APPENDIX H

HYDRAULIC REPORT AND WATER QUALITY MANAGEMENT PLAN

THE KOLL CENTER RESIDENCES NEWPORT

NEWPORT BEACH, CALIFORNIA

HYDRAULIC REPORT
EXISTING STORM REALIGNMENT

Prepared for:
Shopoff Land Fund II, LP
2 Park Plaza, Suite 700
Irvine, CA 92614
Tel: (949) 417-1396

Prepared by:
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17782 E. 17th Street, Suite 200
Tustin, CA 92780
Tel: (714) 665-4500

DAVID EVANS AND ASSOCIATES INC.

Prepared Under the Supervision of:

Andrew Rappé, P.E. R.C.E. 83702 Exp. Date 03/31/2017

Prepared: November 2, 2016
Revised: December 13, 2016
DEA Job No: SHOPOLF2100

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14297 Cajon Avenue
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TABLE OF CONTENTS

Section 1 - Project Description:

The proposed development is located within the Koll Center in the City of Newport Beach, Orange County, California. The Towers at Koll Center Newport includes a 12.6 acre portion of the Koll Center office park. In general, the property is situated within the northerly portion of the Koll Center, and is bordered by Birch Street to the North, Von Karman to the south and existing office buildings and paved parking and drive areas to the East and West.

The project development includes 260 residential units, 3400 square feet of ground floor retail, and 1.2 Acres of park. In addition, a parking structure with five (5) levels of above ground parking and two (2) levels of subterranean parking will be constructed at the east side of the project boundary. This parking structure will impact the existing 66" diameter RCP Storm Drain. This storm drain is proposed to be rerouted around the proposed parking structure as shown on **Sheet U-4** of the civil plans which is included in Appendix "A".

It should be noted that the relocation of this storm drain was previously approved with the Uptown Newport Planned Community Development Plan PA2011-134. Please refer to Section 6.2.3 Drainage and Water Quality and also **Figure 6-4: Storm Drain Concept** which is included in Appendix "A". The subject Storm Drain will be re-routed with the Phase II Uptown Newport project, which may occur in 10 years. However, with the development of the Koll Center project the subject Storm Drain will be re-routed due to the construction of the parking structure.

The purpose of the enclosed Hydraulic Report is to evaluate the hydraulics of the proposed 66 in. storm drain located along the east boundary of the site. The Storm Drain and Lake at the outlet was originally constructed with the Collins Radio project per the plans dated from 1968. **The Collins Radio project Storm Drain Plans** are included within Appendix "A". These plans include the plan and profile of the existing storm drain. The storm drain laterals located on what is now the Tower Jazz site, 4321 Jamboree, are noted per these plans.

In 1973, the storm drain was extended north from Birch Street, as noted in the **Storm Drain plans for Tract 7953**, included with Appendix "A". In 1981, the plans for **Koll Center Newport Building 14** provided for the storm drain connections of what is now the 5000 Birch Street building.

Section 2 - Methodology:

The existing flow rate within the subject storm drain is based on **calculations performed by Tettemer and Associates** completed in 1999 as part of the City of Newport Beach Storm Drain Master Plan study. The master plan calculations evaluated flow and capacity using the 100-year Rational Method Analysis and manning's equation for open channel

Report are numbered to match those in the Tettemer calculations. Refer to Appendix A for the Tettemer calculations.

Existing pipe slopes and inverts in the Hydraulic Report are based on record drawings. Ground elevations are based on topographical surveys (completed 09/16/13, 10/02/14, and 04/15/16) and design drawings. The HGL at the lake outfall structure was assumed to have an elevation of 40.0' based on record drawings. It should be noted that the calculations provided are a hydraulic analysis whereas the Tettemer calculations computed pipe flow using the Orange County Rational Method Analysis. The Tettemer calculations assumed open pipes and did not evaluate the Hydraulic Grade Line. The hydraulic calculations within this report for the proposed realignment were performed using StormCAD software based on the Hazen-Williams equation for energy loss. The StormCAD software does not evaluate minor bend losses, but these were evaluated separately and determined to be negligible for this project (0.56') given the proposed cover below. However, the bend losses are included in the results table below and are plotted on the pipe profile sheet (page 27 in Appendix A). Please refer to Appendix A for all calculations.

