OF 2
CALCULATED BY JB DATE 11/10/86
CHECKED BY _____ DATE _____

Crit. Depth based on design flow

Q = 430 cfs 430/5 = 86 cfs per culvert

Inlet Control Depth HW = 1.55 × 3.5 = 5.43 ft

Outlet Control Depth HO = H + HO − LSo
= 2.2 + 2.23 − .6
↑ from nomograph
HO = 3.83 ft

Inlet Control Governs
with HW = 5.43 ft

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE 11-19-86 (Date) REF. NO.

TO: Distribution

FROM: Terri Martin, Master Scheduler Phone #768-2561

SUBJECT: Notice of D.R.C. Meeting: Project No. 3093

Project Name: SAD 215 - OURAY STORM DRAIN FROM UNSER BLVD TO RONDA DE LECHUSAS

Scheduled for review and comment by the D.R.C. on 11/25/86 at 2:30, in Room 324 (LARGE) of the City Hall Building.

The project is scheduled for:

/ / Review of Schematic Design
/ / Review of Preliminary Plans
/ / Review of Analysis Report
/X/ Review of Final Plans
/ / Approval & Sign-off of Plans
/ / _____

The attached package includes:

/ / Report
/X/ Plans
/X/ Specifications
/ / Cost Estimate

Indicated below are the Departments/Divisions that have received project documents and are requested to attend. Attendance is mandatory for all regular D.R.C. members as well as the user Department Representative. It will be the project managers responsiblity to notify consulting engineering firms of date and time of scheduled meeting.

	NAME	TITLE		NAME	TITLE
/ /	Andre Houle	D.R.C. Chairman	/X/	Joe Luehring	Design Review
/X/	Dave Harmon	Traffic Design	/ /	Albert Letzkus	Traffic Operations
(-specs) /X/	Sergio Miranda	Street Maint.	/ /	Dave Parks	Transportation
/X/	Bill Westmoreland	Utility Dev.	/X/	Dan Hogan	Asst Util Eng Hydro.
/X/	Fred Aguirre	Hydrology	/X/	Russell Givler	Construction Eng.
/X/	Sandy Zuschlag	Parks & Rec.	/ /	Bob Gurule	Aviation Department
/ /	Bob Gill	Aviation Dept.	/ /	Joe DellaLonga	City Architect
/ /	Fred Malone	Env. Health	/X/	~~Lee Lunsford~~	~~SAD Services~~
/X/	Pat McDonald	Legal Depart. (Specs only)			

TM/ns
(ID4672E)

13812 Winterwood Way S.E

John Gomez

Willis Smith

Steve Scott owner 345-3427

WEIR CONTROL

$Q = 3.33\, b\, (H + h_a)^{3/2}$

$H = -h_a + \left(\frac{Q}{3.33\, b}\right)^{2/3}$

$H = -.335 + 2.388 \Rightarrow 2.053'$

Q = flow in cfs
b = width of weir
H = depth of backwater above the weir
h = velocity head

Depth of flow = 2.053 + height of weir $= 1.5'$ = 3.553'

Elev of Weir invert = 15.80
Elev of pipe invert = 16.00
Δ elev. = .20 $\therefore$ TW = 3.553 − .2 = 3.35'

$\therefore$ the T.W. at the invert of the pipe = 3.35'

$h_a \quad \frac{Q^2}{A_a^2 2g}$

$$H = \left(\frac{Q}{3.335}\right)^{2/3} - h_a$$

$$H = \left(\frac{Q}{3.33 \cdot b}\right)^{2/3} - \frac{Q^2}{A^2 \cdot 2 \cdot g}$$

$$= \left(\frac{Q}{3.33 \cdot 3}\right)^{2/3} - \frac{V^2}{2g} \quad \left(\frac{Q}{3.335}\right)^{2/3} -$$

$$H = (-.3346) +$$

Need W.P. $H = 2.053 + 1.5 = 3.553$

TRAPEZOIDAL CHANNEL

Flow Rate	(cfs)	=	430
Depth	(ft)	=	2.779699
Velocity	(ft/s)	=	4.639988
Mannings n		=	.045
Slope (%)		=	.007
Side Slope	(H:V)	=	3
Bottom Width	(ft)	=	25
Top Width	(ft)	=	41.67819
Area	(ft^2)	=	92.67266
Hydraulic Radius		=	2.176418
Freeboard	(ft)	=	0
Top Width (w/ freebrd)		=	41.67819
Froude Number		=	.4906733

STRIKE ANY KEY TO CONTINUE

RECEIVED
NOV 21 1986
HYDROLOGY SECTION

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE 11-19-86 (Date) REF. NO.

TO: Distribution

FROM: Terri Martin, Master Scheduler Phone #768-2561

SUBJECT: Notice of D.R.C. Meeting: Project No. 3093

Project Name: SAD 215 - OURAY STORM DRAIN FROM UNSER BLVD TO RONDA DE LECHUSAS

Scheduled for review and comment by the D.R.C. on 11/25/86 at 2:30, in Room 324 (LARGE) of the City Hall Building.

The project is scheduled for:

/ / Review of Schematic Design
/ / Review of Preliminary Plans
/ / Review of Analysis Report
/X/ Review of Final Plans
/ / Approval & Sign-off of Plans
/ / _____

The attached package includes:

/ / Report
/X/ Plans
/X/ Specifications
/ / Cost Estimate

Indicated below are the Departments/Divisions that have received project documents and are requested to attend. Attendance is mandatory for all regular D.R.C. members as well as the user Department Representative. It will be the project managers responsiblity to notify consulting engineering firms of date and time of scheduled meeting.

	NAME	TITLE		NAME	TITLE
/ /	Andre Houle	D.R.C. Chairman	/X/	Joe Luehring	Design Review
/X/	Dave Harmon	Traffic Design	/ /	Albert Letzkus	Traffic Operations
(-specs) /X/	Sergio Miranda	Street Maint.	/ /	Dave Parks	Transportation
/X/	Bill Westmoreland	Utility Dev.	/X/	Dan Hogan	Asst Util Eng Hydro.
/X/	~~Fred Aguirre~~	~~Hydrology~~	/X/	Russell Givler	Construction Eng.
/X/	Sandy Zuschlag	Parks & Rec.	/ /	Bob Gurule	Aviation Department
/ /	Bob Gill	Aviation Dept.	/ /	Joe DellaLonga	City Architect
/ /	Fred Malone	Env. Health	/X/	Lee Lunsford	SAD Services
/X/	Pat McDonald	Legal Depart. (Specs only)			

TM/ns
(ID4672E)

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE November 19, 1986 REF. NO._____

TO: Andre Houle, Senior Civil Engineer, Design Review, PWD

FROM: Jessie Ortiz, Project Engineer, Transp. Design Eng., PWD

SUBJECT: SUBMITTAL OF PLANS FOR FINAL PLAN REVIEW ON SAD 215: OURAY STORM DRAIN FROM UNSER BOULEVARD TO RONDA DE LECHUSAS (PROJECT NO. 3093)

SAD 215 has been scheduled for DRC review and comment on November 25, 1986 at 2:30 PM, in Room 324 of the City Hall Building. The attached SAD 215 package is in addition to the package you now have and is to be bid as a separate project. Please distribute plans to the following:

Joe Luehring, Design Review Engineer, PWD
Dave Harmon, Transp. Devel. Traffic Engineer, PWD
Bill Westmoreland, Utility Devel. Water & Liq. Waste Engr., PWD
Steve Boberg, Utility Devel. Hydrology Engineer, PWD
Russell Givler, Chief Construction Engineer, PWD
Lee Lundsford, Special Assessment Engineer, PWD
Billy Goolsby, Hydrology Design Section, PWD
Anthony Lopez, Street Maintenance Engineer, PWD
Pat Westbrook, Design & Devel. Sup.'t, Parks & Rec. Dept.

Attachment

cc: George Selvia, Assistant Director, Engineering Group, PWD
Joseph A. Martin, Assistant Director, Special Projects, PWD
Jim Hicks, Principal Engineer, Design, Public Works Dept.
David A. Parks, Chief Transp. Engr., Design, Public Works Dept.

JO:cl

Greiner

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

November 18, 1986

RECEIVED
NOV 19 1986
ENG. DESIGN/TRANSP.
PUBLIC WORKS DEPT.

Mr. Jessie Ortiz
Engineering Division
Public Works Department
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

RE: Special Assessment District No. 215: Ouray Road Storm Drain from Unser Boulevard to Ronda de Lechusas (Proj. No. 3093)

Dear Jessie:

Greiner Engineering is pleased to submit ten (10) sets of the Final Plans and Specifications for "Special Assessment District No. 215: Ouray Road Storm Drain". Following this submittal will be the supplement to the SAD 215 Drainage Report which encompasses the additional hydrology required for final design; and a design report addressing the project hydraulic and other pertinent issues.

As previously discussed, this portion of SAD 215 was to be submitted separately from the Unser/98th portion, but with the intent that the two projects would mesh with each other for final approval in mid-December, 1986.

We hope that this submittal will be sufficient to allow SAD 215 to meet the ambitious schedule that has been established. We appreciate your efforts in coordinating this.

If you have any questions, please feel free to contact us at 292-1936.

Sincerely,

GREINER ENGINEERNG

Rick Beltramo, P.E.
Project Engineer

D.L. Morehead, P.E. & L.S.
Senior Civil Engineer

RB:tw

Attachments
10 sets - Plans & Specifications

cc: Lee Lunsford, P.E., Special Assessment Engineer
Steve Boberg, Hydrology Design Section
Billy Goolsby, Hydrology Design Section

Job No. 0690585

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

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FROM: Jessie Ortiz, Project Engineer, Transp. Design Eng., PWD

SUBJECT: SUBMITTAL OF PLANS FOR FINAL PLAN REVIEW ON SAD 215: OURAY STORM DRAIN FROM UNSER BOULEVARD TO RONDA DE LECHUSAS (PROJECT NO. 3093)

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Russell Givler, Chief Construction Engineer, PWD
Lee Lundsford, Special Assessment Engineer, PWD
Billy Goolsby, Hydrology Design Section, PWD
Anthony Lopez, Street Maintenance Engineer, PWD
Pat Westbrook, Design & Devel. Sup.'t, Parks & Rec. Dept.

Attachment

cc: George Selvia, Assistant Director, Engineering Group, PWD
Joseph A. Martin, Assistant Director, Special Projects, PWD
Jim Hicks, Principal Engineer, Design, Public Works Dept.
David A. Parks, Chief Transp. Engr., Design, Public Works Dept.

JO:cl

Greiner

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

November 18, 1986

RECEIVED
NOV 19 1986
ENG. DESIGN/TRANSP.
PUBLIC WORKS DEPT.

Mr. Jessie Ortiz
Engineering Division
Public Works Department
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

RE: Special Assessment District No. 215: Ouray Road Storm Drain from Unser Boulevard to Ronda de Lechusas (Proj. No. 3093)

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GREINER ENGINEERNG

Rick Beltramo, P.E.
Project Engineer

D.L. Morehead, P.E. & L.S.
Senior Civil Engineer

RB:tw

Attachments
10 sets - Plans & Specifications

cc: Lee Lunsford, P.E., Special Assessment Engineer
Steve Boberg, Hydrology Design Section
Billy Goolsby, Hydrology Design Section

Job No. 0690585

Greiner

RECEIVED
OCT 31 1986
HYDROLOGY SECTION

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

October 31, 1986

Mr. Billy Goolsby
City of Albuquerque
Hydrology Section
P. O. Box 1293
Albuquerque, NM 87103

Dear Mr. Goolsby:

This letter is to confirm the results of our meeting on October 13, 1986 to determine the design criteria for the proposed storm drain system to be built in the Ouray Road right of way under contract of SAD 215. The meeting was attended by yourself, Rick Beltramo and Sheila Dell of Greiner Engineering Sciences, Inc.

Following are the items agreed to:

1. The City of Albuquerque will allow full developed discharge from El Rancho Atrisco Tracts 4X, 6X, and 7X. The outfall to the Ouray system will be that area which historically drains toward Ouray. The remaining area will have full developed free discharge to the Rinconada channel. Design of the Ouray system is to be such that it can accommodate the full developed runoff plus the offsite flows from the west.

2. The Master Plan covering the area, entitled Drainage Plan for Volcano Business Park for Westland Development company, will be used.

3. Flows from Tracts 4X, 6X and 7X will be determined by the Rational Method based on masterplanned land use and densities. A conservative approach will be taken in order to insure adequate downstream capacity for the full developed outfall. The analysis will not serve as a drainage report for Tracts 4X, 6X and 7X but only to properly size the Ouray storm drain. Future development of Tracts 4X, 6X and 7X will require the proper submittals and reviews at the appropriate time. The hydrological calculations will be submitted for review along with the design calculations for the hydraulics. This information will be presented as an addendum to the SAD 215 Drainage Report.

4. Off-Site Flows emptying into the system from Unser Boulevard and Ouray have been determined in the "SAD 215 Drainage Report".

5. The Ouray system will be designed to carry the above mentioned flows. No stub outs will be provided for drainage from Tracts 4X, 6X and 7X. The necessary storm drain improvements needed to drain these parcels will be designed and constructed at the appropriate times. These improvements will be the owner's responsibility.

6. The City owned and maintained channel at the eastern end of the SAD 215 project will be an acceptable outfall for the storm drain system. The channel is approximately 3.75 feet deep and can carry approximately 1200 cfs, as determined from as-built drawings. No channel design hydrology or hydraulics is available. The downstream capacity of the channel will not require analysis. However hydraulics concerning the structure outlet to the channel will be necessary.

Attached is the addendum to the "SAD 215 Drainage Report". The data presented is based on conditions stated earlier in this letter. As you know the design of SAD 215 and Ouray are on tight schedules. At this time we are proceeding with the design of the storm drain based on the information stated. If you have any questions, additions or disagree with any of the information provided in this confirmation letter please call. A timely response would be greatly appreciated.

Sincerely,

GREINER ENGINEERING

Rick Beltramo
Project Engineer

Enclosures: First Addendum to "Drainage Analysis Report. Special Assessment District No. 215/Unser Boulevard and 98th Street"

cc: Lee Lunsford, Special Assessment Engineering
Steve Boberg, Project Engineer, Utility Design Section
Jesse Ortiz, Project Engineer, Transportation Section

RB:SK:bwr

NOTE A – IF EXIT VELOCITY OF BASIN IS SPECIFIED, EXTEND BASIN AS REQUIRED TO OBTAIN SUFFICIENT CROSS–SECTIONAL AREA AT SECTION A–A SUCH THAT Q_{des}/(CROSS SECTION AREA AT SEC. A–A) = SPECIFIED EXIT VELOCITY.

NOTE B – WARP BASIN TO CONFORM TO NATURAL STREAM CHANNEL. TOP OF RIPRAP IN FLOOR OF BASIN SHOULD BE AT THE SAME ELEVATION OR LOWER THAN NATURAL CHANNEL BOTTOM AT SEC. A–A.

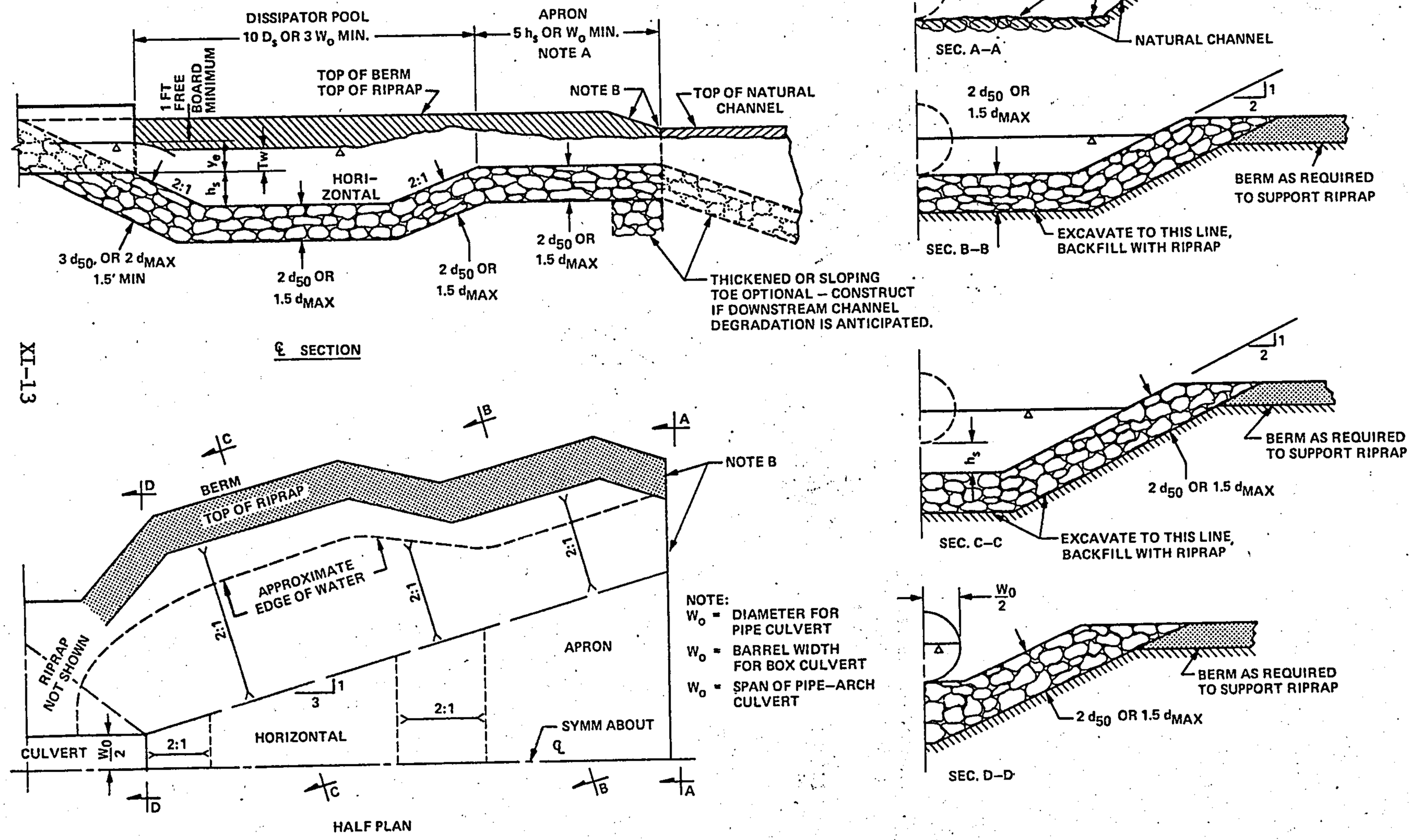

FIGURE X1–1. DETAILS OF RIPRAPPED CULVERT ENERGY BASIN

Greiner

RECEIVED
OCT 31 1986
HYDROLOGY SECTION

FIRST ADDENDUM TO

"DRAINAGE ANALYSIS REPORT - SPECIAL ASSESSMENT

DISTRICT NO. 215/UNSER BOULEVARD & 98TH STREET

OURAY ROAD STORM DRAIN HYDROLOGY

Following is a discussion of the method used to calculate the design flow for the Ouray Road Storm Drain. It was necessary to determine a developed flow rate in order to design/size the storm drain system. Runoff is intercepted into the system from 2 major sources. The largest source is the offsite flow from areas west of, and including Unser Boulevard. These flow rates are taken from the "Drainage Analysis Report for SAD 215 Unser Boulevard and 98th Street". A large tract of land to the north constitutes the second major source of runoff to the system. Detailed development plans have not been made for this property; however, a conceptual drainage report has been done titled "Drainage Report for Tracts 4X, 6X and 7X, El Rancho Atrisco". The property south of Ouray is drained by an internal storm drain system and no runoff drains to the Ouray system.

Hydrology is based on the Rational Method. While this method is somewhat rough, it is also conservative. This is necessary due to the assumptions that are required at this time.

1. Plate 2 from the El Rancho Atrisco Drainage Report was used as a base map. Drainage areas were revised to allow approxmiately 23.5 acres (Areas 5 and 6) more to drain south to the storm drain than were

considered in the El Rancho Atrisco Report. See attached Exhibit 1 for revised areas. This is an conservative approach since it is very likely some flow in Area 6 will actually drain north to the Rinconada Channel in the developed condition. However it is possible it will drain to the Ouray system.

2. "C" values were determined from land use as described in the El Rancho Atrisco Report and the City's most recent "C" value guidelines.

3. Offsite flows from the west were obtained from the Drainage Analysis Report for SAD 215 Unser Boulevard and 98th Street.

4. Time of Concentration was calculated by adding the Time of Concentration of the longest offsite basin, 66.7 minutes, to the Time of Concentration along Ouray Road, 2 minutes, resulting in 68.7 minutes.

5. All areas were then added, a composite C was determined, and the 100 year- and 10 year-flows were calculated using Mannings equation. One flowrate was determined for the entire storm drain drainage basin. This will be used to design the storm drain line.

Information has been compiled in the attached table, Exhibit 2.

EXHIBIT 2

HYDROLOGY — PROPOSED CONDITIONS — COMPUTER FILE OURAY.SKD

BASIN	AREA AC.	RUNOFF COEF. C	C x A	Tc min.	I100 in./hr.	Q10 cfs	Q100 cfs	COMMENTS
ONE	15.69	0.75	11.77	8.8	4.77	37	56	TOWNHOMES
TWO	7.73	0.75	5.80					TOWNHOMES
	13.86	0.30	4.16					OPEN SPACE
	21.59		9.96	9.8	4.77	31	47	
THREE	13.80	0.50	6.90	11.9	4.36	20	30	SINGLE FAMILY
FOUR	3.90	0.95	3.71	2.0	4.77	12	18	OURAY ROAD RIGHT OF WAY
FIVE	6.95	0.50	3.48	10	4.77	11	17	SINGLE FAMILY
SIX	7.58	0.75	5.68					TOWNHOMES
	5.48	0.30	1.64					OPEN SPACE
	3.44	0.80	2.75					CONDOMINIUMS OR COMMERCIAL
	16.50		10.07	10	4.77	32	48	
EIGHT	12.90	0.95	12.26	10	4.77	39	58	UNSER BLVD. RIGHT OF WAY
E**	107.60	0.41	44.19	33.3	2.52	74	111	WEST OF UNSER BLVD.
G**	163.00	0.51	83.13	66.7	1.77	97	147	WEST OF UNSER BLVD.
H**	22.40	0.45	10.16	10	4.65	31	47	WEST OF UNSER BLVD.
TOTAL	384.33	0.51	195.45	68.7	1.74	225	340	TOTAL AREA DRAINING TO OURAY ROAD STORM DRAAIN

** SEE DRAINAGE REPORT FOR S.A.D. 215 UNSER BLVD. AND 98TH STREET

INFORMATION FOR THIS TABLE WAS OBTAINED FROM THE DRAINAGE REPORT FOR TRACTS 4X, 6X AND 7X EL RANCHO ATRISCO EXCEPT WHERE NOTED