Section 3 - Summary of Results:

The following section provides a summary of the results of the enclosed hydraulic analysis for the Project.

Table 1: Existing Calculation Results

Node	Q (cfs)	HGL El.	Ground El.	Cover (ft)
10002.62	146.60	43.24	47.26	4.02
10002.70	155.38	42.42	49.41	6.99
10002.72	155.38	41.54	49.35	7.81
10002.74	155.38	41.12	49.48	8.36
10002.76	155.38	40.00	40.00	0

Table 2: Proposed Calculation Results

Node	Q (cfs)	HGL El.	Adj. HGL El.*	Ground El.	Cover (ft)
10002.62	146.60	43.21	43.77	47.26	3.49
10002.70	155.38	42.39	42.95	49.41	6.46
10002.72	155.38	41.51	42.07	49.35	7.28
10002.73	155.38	41.30	41.86	49.48	7.62
10002.76	155.38	40.00	40.00	40.00	0

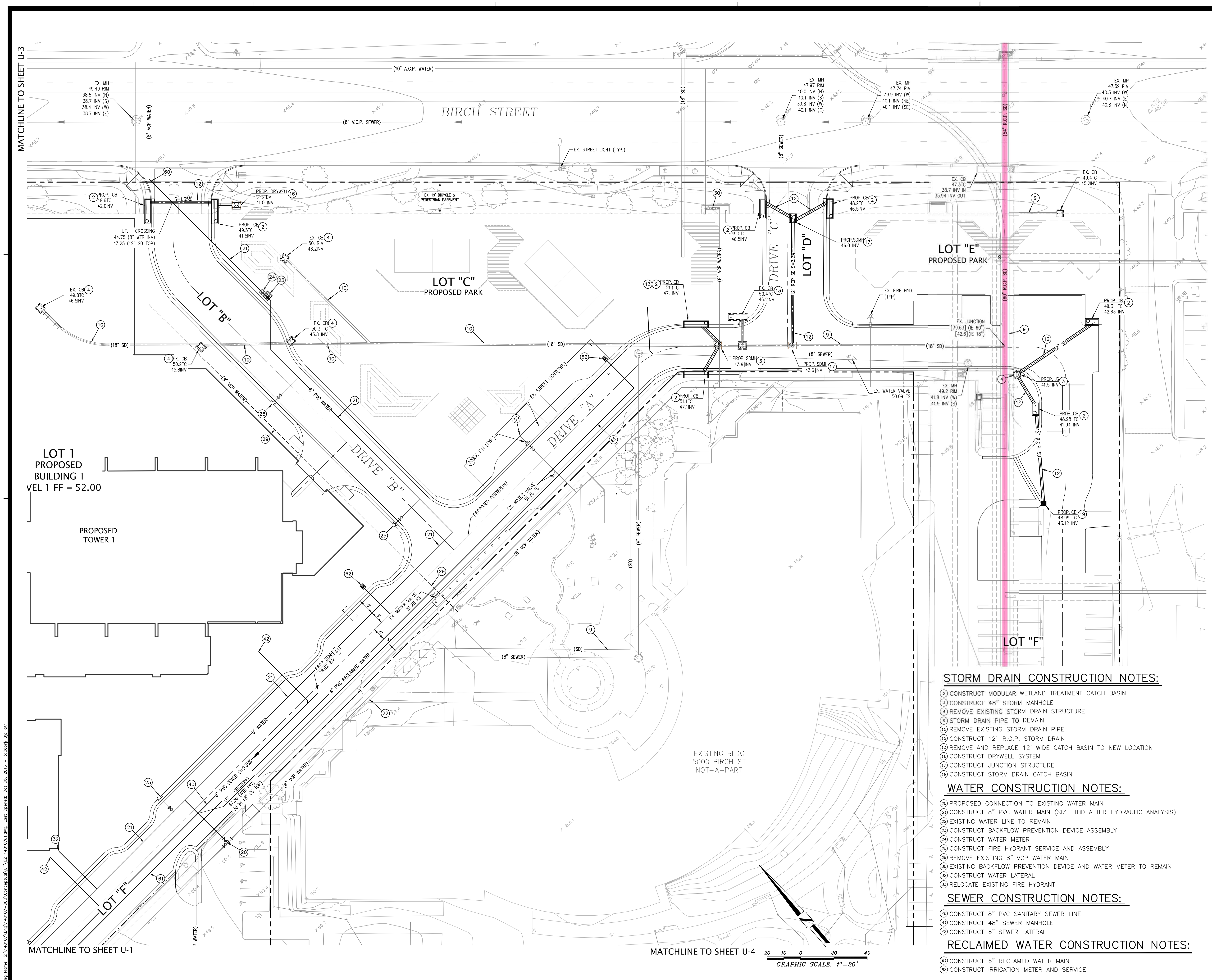
*HGL adjusted to include minor bend losses