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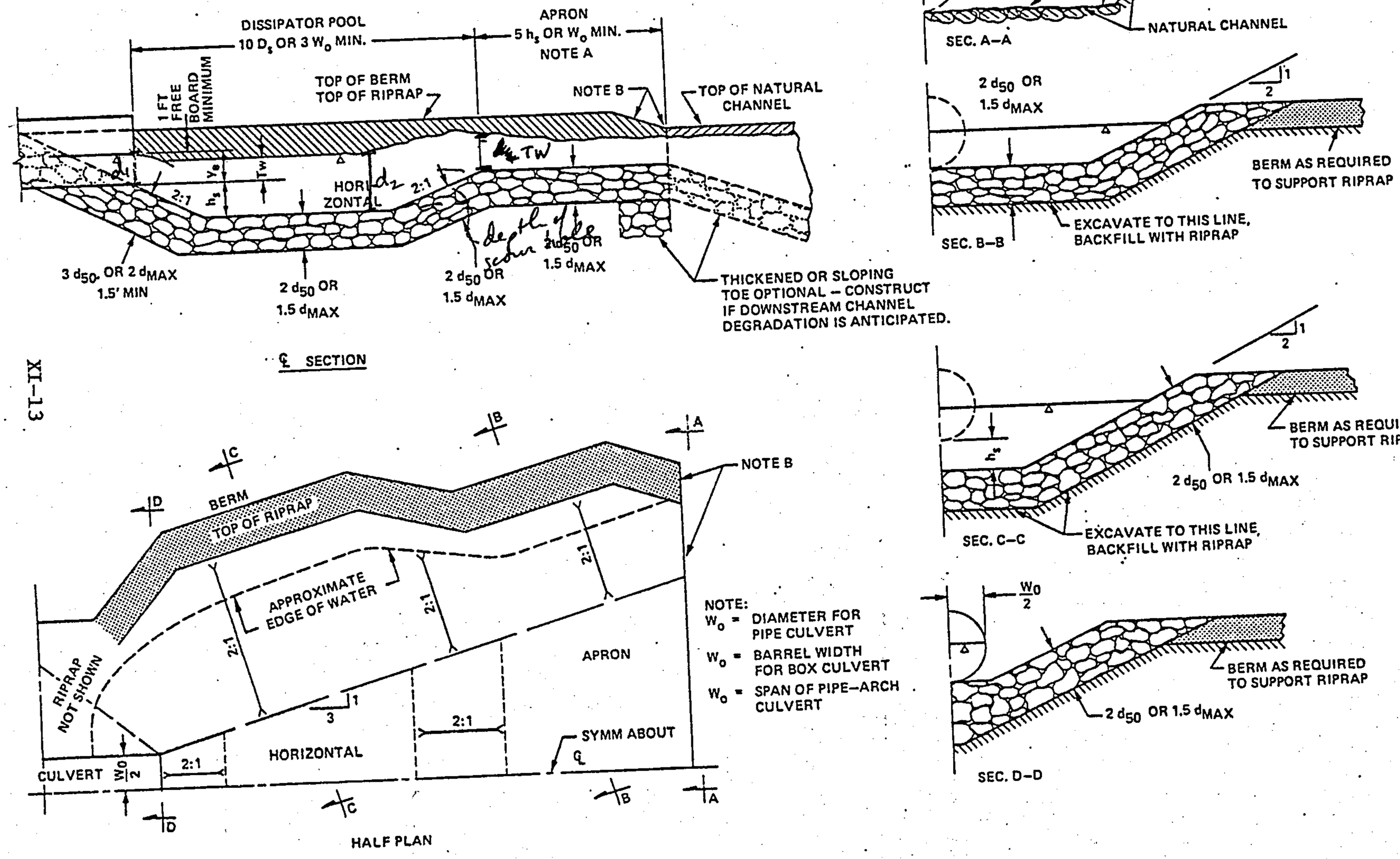
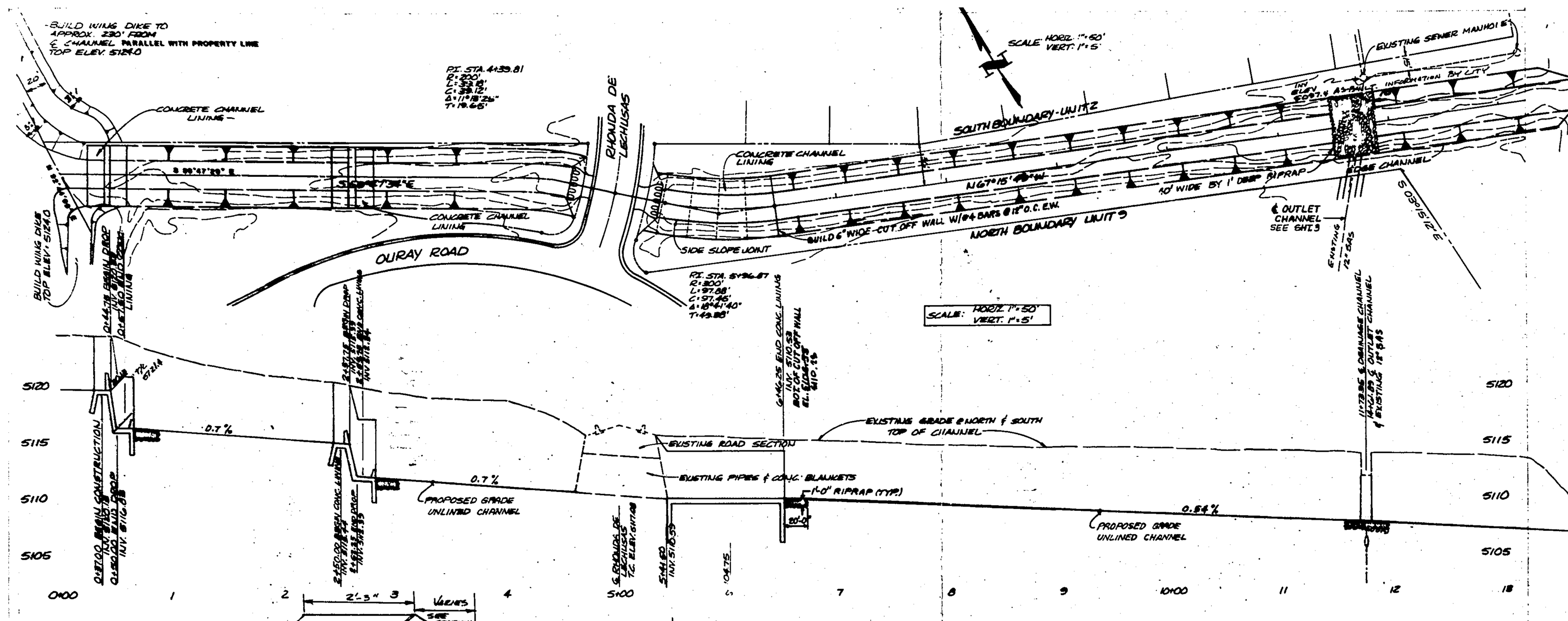
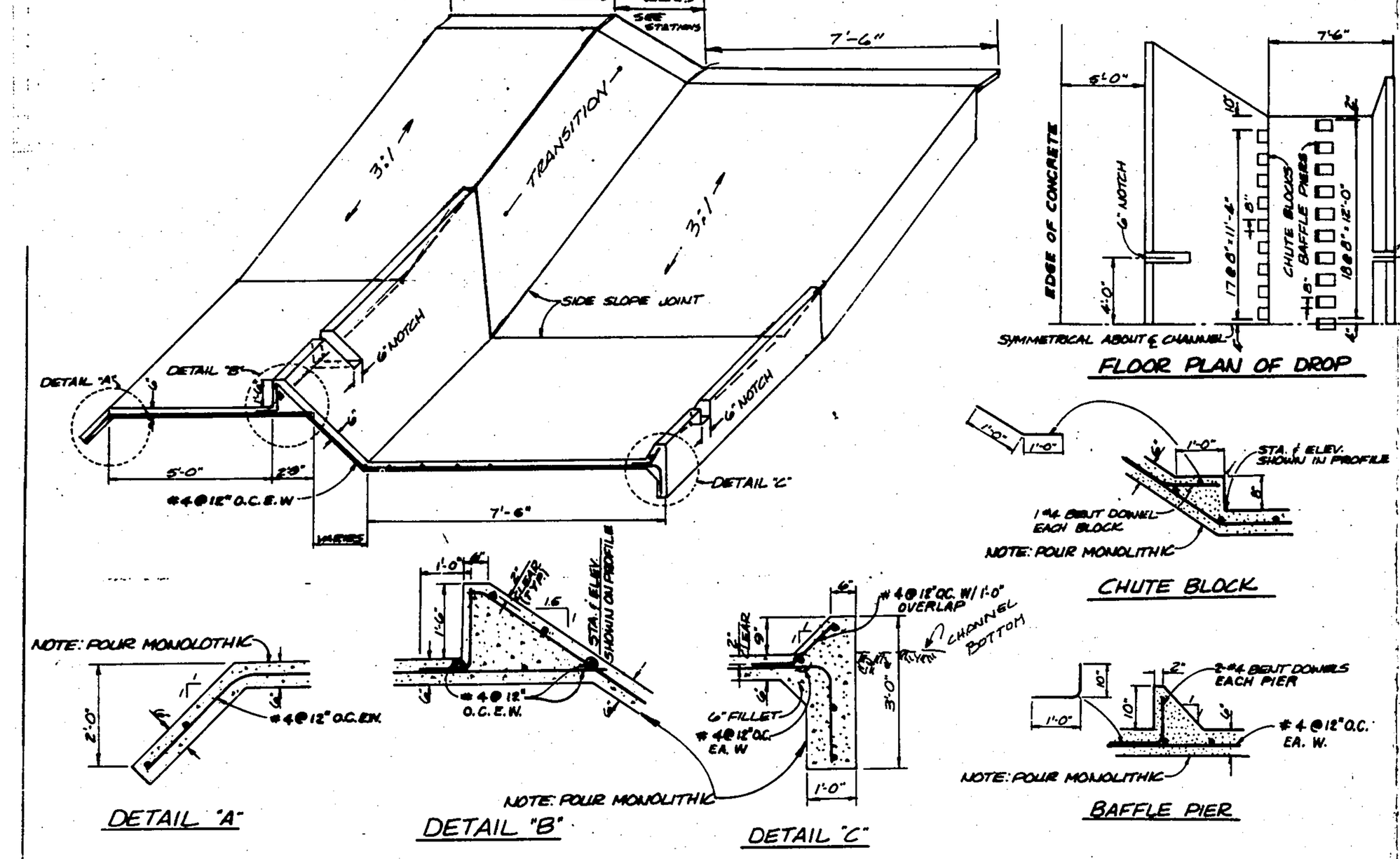
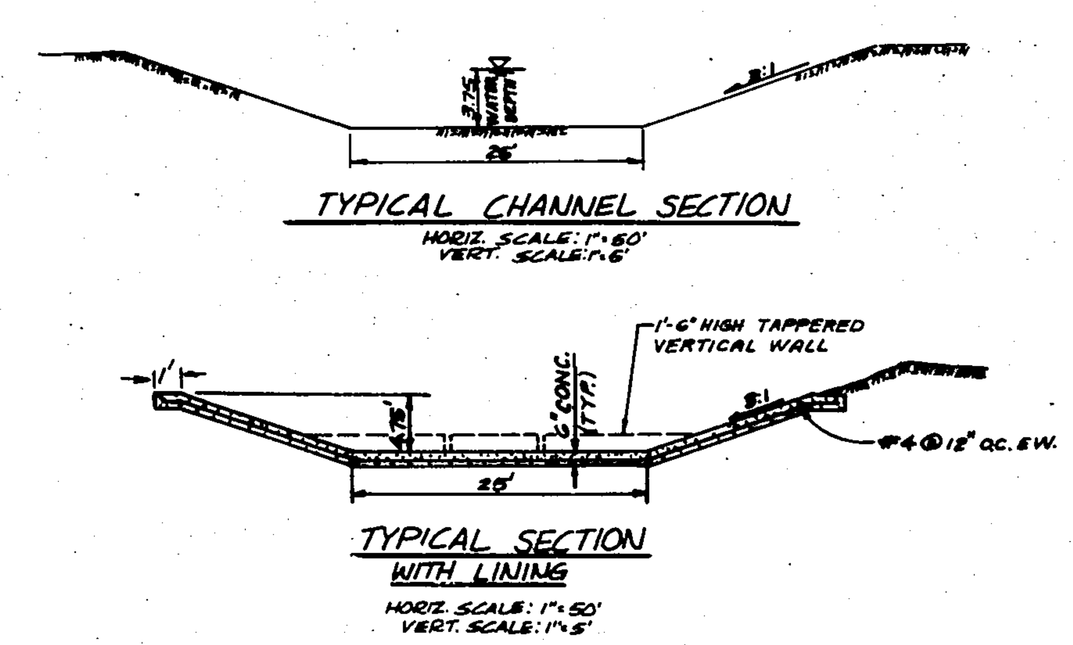


FIGURE X1–1. DETAILS OF RIPRAPPED CULVERT ENERGY BASIN



AGS BENCH MARK G-510
A STANDARD BRONZE TABLET, 25 FT. SOUTH OF THE CHANNEL BACKSLOPE, 3 FT. WEST OF THE CHAIN LINK FENCE MARKING THE WEST BOUNDARY OF THE CITY OF ALBUQUERQUE LADERA GOLF COURSE.
ELEV. = 5111.87





26 1807 0984

AS BUILT

6-18-84

JAMES E. BLACKWELL NEW MEXICO 7145 PROFESSIONAL ENGINEER

CITY OF ALBUQUERQUE
MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION

EL RANCHO ATRISCO UNIT 9 PHASE I
PLAN & PROFILE
DRAINAGE CHANNEL

	14 Sep	NM
	2 Sep 83	NM
	10/18/83	NM

DRAWING 1807 G-10 9

$D_1 = 4.25$

$T_W = 2.81$

$F = 1.737$

$V = 20.24$

$\frac{T_1}{D_1} = .6612$

$\frac{D_2}{D_1} = 1.9.5$

$D_2 = 8.49$

Depth of hole = 5.684'

S A D 215

# CALC	NODE 1	NODE 2	ELEV	D1	D2	Q	A	V1	V2	K	LENGTH	DELTA	HV	n
1.000	21.470	21.470	16.000	60.000	0.000	360.000	19.635	18.335	0.000	0.000	0.000	0.000	5.220	0.000
2.000	21.470	17.800	17.670	60.000	0.000	360.000	19.635	18.335	0.000	2604.422	367.000	21.820	5.220	0.013
3.000	17.800	17.800	17.770	60.000	0.000	360.000	19.635	18.335	0.000	0.000	0.000	0.000	5.220	0.013
4.000	17.800	13.550	26.030	60.000	0.000	360.000	19.635	0.000	0.000	2604.422	425.000	0.000	5.220	0.013
5.000	13.550	13.550	26.190	60.000	0.000	360.000	19.635	18.335	0.000	0.000	0.000	0.000	5.220	0.013
6.000	13.550	9.050	34.920	60.000	0.000	300.000	19.635	0.000	0.000	2604.422	450.000	0.000	3.625	0.013
7.000	9.050	9.050	35.080	60.000	0.000	300.000	19.635	15.279	0.000	0.000	0.000	0.000	3.625	0.013
8.000	9.050	4.550	43.810	60.000	0.000	300.000	19.635	15.279	0.000	2604.422	450.000	41.000	3.625	0.013
9.000	4.550	4.550	43.970	60.000	0.000	300.000	19.635	15.279	0.000	0.000	0.000	0.000	3.625	0.013
10.000	4.550	0.000	49.910	60.000	0.000	265.000	19.635	0.000	0.000	2604.422	456.500	0.000	2.828	0.013
11.000	0.000	0.000	49.910	60.000	0.000	265.000	19.635	13.496	0.000	0.000	0.000	0.000	2.828	0.013

CODE	NODE	FS	FRIC L	MANH L	BEND L	EXP L	JUNC L	ANG L	CONT L	INLT L	TRANS L	TOT L	HGL	EGL
0.000	21.470	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	21.000	26.220
3.000	17.800	0.019	7.012	0.000	0.643	0.000	0.000	0.000	0.000	0.000	0.000	7.655	28.655	33.874
2.000	17.800	0.000	0.000	0.261	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.261	28.916	34.135
1.000	13.550	0.019	8.120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.120	37.036	42.256
2.000	13.550	0.000	0.000	0.261	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.261	37.297	42.517
1.000	9.050	0.013	5.971	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.971	44.863	48.488
2.000	9.050	0.000	0.000	0.181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.181	45.044	48.669
3.000	4.550	0.013	5.971	0.000	0.612	0.000	0.000	0.000	0.000	0.000	0.000	6.582	51.626	55.251
2.000	4.550	0.000	0.000	0.181	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.181	51.808	55.432
1.000	0.000	0.010	4.726	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.726	57.330	60.159
2.000	0.000	0.000	0.000	0.141	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.141	57.472	60.300

CODES

1 - PIPE SECTION	2 - MANHOLE	3 - PIPE-BEND	4 - EXPANSION	5 - JUNCTION
6 - ANGLE - POINT	7 - CONTRACTION	8 - INLETS	9 - TRANSITIONS	

TRAPEZOIDAL CHANNEL

Flow Rate	(cfs)	=	1116.584
Depth	(ft)	=	3.75
Velocity	(ft/s)	=	8.213948
Mannings n		=	.03
Slope (%)		=	.007
Side Slope	(H:V)	=	3
Bottom Width	(ft)	=	25
Top Width	(ft)	=	47.5
Area	(ft^2)	=	135.9375
Hydraulic Radius		=	2.790346
Freeboard	(ft)	=	0
Top Width (w/ freebrd)		=	47.5
Froude Number		=	.7478436

STRIKE ANY KEY TO CONTINUE

TRAPEZOIDAL CHANNEL

Flow Rate	(cfs)	=	980.7066
Depth	(ft)	=	3.75
Velocity	(ft/s)	=	7.214394
Mannings n		=	.03
Slope (%)		=	.0054
Side Slope	(H:V)	=	3
Bottom Width	(ft)	=	25
Top Width	(ft)	=	47.5
Area	(ft^2)	=	135.9375
Hydraulic Radius		=	2.790346
Freeboard	(ft)	=	0
Top Width (w/ freebrd)		=	47.5
Froude Number		=	.6568386

STRIKE ANY KEY TO CONTINUE

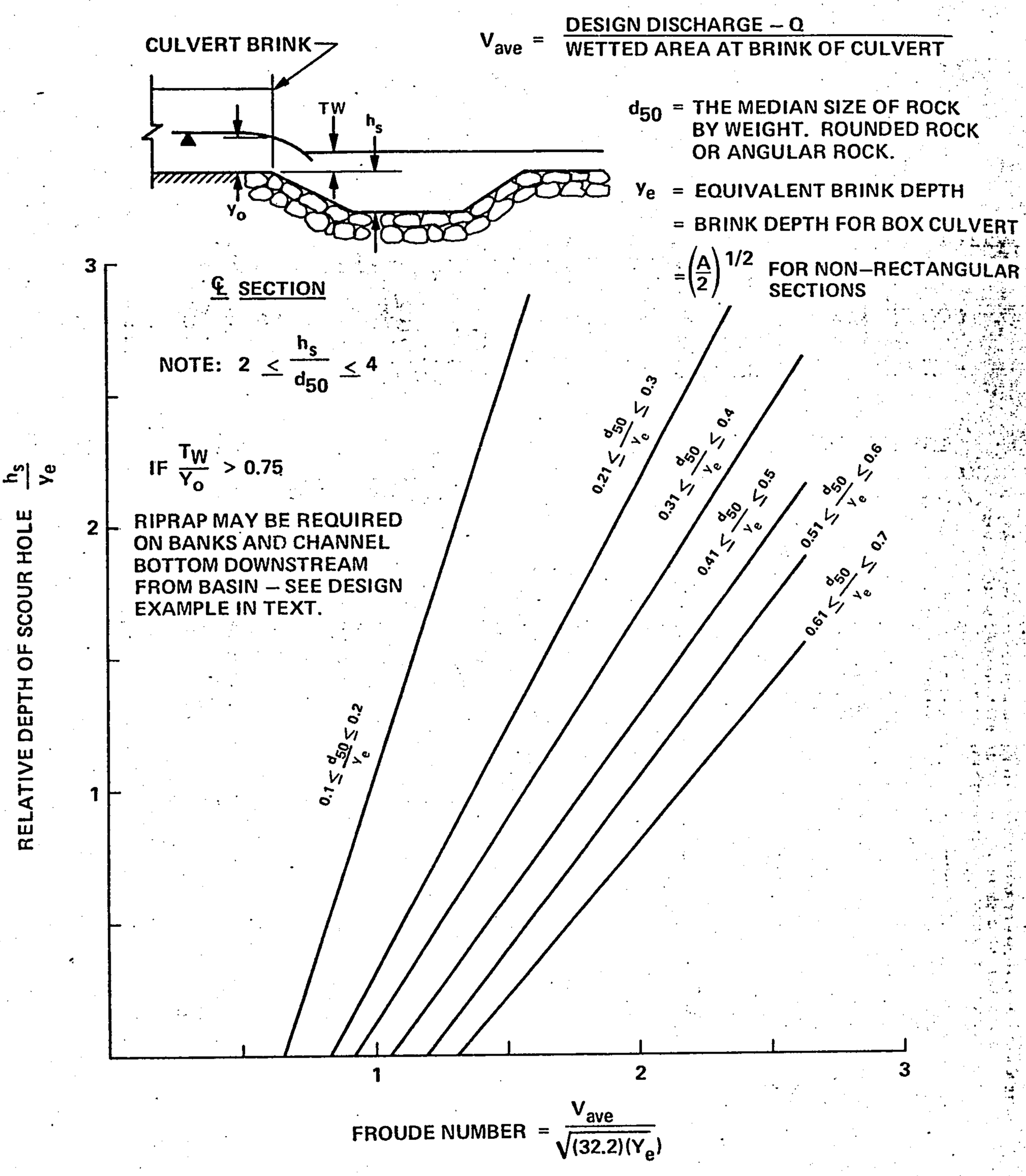


FIGURE X1–2. RELATIVE DEPTH OF SCOUR HOLE VERSUS FROUDE NUMBER AT BRINK OF CULVERT WITH RELATIVE SIZE OF RIPRAP AS A THIRD VARIABLE

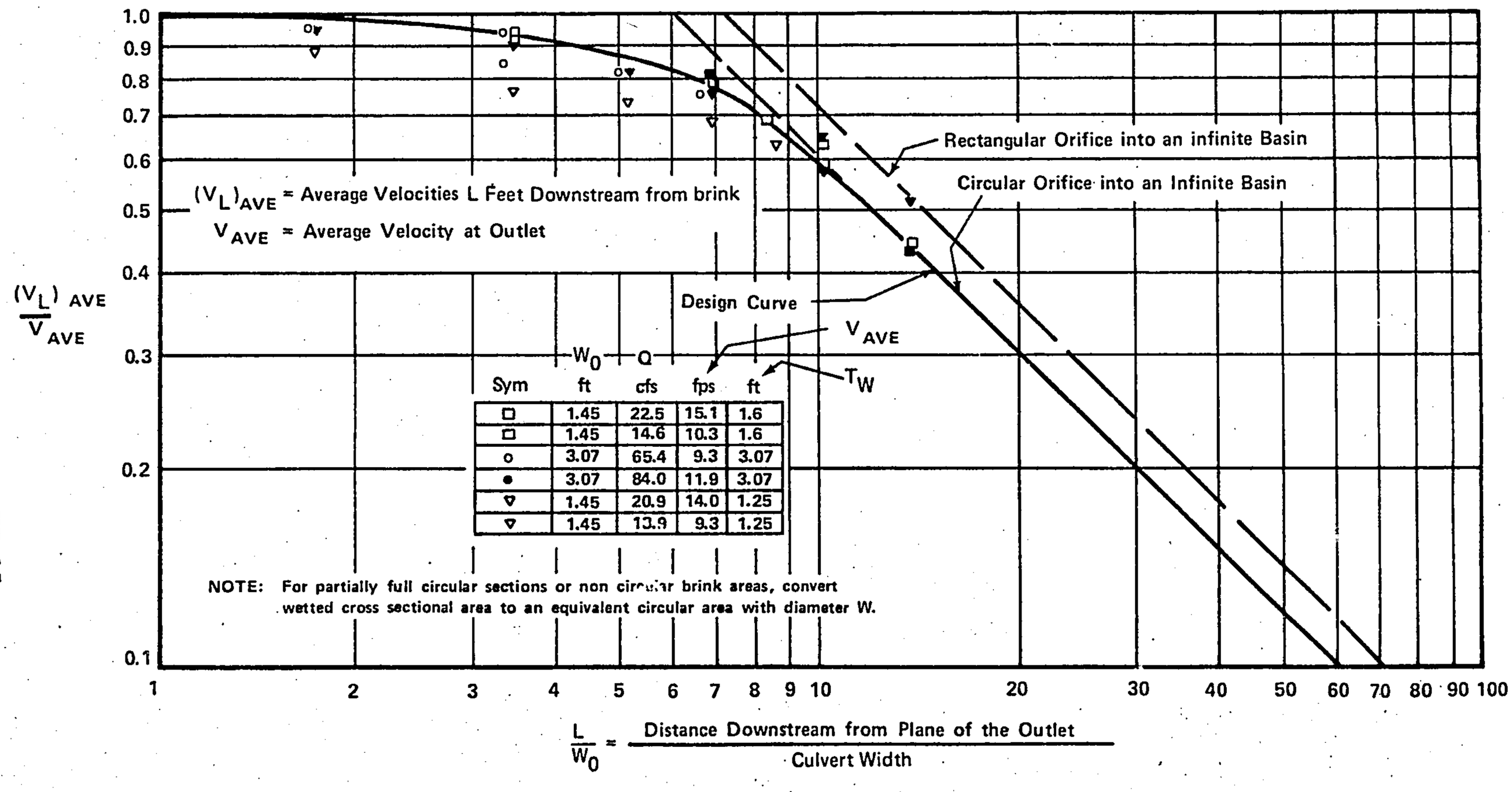


Figure XI - 3 Distribution of Centerline Velocity for Flow from Submerged Outlets from Reference XI - 2. to be used for Predicting Channel Velocities Downstream from Culvert Outlet where High Tailwater prevails. Velocities obtained from the use of this Chart can be used with Figure 2 of HEC No. 11 for sizing riprap (DO not use Figure 1 HEC No. 11, use Mean Velocity Values)

GREINER ENGINEERING SCIENCES, INC.
2601 Wyoming Blvd., N.E., Suite F
Albuquerque, New Mexico 87112
(505) 292-1936
Formerly MSM Consultants, Inc.
A Greiner Engineering, Inc. Company

TRANSMITTAL

RECEIVED
OCT 31 1986
HYDROLOGY SECTION

TO City of Albuquerque
Hydrology

ATTN: Billy Goolsby

DATE 31 October 1986
RE: SAD 215 - Ouray Rd. Storm Drain

JOB NO.

WE ARE SENDING THE FOLLOWING ☐ ATTACHED, ☐ UNDER SEPARATE COVER, VIA

☐ PRINTS ☐ COPY OF LETTER ☐ CHANGE ORDER ☐ SPECIFICATIONS
☐ ESTIMATES ☐ PROPOSAL ☐ REPORTS ☐

NO. OF COPIES	DATED	DESCRIPTION
4	31 Oct	Enclosed is a recap letter of our meeting on the Ouray Rd. Storm Drain along with the hydrology we are planning to use
		We are also sending 3 extra copies for Steve Bobers, Jesse Ortiz, Lee Lunsford

THESE ARE TRANSMITTED:

☐ FOR YOUR USE ☐ FOR REVIEW AND COMMENT
☐ FOR APPROVAL ☐ AS REQUESTED

REMARKS:

CC:

GREINER ENGINEERING SCIENCES, INC.

Sheila Dell

PARTIALLY FILLED CIRCULAR CONDUIT SECTIONS

$\frac{D}{d}$	$\frac{\text{area}}{d^2}$	$\frac{\text{wet. per.}}{d}$	$\frac{\text{hyd. rad.}}{d}$	$\frac{D}{d}$	$\frac{\text{area}}{d^2}$	$\frac{\text{wet. per.}}{d}$	$\frac{\text{hyd. rad.}}{d}$
0.01	0.0013	0.2003	0.0066	0.51	0.4027	1.5908	0.2531
0.02	0.0037	0.2838	0.0132	0.52	0.4127	1.6108	0.2561
0.03	0.0069	0.3432	0.0197	0.53	0.4227	1.6308	0.2591
0.04	0.0105	0.4027	0.0262	0.54	0.4327	1.6509	0.2620
0.05	0.0147	0.4510	0.0326	0.55	0.4426	1.6710	0.2649
0.06	0.0192	0.4949	0.0389	0.56	0.4526	1.6911	0.2676
0.07	0.0242	0.5355	0.0451	0.57	0.4625	1.7113	0.2703
0.08	0.0294	0.5735	0.0513	0.58	0.4723	1.7315	0.2728
0.09	0.0350	0.6094	0.0574	0.59	0.4822	1.7518	0.2753
0.10	0.0409	0.6435	0.0635	0.60	0.4920	1.7722	0.2776
0.11	0.0470	0.6761	0.0695	0.61	0.5018	1.7926	0.2797
0.12	0.0534	0.7075	0.0754	0.62	0.5115	1.8132	0.2818
0.13	0.0600	0.7377	0.0813	0.63	0.5212	1.8338	0.2839
0.14	0.0668	0.7670	0.0871	0.64	0.5308	1.8546	0.2860
0.15	0.0739	0.7954	0.0929	0.65	0.5404	1.8755	0.2881
0.16	0.0811	0.8230	0.0986	0.66	0.5499	1.8965	0.2899
0.17	0.0885	0.8500	0.1042	0.67	0.5594	1.9177	0.2917
0.18	0.0961	0.8763	0.1097	0.68	0.5687	1.9391	0.2935
0.19	0.1039	0.9020	0.1152	0.69	0.5780	1.9606	0.2950
0.20	0.1118	0.9273	0.1206	0.70	0.5872	1.9823	0.2962
0.21	0.1199	0.9521	0.1259	0.71	0.5964	2.0042	0.2973
0.22	0.1281	0.9764	0.1312	0.72	0.6054	2.0264	0.2984
0.23	0.1365	1.0003	0.1364	0.73	0.6143	2.0488	0.2995
0.24	0.1449	1.0239	0.1416	0.74	0.6231	2.0714	0.3006
0.25	0.1535	1.0472	0.1466	0.75	0.6318	2.0944	0.3017
0.26	0.1623	1.0701	0.1516	0.76	0.6404	2.1176	0.3025
0.27	0.1711	1.0928	0.1566	0.77	0.6489	2.1412	0.3032
0.28	0.1800	1.1152	0.1614	0.78	0.6573	2.1652	0.3037
0.29	0.1890	1.1373	0.1662	0.79	0.6655	2.1895	0.3040
0.30	0.1982	1.1593	0.1709	0.80	0.6736	2.2143	0.3042
0.31	0.2074	1.1810	0.1755	0.81	0.6815	2.2395	0.3044
0.32	0.2167	1.2025	0.1801	0.82	0.6893	2.2653	0.3043
0.33	0.2260	1.2239	0.1848	0.83	0.6969	2.2916	0.3041
0.34	0.2355	1.2451	0.1891	0.84	0.7043	2.3186	0.3038
0.35	0.2450	1.2661	0.1935	0.85	0.7115	2.3462	0.3033
0.36	0.2546	1.2870	0.1978	0.86	0.7186	2.3746	0.3026
0.37	0.2642	1.3078	0.2020	0.87	0.7254	2.4038	0.3017
0.38	0.2739	1.3284	0.2061	0.88	0.7320	2.4341	0.3008
0.39	0.2836	1.3490	0.2102	0.89	0.7384	2.4655	0.2996
0.40	0.2934	1.3694	0.2142	0.90	0.7445	2.4981	0.2980
0.41	0.3032	1.3898	0.2181	0.91	0.7504	2.5322	0.2963
0.42	0.3130	1.4101	0.2220	0.92	0.7560	2.5681	0.2944
0.43	0.3229	1.4303	0.2257	0.93	0.7642	2.6061	0.2922
0.44	0.3328	1.4505	0.2294	0.94	0.7662	2.6467	0.2896
0.45	0.3428	1.4706	0.2331	0.95	0.7707	2.6906	0.2864
0.46	0.3527	1.4907	0.2366	0.96	0.7749	2.7389	0.2830
0.47	0.3627	1.5108	0.2400	0.97	0.7785	2.7934	0.2787
0.48	0.3727	1.5308	0.2434	0.98	0.7816	2.8578	0.2735
0.49	0.3827	1.5508	0.2467	0.99	0.7841	2.9412	0.2665
0.50	0.3927	1.5708	0.2500	1.00	0.7854	3.1416	0.2500