The results show that the proposed realignment will not result in a significant increase in Hydraulic Gradient elevation. The realignment of the proposed pipe will be adequate to convey the 100-yr storm. Please refer to Appendix A for full calculations results and profiles.

APPENDIX 'A'

- Preliminary Utility Plans
- Storm Drain Concept
- Record Drawings
- Existing Pipe Network Drawing, Calculations, & Profile
- Proposed Pipe Network Drawing, Calculations, & Profile
- Minor Bend Loss Calculations
- 1999 City of Newport Beach SD Master Plan Calculations

Preliminary Utility Plans



STORM DRAIN CONSTRUCTION NOTES:

(2) CONSTRUCT MODULAR WETLAND TREATMENT CATCH BASIN
(3) CONSTRUCT 48" STORM MANHOLE
(4) REMOVE EXISTING STORM DRAIN STRUCTURE
(9) STORM DRAIN PIPE TO REMAIN
(10) REMOVE EXISTING STORM DRAIN PIPE
(12) CONSTRUCT 12" R.C.P. STORM DRAIN
(13) REMOVE AND REPLACE 12' WIDE CATCH BASIN TO NEW LOCATION
(16) CONSTRUCT DRYWELL SYSTEM
(17) CONSTRUCT JUNCTION STRUCTURE
(19) CONSTRUCT STORM DRAIN CATCH BASIN

WATER CONSTRUCTION NOTES:

(20) PROPOSED CONNECTION TO EXISTING WATER MAIN
(21) CONSTRUCT 8" PVC WATER MAIN (SIZE TBD AFTER HYDRAULIC ANALYSIS)
(22) EXISTING WATER LINE TO REMAIN
(23) CONSTRUCT BACKFLOW PREVENTION DEVICE ASSEMBLY
(24) CONSTRUCT WATER METER
(25) CONSTRUCT FIRE HYDRANT SERVICE AND ASSEMBLY
(29) REMOVE EXISTING 8" VCP WATER MAIN
(30) EXISTING BACKFLOW PREVENTION DEVICE AND WATER METER TO REMAIN
(32) CONSTRUCT WATER LATERAL
(33) RELOCATE EXISTING FIRE HYDRANT

SEWER CONSTRUCTION NOTES:

(40) CONSTRUCT 8" PVC SANITARY SEWER LINE
(41) CONSTRUCT 48" SEWER MANHOLE
(42) CONSTRUCT 6" SEWER LATERAL

RECLAIMED WATER CONSTRUCTION NOTES:

(61) CONSTRUCT 6" RECLAMED WATER MAIN
(62) CONSTRUCT IRRIGATION METER AND SERVICE

THE KOLL CENTER RESIDENCES NEWPORT

CITY OF NEWPORT BEACH

SHOPOFF REALTY INVESTMENTS
2 PARK PLAZA, SUITE 700, IRVINE, CA 92614
TELEPHONE: (949) 417-1396

REVISIONS

	DESCRIPTION	DATE
△		
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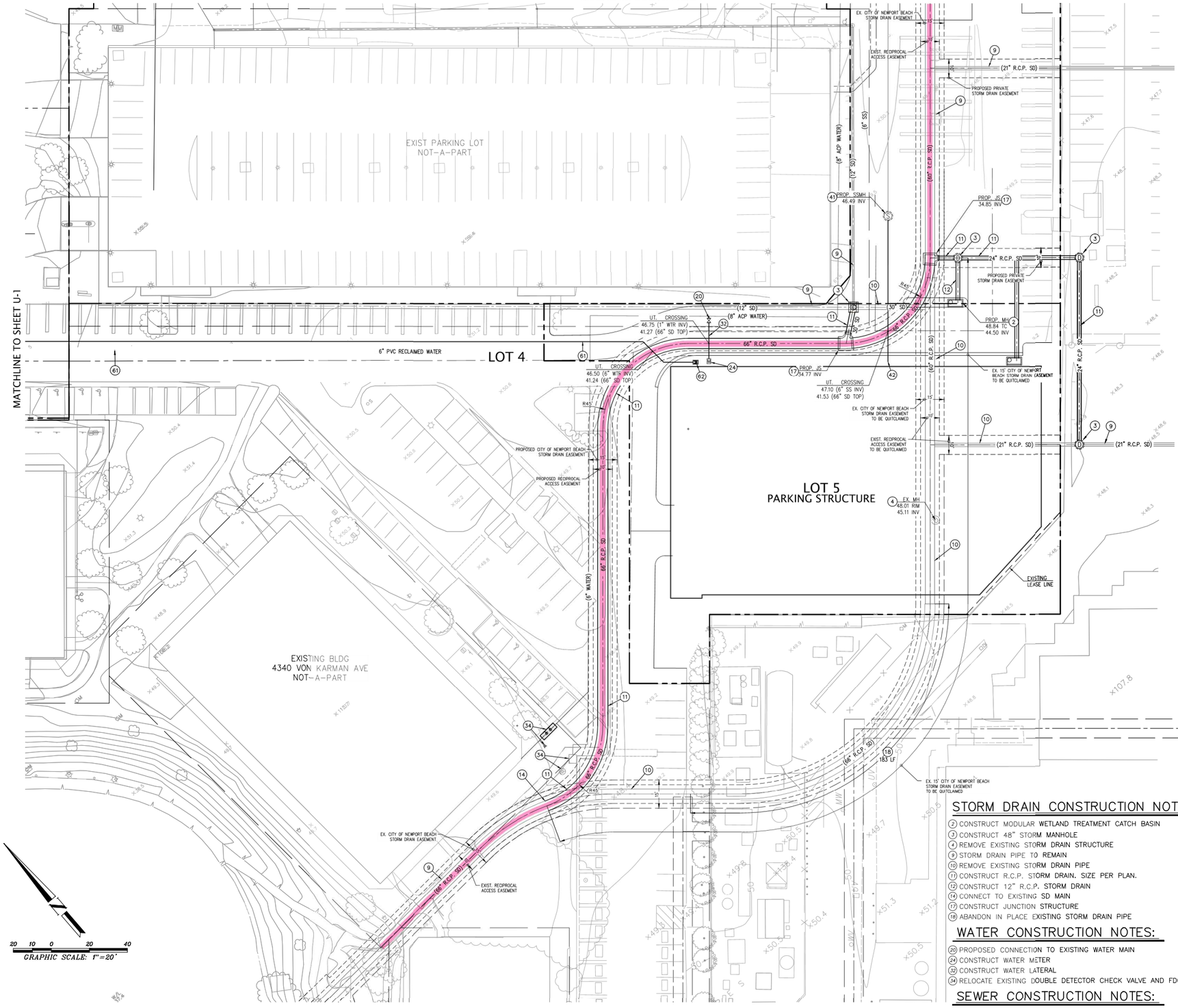
SHEET TITLE