PLATE 22.3 B-6

FACTORS FOR CIRCULAR CONDUITS FLOWING PARTLY FULL

D = depth of water
d = diameter of conduit

Tabulated Values

$K = \frac{\text{momentum}}{(Q/d)^2}$ $C = \frac{\text{Pressure}}{d^3}$ $F = \frac{\text{Velocity Head}}{(Q/d^2)^2}$

D/d	K	C	F	D/d	K	C	F	D/d	K	C	F	D/d	K	C	F
.00	∞	.0000	∞	.25	.2026	.0157	0.659	.50	.0792	.0833	.1007	.75	.0492	.2121	.0389
.01	23.919	.0000	9188.	.26	.1916	.0173	0.589	.51	.0773	.0873	.0958	.76	.0485	.2185	.0379
.02	8.403	.0000	1134.	.27	.1817	.0190	0.530	.52	.0753	.0914	.0912	.77	.0479	.2249	.0369
.03	4.507	.0001	326.	.28	.1727	.0207	0.479	.53	.0736	.0956	.0869	.78	.0473	.2314	.0359
.04	2.961	.0002	140.9	.29	.1645	.0226	0.435	.54	.0719	.0998	.0829	.79	.0467	.2380	.0351
.05	2.115	.0003	71.9	.30	.1569	.0255	0.395	.55	.0703	.1042	.0793	.80	.0462	.2447	.0342
.06	1.620	.0005	42.1	.31	.1493	.0266	0.361	.56	.0687	.1087	.0758	.81	.0456	.2515	.0334
.07	1.285	.0007	26.5	.32	.1435	.0287	0.331	.57	.0672	.1133	.0726	.82	.0451	.2584	.0327
.08	1.058	.0010	17.97	.33	.1376	.0309	0.304	.58	.0658	.1179	.0696	.83	.0446	.2653	.0320
.09	0.888	.0013	12.68	.34	.1320	.0332	0.280	.59	.0645	.1227	.0668	.84	.0441	.2723	.0313
.10	0.760	.0017	9.28	.35	.1269	.0356	0.259	.60	.0632	.1276	.0641	.85	.0437	.2794	.0307
.11	0.662	.0021	7.03	.36	.1221	.0381	0.240	.61	.0620	.1326	.0617	.86	.0433	.2865	.0301
.12	0.582	.0026	5.45	.37	.1177	.0407	0.222	.62	.0608	.1376	.0594	.87	.0429	.2938	.0295
.13	0.518	.0032	4.31	.38	.1135	.0434	0.207	.63	.0597	.1428	.0572	.88	.0425	.3011	.0290
.14	0.466	.0038	3.48	.39	.1096	.0462	.1931	.64	.0586	.1481	.0551	.89	.0421	.3084	.028[illegible]
.15	0.421	.0045	2.84	.40	.1060	.0491	.1804	.65	.0575	.1534	.0532	.90	.0418	.3158	.0280
.16	0.383	.0053	2.36	.41	.1026	.0520	.1689	.66	.0565	.1589	.0514	.91	.0414	.3233	.0276
.17	0.351	.0061	1.982	.42	.0993	.0551	.1585	.67	.0559	.1644	.0496	.92	.0411	.3308	.0272
.18	0.324	.0070	1.681	.43	.0963	.0583	.1489	.68	.0547	.1700	.0480	.93	.0408	.3384	.0266
.19	0.299	.0080	1.438	.44	.0934	.0616	.1402	.69	.0538	.1758	.0465	.94	.0406	.3460	.0265
.20	0.278	.0091	1.242	.45	.0907	.0650	.1321	.70	.0530	.1816	.0450	.95	.0403	.3537	.0261
.21	0.259	.0103	1.080	.46	.0882	.0684	.1248	.71	.0521	.1875	.0437	.96	.0401	.3615	.0259
.22	0.243	.0115	0.946	.47	.0857	.0720	.1180	.72	.0514	.1935	.0424	.97	.0399	.3692	.0256
.23	0.228	.0128	0.833	.48	.0834	.0757	.1118	.73	.0506	.1996	.0411	.98	.0398	.3770	.0254
.24	0.215	.0143	0.740	.49	.0813	.0795	.1060	.74	.0499	.2058	.0400	.99	.0397	.3848	.0253
												1.00	.0396	.3927	.0252

PRELMINARY DESIGN INFORMATION
SPECIAL ASSESSMENT DISTRICT NO. 215

Greiner
Engineering

PREPARED FOR
CITY OF ALBUQUERQUE

PRELMINARY DESIGN INFORMATION SPECIAL ASSESSMENT DISTRICT NO. 215

AUGUST, 1986
PROJECT NO. 2803

GREINER ENGINEERING SCIENCES, INC.
2601 Wyoming Boulevard, N.E. Albuquerque, New Mexico 87112 (505) 292-1936

CONTENTS

- SAD 215: 30% Review and Understanding of Design Concepts

  Update - 8/6/86 Memo to File

- Outline of Specifications

- Preliminary Construction Cost Estimate
  (identical to the Estimate included in the Engineer's Report)

- Real Estate Acquisition Requirements

- Construction Cost Estimate Comparison
  1/29/86 Evaluation Report vs. Preliminary Construction Cost Estimate @
  Resolution #2

MEMO - Redesign - SAD 215 8/6/86

TO: File

FROM: D. Morehead

RE: Update: SAD 215 - 98th Street & Unser Boulevard Intersections (Items #2 & #3 of the 7/7/86 Letter from Morehead to Lunsford - RE: SAD 215 - 30% Review and Understanding of Design Concepts)

1. 7/10/86 - Meeting at Transportation - RE: SAD 215 intersections; Attendee's: City staff, Westland Corporation staff, Plains Electric, Greiner
Discussion of number and location of intersections to Westland Corporation abutting properties.
Results - Agreed to discuss further after further investigations by City staff.
- The contents of the 7/7/86 letter was substantially corrected, but that it did have to be revised to reflect outcome of discussions with Westland.
- City staff was to arrange for the same type of meeting with Skip Buchannan pertaining to El Rancho Atrisco IV.
- Concurrance with treatment of "partial intersections (i.e., settle on number and location of intersections, but don't construct in SAD 215. Construction will take place during development of properties).

2. 8/5/86 - Meeting at Transportation - RE: SAD 215 intersections; Attendee's: City staff, Plains Electric, Westland Corporation staff (Greiner not present)
City and Westland agreed in concept to placement of "partial intersections" for Ladera Industrial Center and El Rancho Atrisco V. The provisions will be addressed in agreements between the City and Westland which will be formalized prior to/or concurrently with future platting.
- City staff had meet with Skip Buchannan. He agreed to their restrictions on access to El Rancho Atrisco IV.

Greiner

Greiner Engineering Sciences, Inc.
2601 Wyoming Boulevard, N.E.
Albuquerque, New Mexico 87112
(505) 292-1936

A Greiner Engineering, Inc. Company

July 7, 1986

Lee Lunsford, P.E.
Special Assessment Engineer
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: SAD 215 - 30% Review and Understanding of Design Concepts

Dear Lee:

Per A/E Agreement 86-12, on Tuesday, July 1, 1986, Reynaldo Cortez and I met with Jesse Ortiz and Dave Harmon to confirm design criteria. Following are those items discussed:

1. Discussion of the Project's time schedule and brief description of what we are attempting to accomplish by the expeditious handling of SAD 215.

2. 98th St. Intersections -

   - Full intersections will be allowed at approximately 749 ft. and 2060 ft. west of centerline at Unser. These intersections will be anticipated by providing median openings and temporary outside curb and gutter. Due to the fact that precise locations have yet to be approved via platting, the actual intersection will not be constructed as a part of SAD 215 (i.e. when properties are developed, the intersection will be completed by the developer).

   - No other intersections on 98th St. will be included in the plans.

3. Unser Blvd. Intersections -

   - Full intersections will be allowed at 98th and Ouray. These have been located and designed per A/E Agreement 84-67.

   - Partial intersections are anticipated:
     + La Midara (proposed street in El Rancho Atrisco III, Tract 6 just north of the Mirehaven Channel crossing) - This shall be a "right-in" only with specific location to be determined.
     + (Old) Ouray Rd. - This shall be a "right-in/right-out" with specific location determined by its platted location. This intersection has been designed and will be constructed.
     + Unnamed Street (proposed in El Rancho Atrisco V just north of the Mirehaven Channel crossing) - This shall be a "right-in/right-out" only with specific location to be determined.
     + Unnamed Street (proposed in El Rancho Atrisco IV midway between the Ladera Channel crossing and the Ouray/Unser intersection) - This shall be a "right-in/right-out" only with specific location to be determined.

Greiner

- The actual location of these partial intersections will be determined by discussion with appropriate City staff, the affected developers, and Greiner prior to final design. Currently this discussion is scheduled for July 10, 1986.

- These intersections will be anticipated by providing temporary outside curb and gutter with the actual intersections being constructed when development takes place rather than during SAD 215.

4. Street Section for Unser Blvd. -

   - The section shall include a 6' sidewalk on the west and a 12' bike lane (offset from the back of curb 6'), on the east. Details of vertical/horizontal design will be reviewed and approved during Preliminary Design Review scheduled for July 1986.

This summarizes our understanding of the general design criteria discussed. By acknowledgement of those noted below, City staff concurs with these findings.

Should you or any City Staff member have any questions and/or comments please call either myself or Reynaldo Cortez. As indicated earlier, timely response to any objection of the above is vital to the smooth development of this project.

Sincerely,

GREINER ENGINEERING

D.L. Morehead, P.E. & L.S.
Project Manager

Attachment: Location Map

cc: Dave Harmon
Jesse Ortiz
Joe David Montano

DLM:tw

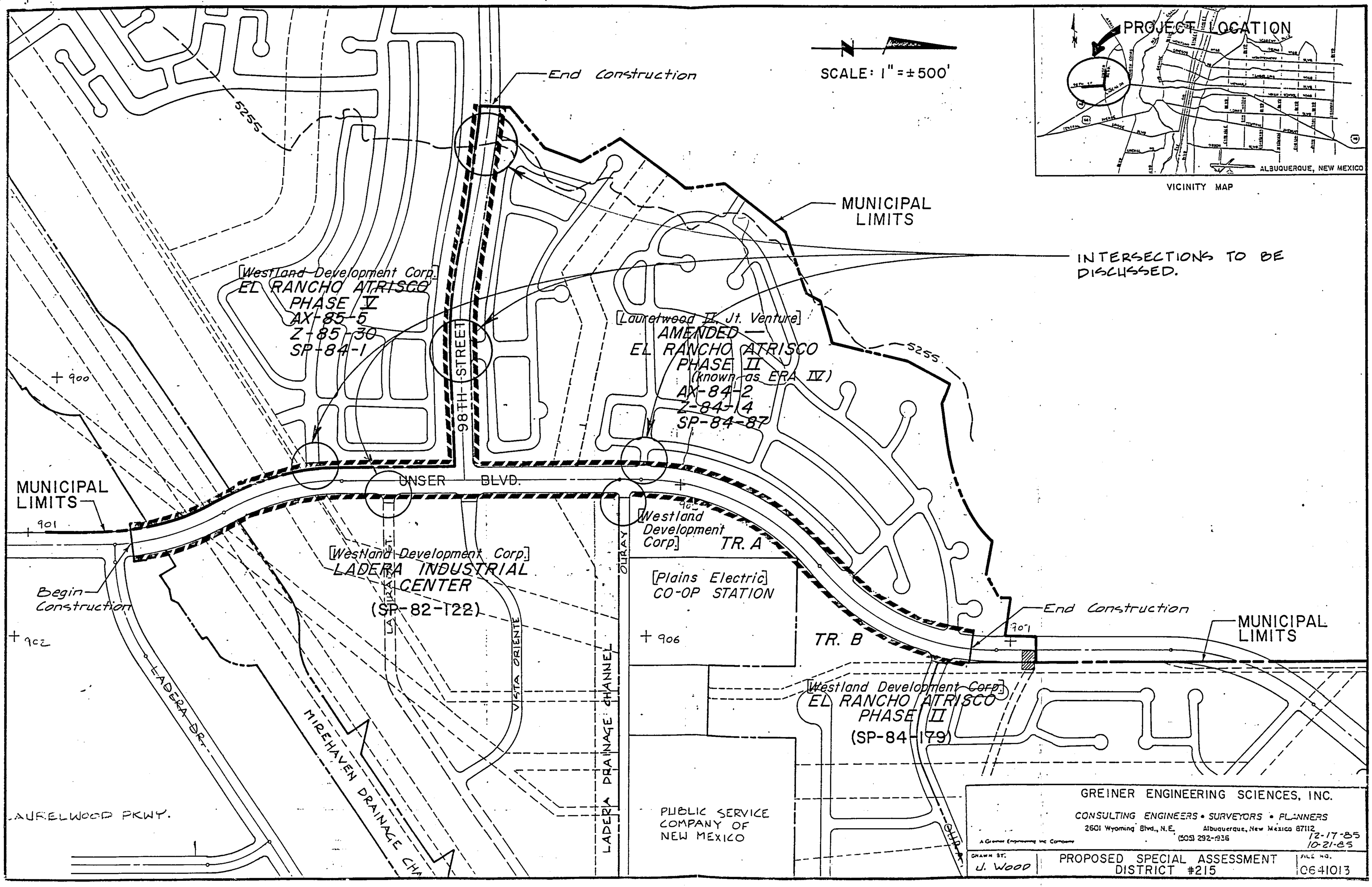
Job No. 0690575

Concurrance:

Robert Fosnaugh, P.E.
Traffic Engineer
Public Works Dept.

George Meador, P.E.
Transportation Planning Engineer
Public Works Dept.

James Hicks, P.E.
Group Head, Design Group
Public Works Dept.


PROJECT LOCATION
ALBUQUERQUE, NEW MEXICO
VICINITY MAP
SCALE: 1" = ± 500'
End Construction
5255
MUNICIPAL LIMITS
INTERSECTIONS TO BE DISCUSSED.
[Westland Development Corp.]
EL RANCHO ATRISCO
PHASE V
AX-85-5
Z-85-30
SP-84-1
[Laurelwood II, Jt. Venture]
AMENDED —
EL RANCHO ATRISCO
PHASE II
(known as ERA IV)
AX-84-2
Z-84-14
SP-84-87
98TH STREET
UNSER BLVD.
+ 900
MUNICIPAL LIMITS
901
Begin Construction
+ 902
[Westland Development Corp.]
LADERA INDUSTRIAL CENTER
(SP-82-122)
LA MIRA ST.
VISTA ORIENTE
LADERA DRAINAGE CHANNEL
OLIVAY
[Westland Development Corp.] TR. A
[Plains Electric] CO-OP STATION
+ 906
TR. B
End Construction
907
MUNICIPAL LIMITS
[Westland Development Corp.]
EL RANCHO ATRISCO
PHASE II
(SP-84-179)
LADERA DR.
MIREHAVEN DRAINAGE CHA
LAUREL WOOD PKWY.
PUBLIC SERVICE COMPANY OF NEW MEXICO
GREINER ENGINEERING SCIENCES, INC.
CONSULTING ENGINEERS • SURVEYORS • PLANNERS
2601 Wyoming Blvd., N.E. Albuquerque, New Mexico 87112
(505) 292-4936
A Greiner Engineering Inc Company
12-17-85
10-21-85
DRAWN BY: J. WOOD
PROPOSED SPECIAL ASSESSMENT DISTRICT #215
FILE NO. 0641013

OUTLINE OF SPECIFICATIONS

A. Project Title

Special Assessment District 215

B. Project Scope

Special Assessement District No. 215 consists of paving, storm drainage and utility improvements for the following streets:

UNSER BLVD., N.W. - From Ladera Drive, N.W. to Ouray Rd., N.W.

98TH ST., N.W. - From Unser Blvd., N.W. westerly approximately 2155 feet.

C. List of Drawings

The preliminary plans shall consist of the following:

Description	Sheet No.
Title Sheet	1
Location Map	2
Design Sheets (P & P and Details)	3-25

D. Standard Specifications

The City of Albuquerque, Interim Standard Specifications Public Works Construction, 1985 Edition, revisions and modifications thereof will be used as a part of the Contract Documents.

The following Technical Specifications will be included as a part of the final plans:

TECHNICAL SPECIFICATIONS

Materials

Section No.	Title
101	Portland Cement Concrete
102	Steel Reinforcement
105	Concrete Curing Compound
106	Cement Mortar and Grout
107	Joint Filler and Sealant Material
108	Brick
112	Paving Asphalt
113	Emulsified Asphalt
116	Asphalt Concrete
121	Plastic Pipe
123	Reinforced Concrete Pipe

125	Vitrified Clay Pipe
129	Ductile Iron Pipe
130	Gray Iron and Dutile Iron Fittings
157	Paint
161	Gray Iron Castings
170	Electronic Marker Disks

Earthwork

201	Clearing and Grubbing
202	Roadway Excavation
204	Fill Construction (revision to be made)
205	Borrow Excavation

Streets and Related Work

301	Subgrade Preparation (revision to be made)
302	Base Course
303	Subbase Preparation
305	Cement Treated Base
336	Asphalt Concrete Pavement
337	Portland Cement Concrete Pavement
340	Portland Cement Concrete Curbs, Gutters, Walks, Driveways, Alley, Intersections, and Median Paving
341	Extruded Asphalt Curb
343	Removal and Disposal of Existing Pavements, Curbs, Gutters, Sidewalks, and Drivepads

Traffic Control

410	Fences

Structures

501	Excavation and Backfill for Structures
510	Concrete Structures
520	Steel Structures
540	Concrete Block Masonry Structures
541	Brick Masonry Structures

Open Channels, Dikes, or Dams

601	Earthwork for Open Channels, Dikes or Dams
603	Riprap

Water Transmission, Collector, Distribution, and Service Lines

701	Installation of Water Transmission, Collector and Distribution Lines
702	Installation of Water Service Lines

Sanitary and Storm Sewer Facilities

801	Trench Excavation and Backfill
802	Sanitary and Storm Sewer Underground Facilities
805	Sanitary Sewer Service Lines
810	Storm Sewer Drainage Appurtenances

Landscaping

915	Seeding (for erosion control)

E. Standard Details

The following City of Albuquerque Standard Details will be used.

CITY OF ALBUQUERQUE STANDARD DETAILS

Sewer

Drawing No.	Title
S-1	Manhole Type "C"
S-2	Manhole Type "E"
S-3	Concrete Manhole Type "C"
S-5	Manhole Frame and Cover
S-6	Service Line & Concrete Block Details for Manhole
S-7	Riser Details Rigid Pipe Main
S-9	Service Line Details
S-12	Sewer Line Dead-End Marker

Drainage

K-1	Storm Inlet Type "A" Plan and Section A-A
K-2	Storm Inlet Type "A" Sections B-B, C-C, D-D & E-E
K-4	Storm Inlet Single "C"
K-5	Storm Inlet Double "C"
K-6	Storm Inlet Double "D"
K-7	Storm Inlet Transition
K-8	Storm Inlet Frame
K-9	Storm Inlet Albuquerque Grate
K-10	Storm Inlet Alternate Grate
K-11	Storm Inlet Center Support Assembly
K-25	Channel Step Detail
K-26	Wire Enclosed Riprap

Water

W-1	Waterline Connection Details
W-2	Valve Box Type "A"
W-3	Valve Box Type "B"
W-4	Ring & Cover for Valve Box
W-7	Plastic Pipe Trench Terminology
W-8	Water Valve Anchorage
W-10	Metered Service Line Installation

W-11	Metered Service Line Installation
W-14	Meter Box Location
W-15	Typical Meter Box Installation
W-16	Double Meter Box for 3/4" and 1" Meters
W-17	Single Meter Box and Cover for 1-1/2" - 2" Water Meters
W-18	Meter Box Cover and Lid
W-19	Heavy Weight Meter Box Cover and Lid
W-20	Fire Hydrant Installation
W-21	Details on Typical Fire Hydrant Locations
W-22	Concrete Blocking Design

Paving

P-1	Typical Residential Street Intersection
P-2	Residential Street Section
P-4	Arterial/Collector Street Sections Without Median
P-8	Curb and Gutter and Temporary Paving Section
P-9	Concrete Valley Gutter
P-11	Drivepads
P-12	Alley Intersection
P-13	Sidewalk Details
P-14	Sidewalk Obstructions
P-15	Sidewalk Transitions
P-16	Wheel Chair Ramp
P-17	Wheel Chair Ramp
P-24	Manhole and Valve Box Regarding
P-25	Citywide Pavement Cuts for all Utilities

REAL ESTATE ACQUISITION REQUIREMENTS

Per contract (Exhibit I, Sec. A.1.f.), included is a location maps showing the real estate acquisitions that will be necessary prior to construction.

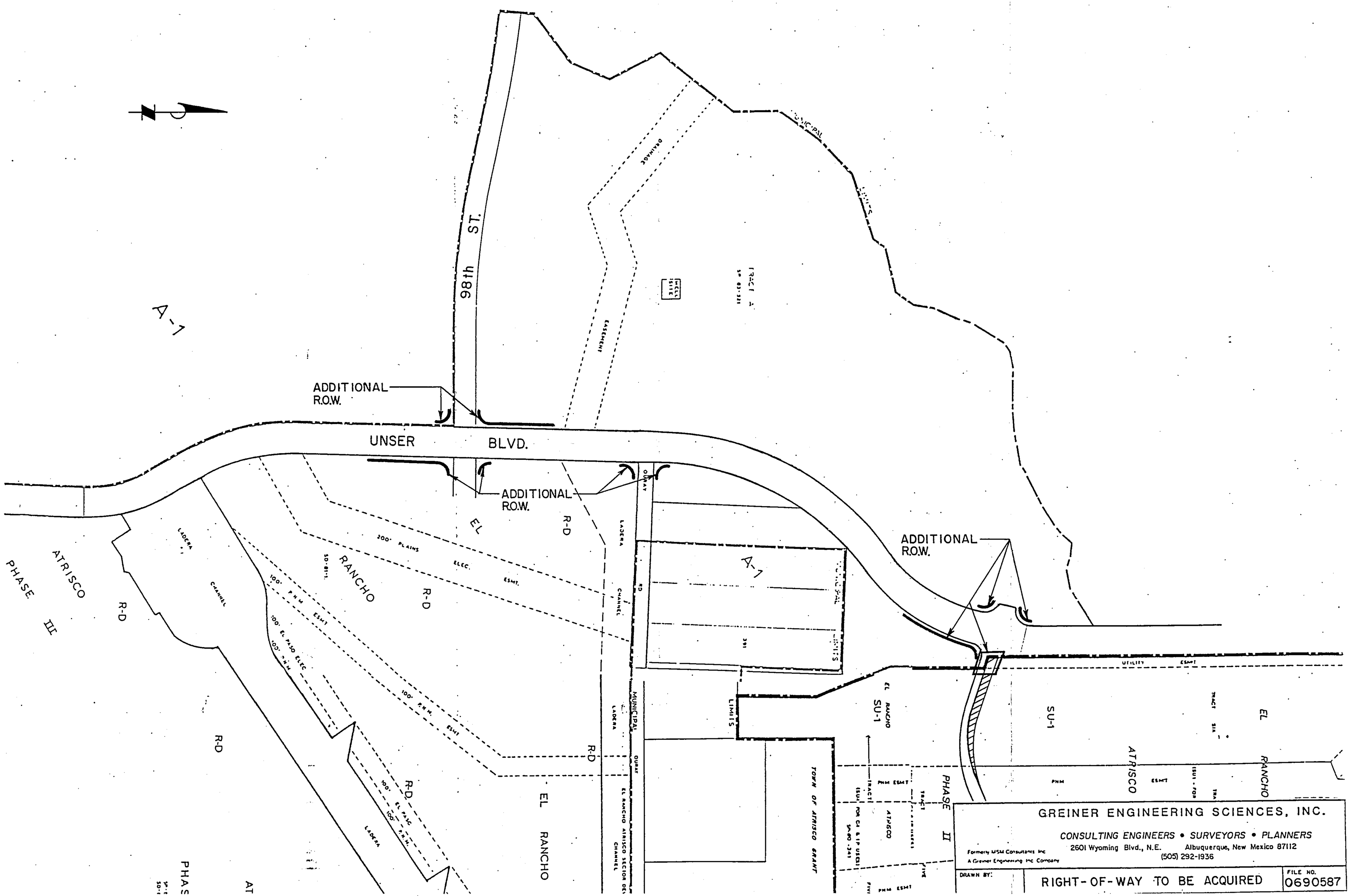
Acquisitions have benn shown as:

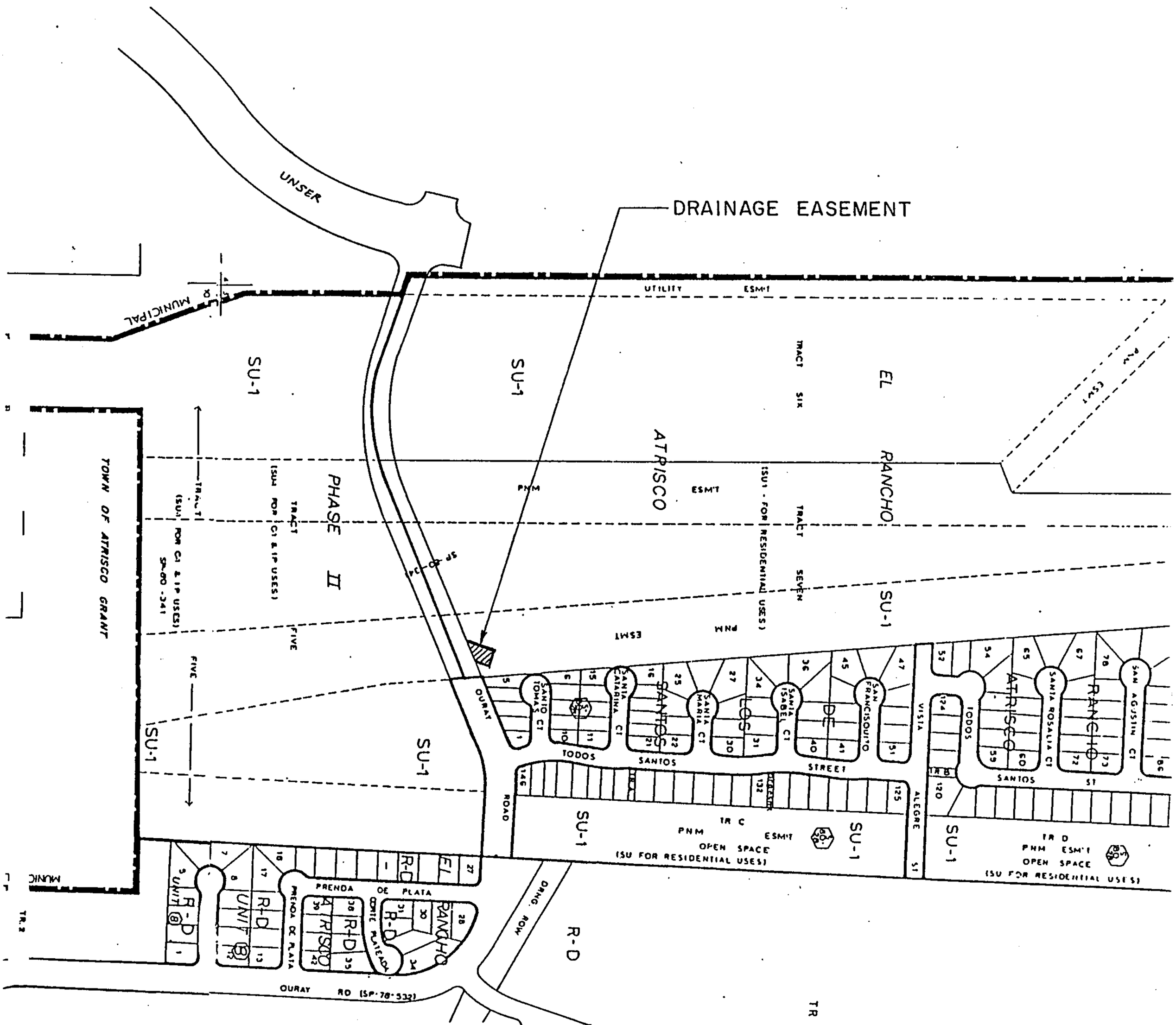
- Right-of-Way acquisition
- Permanent easement acquisition
- Temporary (construction) easement acquisition

The right-of-Way acquisition shown are for acceleration/deceleration lanes, expanded curb return radii and storm drain facilities. These are design elements which need additional right-of-way for their placement.

A permanent easement shown for drainage way realignment. This may be necessary to allow for construction of permanent drainage facilities and will be consistant with the ultimate platting of the corresponding subdivision.

The temporary (construction) easements shown are incidential easements to allow for the construction of the roadway and/or drainage improvements. Some will revert to the property owner when construction is complete. Others will revert to the property owner when the actual property is developed eliminating the need for the temporary roadway and/or drainage improvement (i.e., slope easements).


98th ST.
UNSER BLVD.
ADDITIONAL R.O.W.
ADDITIONAL R.O.W.
ADDITIONAL R.O.W.
A-1
EL RANCHO ATRISCO PHASE III
R-D
RANCHO
200' PLAINS ELEC. ESMT.
100' PNM ESMT
100' EL PASO ELEC
100' PNM
100' EL PASO
100' P.N.M.
LADERA CHANNEL
DURAY RD
MUNICIPAL LIMITS
TOWN OF ATRISCO GRANT
EL RANCHO ATRISCO SECTOR DEV. CHANNEL
SU-1
PHASE II
UTILITY ESMT
PNM ESMT
GREINER ENGINEERING SCIENCES, INC.
CONSULTING ENGINEERS • SURVEYORS • PLANNERS
2601 Wyoming Blvd., N.E. Albuquerque, New Mexico 87112
(505) 292-1936
Formerly MSM Consultants Inc
A Greiner Engineering Inc Company
DRAWN BY:
RIGHT-OF-WAY TO BE ACQUIRED
FILE NO.
0690587



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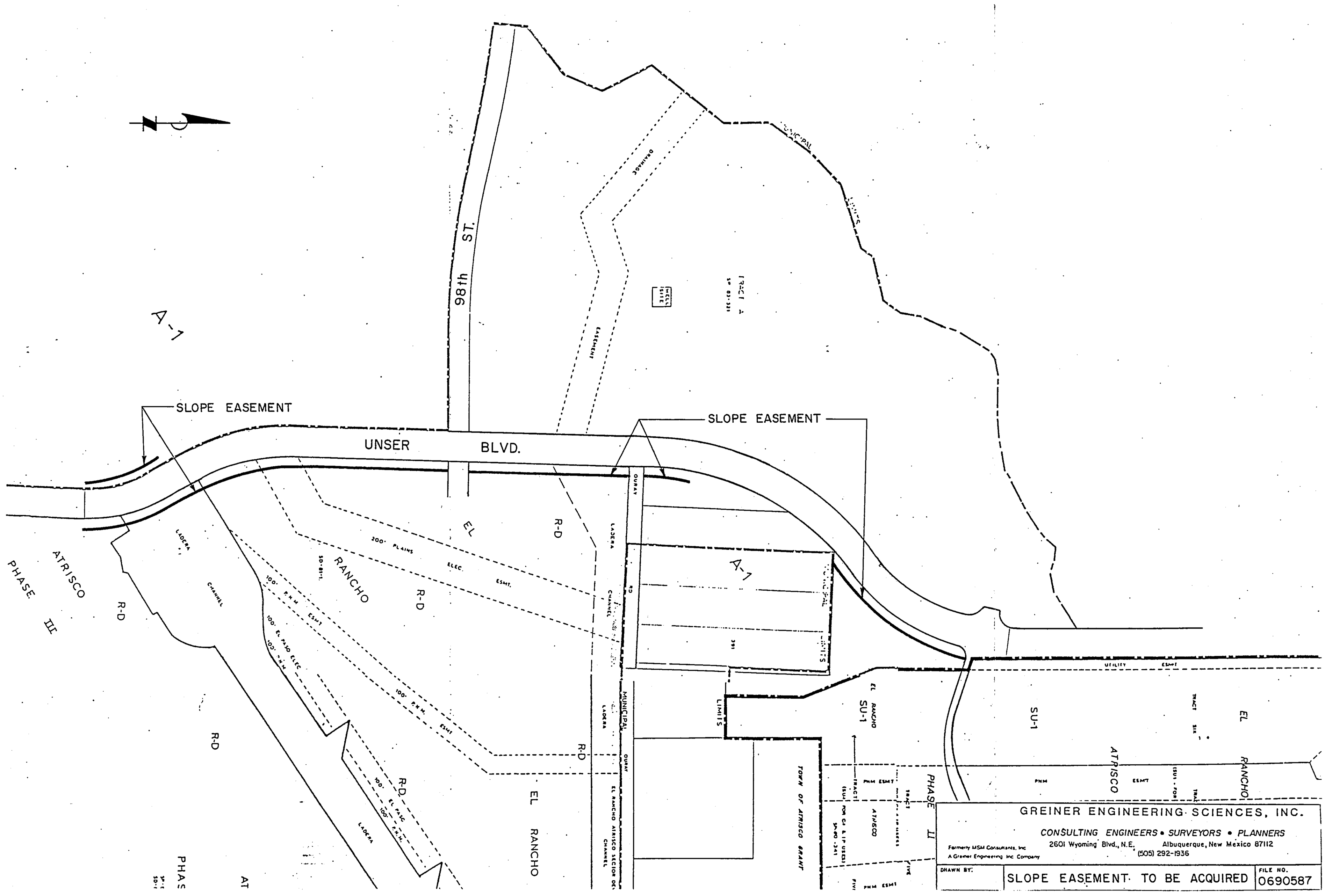
DRAWN BY:	DRAINAGE EASEMENT	FILE NO. 0690587


N
A-1
98th ST.
SLOPE EASEMENT
SLOPE EASEMENT
UNSER BLVD.
EL RANCHO
ATRISCO
PHASE III
R-D
LADERA
CHANNEL
200' PLAINS ELEC. ESMT.
100' PNM ESMT
100' EL PASO ELEC
100' PNM
100' EL PASO ELEC
100' PNM
DURAN
MUNICIPAL
LIMITS
A-1
EL RANCHO ATRISCO SECTION 06
TOWN OF ATRISCO GRANT
SU-1
PHASE II
UTILITY ESMT
PNM ESMT
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SLOPE EASEMENT TO BE ACQUIRED
FILE NO.
0690587

CONSTRUCTION COST ESTIMATE COMPARISON

1/29/86 Evaluation Report vs. Preliminary Construction Cost Estimate @ Resolution #2

	Property Owner		City		Total	
	1/29/86 Evaluation Report	Res. #2	1/29/86 Evaluation Report	Res. #2	1/29/86 Evaluation Report	Res. #2
UNSER:						
Roadway	$ 872,000	$ 617,743	$ 238,000	$ 375,130	$1,110,000	$ 992,873
Drainage	140,000	345,884	45,000	112,491	185,000	458,375
Crossings	-0-	-0-	435,000	469,493	435,000	469,493
Water	22,000	18,358	-0-	9,900	22,000	28,258
Sanitary Sewer	83,000	99,246	-0-	-0-	83,000	99,246
Subtotal	$1,117,000	$1,081,231	$ 718,000	$ 967,014	$1,835,000	$2,048,245
98TH ST.:						
Roadway	$ 195,000	$ 167,398	$ 120,000	$ 101,442	$ 315,000	$ 268,840
Drainage	-0-	-0-	50,000	44,752	50,000	44,752
Water	50,000	7,787	-0-	-0-	50,000	7,787
Sanitary Sewer	-0-	-0-	-0-	-0-	-0-	-0-
Subtotal	$ 245,000	$ 175,185	$ 170,000	$ 146,194	$ 415,000	$ 321,379
TOTAL	$1,362,000	$1,256,416	$ 888,000	$1,113,208	$2,250,000	$2,369,624

EXHIBIT 1

TRACTS 4X, 6X AND 7X EL RANCHO ATRISCO

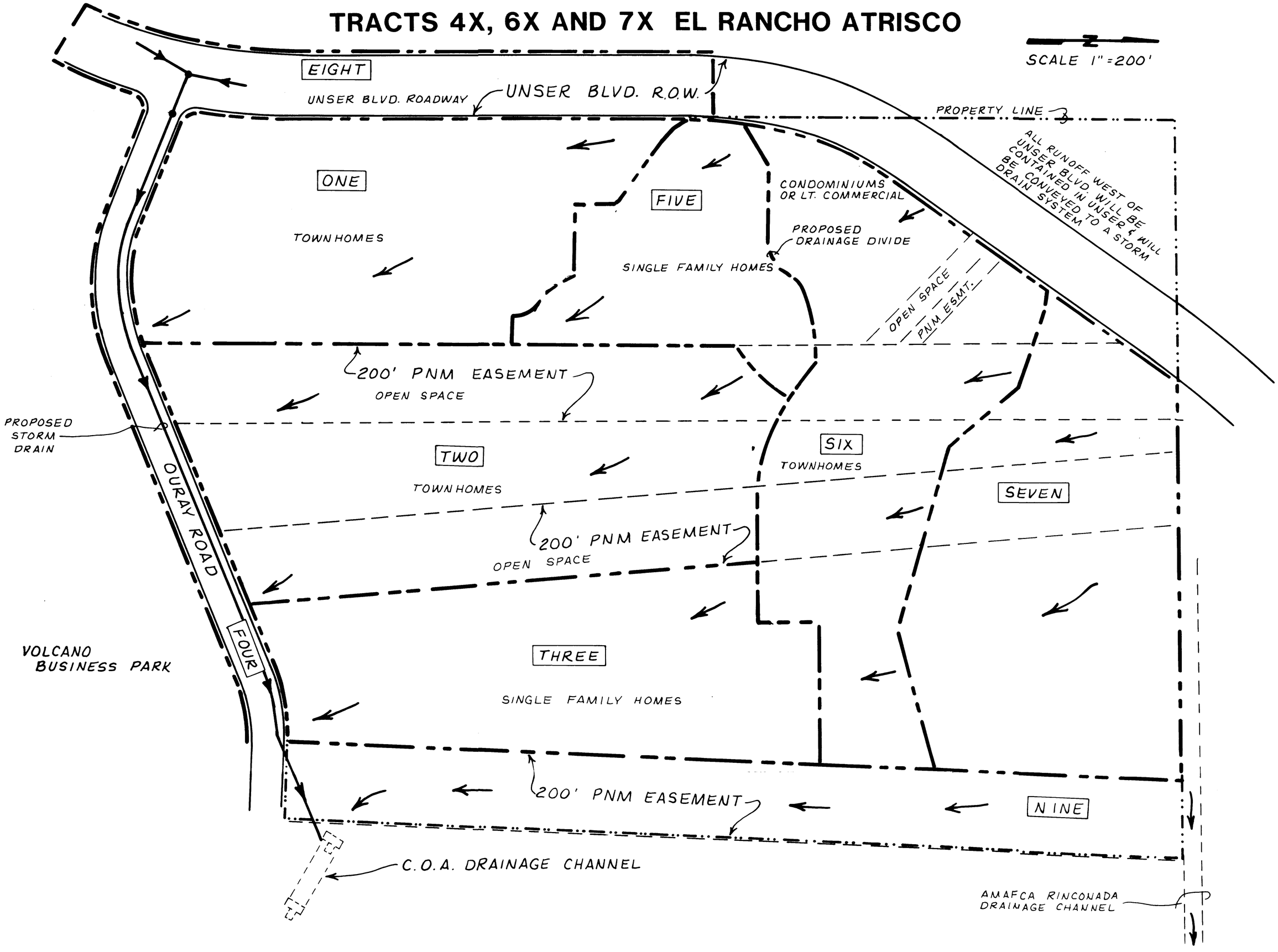

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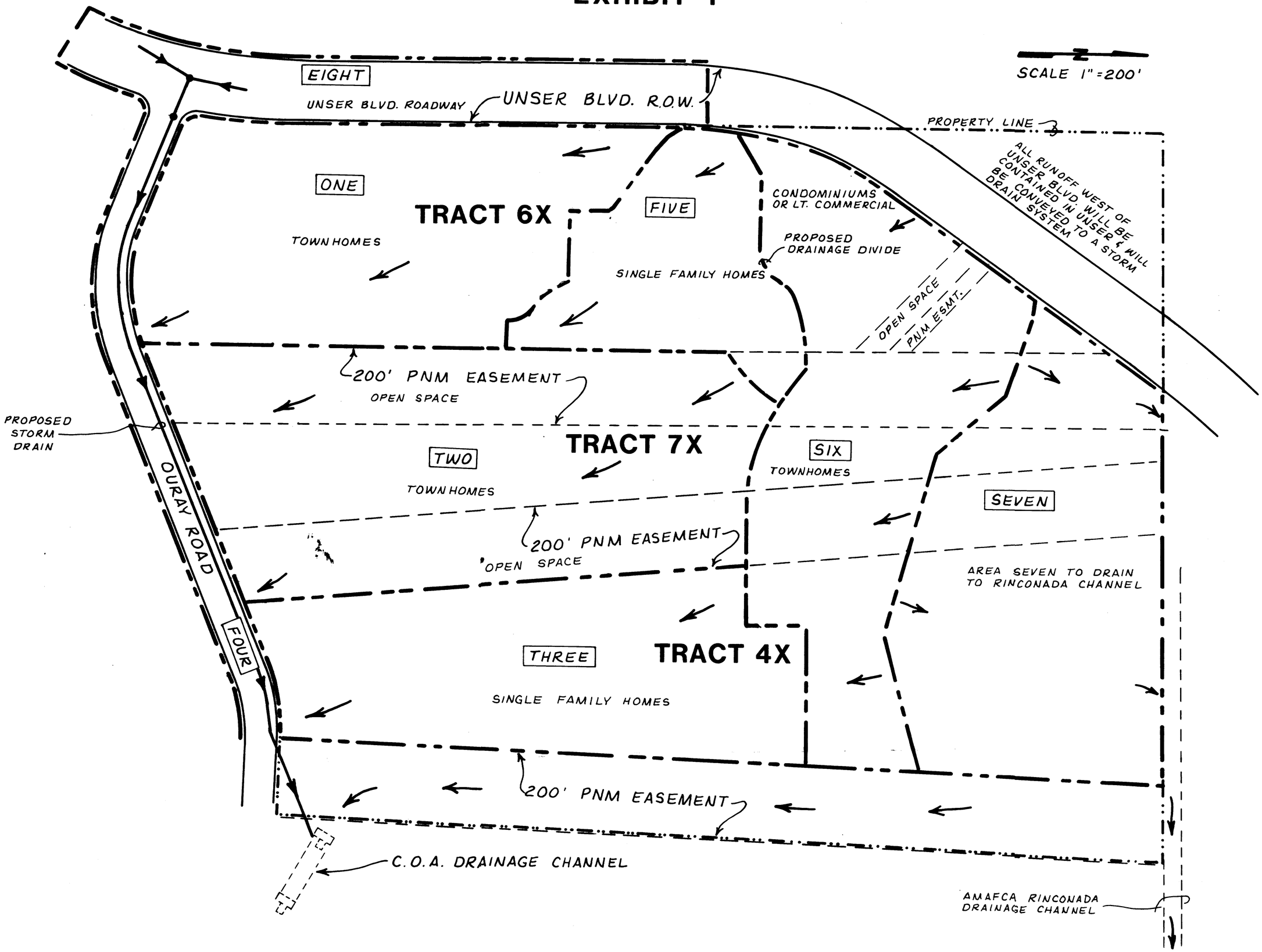
EXHIBIT 1



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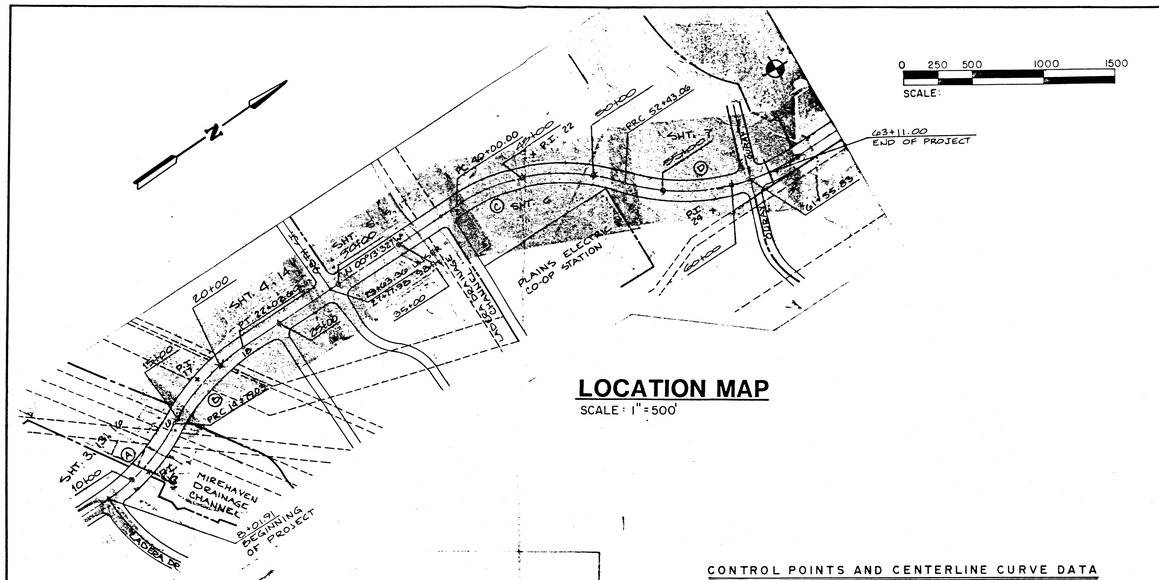

LOCATION MAP

SCALE: 1" = 500'

CONSTRUCTION LENGTH

	STATIONS	LIN. FT.	MI.
UNSER BLVD	8+01.91 to 63+11	5509.09	1.04
98th ST.	5+00 to 27+77.98	2277.98	0.43

LEGEND

PROPOSED EXISTING

Survey Control Points

℄ SURVEY, ℄ CONSTRUCTION

RIGHT-OF-WAY LINE

Curb & Gutter

Asphalt Median Curb

Sidewalks

Bike Path

Wheel Chair Ramps

Map Zone Boundary

8" SAS — Sanitary Sewer Line

Sanitary Sewer Manhole

24" SD — Storm Sewer Line

Storm Sewer Manhole

Storm Drain Inlet

8" W — Water Line

Fire Hydrant

Water Valves

Gas Lines

Telephone Lines

89.53 — Power Pole

Spot Elevation

SHT. 3 — Sheet Layout

Asphalt Mat

Pull Box Location

Mast-Arm Location

Conduit

Slope Limits

Valley Gutter

TEMPORARY CONSTRUCTION EASEMENT

CONTROL POINTS AND CENTERLINE CURVE DATA

ALL COORDINATES BASED ON STATE PLANE COORDINATES FOR "USCGS FALLS"

Point	North	East	Station/Angle	Bearing
"FALLS"	503241.4900	358661.3400	CONTROL	S 47- 2-19.6WST
ACS 3-F10	506553.0445	362217.3694	CONTROL	FROM "FALLS"
13	493207.6258	356642.0906	5+01.90	N 0-39-13.0 E
PC 14	493439.6807	356644.7379	7+33.98	N 0-39-13.0 E
CURVE A				
CC 98	493455.6511	355244.8290	RAD= 1400.0000	=30-29-30.0 LT
	DEGREE=	4- 5-33.2	L= 745.0520	
PI 15	493821.2303	356649.0907	TAN= 381.5744	EXT= 51.3662
				N 29-50-17.0 W
PRC 16	494152.2214	355459.2382	14+79.03	N 29-50-17.0 W
Curve B				
CC 99	49848.7917	357673.6475	RAD= 1400.0000	=29-36-45.0 RT
	DEGREE=	4- 5-33.2	L= 723.5699	
PI 17	494473.2239	356275.4151	TAN= 370.0593	EXT= 48.3828
				N 0-13-32.0 W
PT 18	494843.2803	356273.6583	22+02.60	N 0-13-32.0 W
PC 21	496640.6664	356266.5826	40+00.00	N 0-13-32.0 W
Curve C				
CC 100	493646.1778	357666.5717	RAD= 1400.0000	=50-52-21.0 RT
	DEGREE=	4- 5-33.2	L= 1243.0565	
PI 22	497306.5201	356263.9613	TAN= 665.8588	EXT= 150.2800
				N 50-38-50.0 E
PRC 23	497728.7368	356778.8409	52+43.05	N 50-38-50.0 E
Curve D				
CC 101	498804.8778	355896.3731	RAD= 1391.7000	=50-24-31.0 LT
	DEGREE=	4- 7- 1.1	L= 1224.4124	
PI 24	498144.0756	357285.3332	TAN= 655.0121	EXT= 146.2384
				N 0-14-15.0 E
PT 25	498799.0820	357288.0610	64+67.47	

MASTER DRAINAGE PLAN

LEGEND (DRAINAGE)

- CATCH BASIN
- STORM DRAIN MANHOLE
- DESILTING BASIN
- FUTURE STORM DRAIN
- STORM DRAIN W/HEADWALL
- (F) BASIN DELINEATION
- Q= 42 cfs — 100-YEAR RUN-OFF RATE
- DIRECTION OF FLOW
- DRAINAGE DITCH
- DIVERSION BERM & SWALE

PRINTED

AUG 18 1986

GREINER ENGINEERING
2601 Wyoming NE
Albuquerque, New Mexico 87112
(505) 292-1936

AS BUILT INFORMATION

CONTRACTOR	DATE
SURVEYS STAKED BY	
INSPECTORS	DATE
REPORTS FILED BY	
FIELD	DATE
DRAWINGS CORRECTED BY	
MICRO-FILM INFORMATION	
RECORDED BY	DATE
NO	

BENCH MARKS

"BH-29" BRASS CAP ON NORTH 0.1 MILES FROM THE INTERSECTION OF I-40 & COORS RD. TO OURAY RD. ON WEST APPROX. 0.7 MILES TO THE END OF PAVEMENT. CONTINUE WEST 0.9 MILES ON THE DIRT ROAD TO THE TOP OF THE DAM; ALONG THE BANK OF THE DAM, PAST THE POWER SUB STATION TO A DIRT ROAD, ON SOUTH 0.4 MILES TO A DIRT ROAD, ON N.E. FOR 0.1 MILES TO THE STATION ON THE RIGHT.

ELEVATION = 5395.46

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

NO.	DATE	REMARKS	BY
		REVISIONS	

Greiner JN. 0690585

DESIGN

DESIGNED BY — DATE

DRAWN BY — DATE 6-86

CHECKED BY — DATE

CITY OF ALBUQUERQUE
TRANSPORTATION DEPARTMENT

TITLE: **SAD 215**
UNSER BLVD. – LADERA DR. to OURAY RD.
LOCATION MAP, LEGEND & MASTER DRAINAGE PLAN

APPROVALS	ENGINEER	DATE	APPROVALS	ENGINEER	DATE
City Engineer			Liquid Waste		
A.C.E. Design			Traffic		
A.C.E.-Hydrology			Water		

DRAWING NO. 2803 | MAP NO. G & H9 | SHEET 2 OF