CONCEPTUAL UTILITY PLAN
NORTHEAST

SHEET NUMBER	
U-2	JOB NO. SHOP0LF21000
	DATE 08/25/16
	SCALE 1"=20'

DAVID EVANS AND ASSOCIATES INC.
17782 17th Street Suite 200
Tustin California 92780-1947
Phone: 714.665.4500

CONCEPTUAL DESIGN



STORM DRAIN CONSTRUCTION NOTES:

(2) CONSTRUCT MODULAR WETLAND TREATMENT CATCH BASIN
(3) CONSTRUCT 48" STORM MANHOLE
(4) REMOVE EXISTING STORM DRAIN STRUCTURE
(9) STORM DRAIN PIPE TO REMAIN
(10) REMOVE EXISTING STORM DRAIN PIPE
(11) CONSTRUCT R.C.P. STORM DRAIN. SIZE PER PLAN.
(12) CONSTRUCT 12" R.C.P. STORM DRAIN
(14) CONNECT TO EXISTING SD MAIN
(17) CONSTRUCT JUNCTION STRUCTURE
(18) ABANDON IN PLACE EXISTING STORM DRAIN PIPE

WATER CONSTRUCTION NOTES:

(20) PROPOSED CONNECTION TO EXISTING WATER MAIN
(24) CONSTRUCT WATER METER
(32) CONSTRUCT WATER LATERAL
(34) RELOCATE EXISTING DOUBLE DETECTOR CHECK VALVE AND FDC PORT

SEWER CONSTRUCTION NOTES:

(41) CONSTRUCT 48" SEWER MANHOLE
(42) CONSTRUCT 6" SEWER LATERAL

RECLAIMED WATER CONSTRUCTION NOTES:

(61) CONSTRUCT 6" RECLAMED WATER MAIN
(62) CONSTRUCT IRRIGATION METER AND SERVICE

SHOPOFF REALTY INVESTMENTS
2 PARK PLAZA, SUITE 700, IRVINE, CA 92614
TELEPHONE: (949) 417-1396

THE KOLL CENTER RESIDENCES NEWPORT
CITY OF NEWPORT BEACH

REGISTERED PROFESSIONAL ENGINEER JOHN CURT TILDEN No. 28229 Exp. 03/31/18 CIVIL STATE OF CALIFORNIA

REVISIONS

	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

SHEET TITLE
CONCEPTUAL UTILITY PLAN
SOUTHEAST

SHEET NUMBER
U-4

JOB NO.: SHOP0LF21000
DATE: 11/14/16
SCALE: 1"=20'

DAVID EVANS AND ASSOCIATES INC.
17782 17th Street Suite 200
Tustin California 92780-1947
Phone: 714.665.4500

CONCEPTUAL DESIGN

Storm Drain Concept

6.2.3 Drainage & Water Quality

Upon completion of demolition of the TowerJazz facilities, the storm drain system constructed for Phase 1 will be extended to the northwestern property line to connect to the existing off-site system. Existing storm drains within the Phase 2 area will be removed and replaced with a new underground system that will tie into the off-site public storm drain system within the Koll Center Newport site, as conceptually illustrated in Figure 6-4. The drainage system will be designed in accordance with Orange County hydrology methodology and will be coordinated with the design of the water quality treatment facilities. Because the proposed project will have more vegetated open space areas than currently exists on the site, the amount of post-development runoff will be less than existing.

As described in Section 3.2.3, the proposed project will require development of a Water Quality Management Plan that will specify Low Impact Development (LID) measures to minimize the effects of urbanization on stormwater runoff quality and quantity. The LID Best Management Practices (BMP's) will include infiltration with bioretention in landscape and park areas, planter boxes with underdrains, vegetated filter strips, and proprietary treatment systems. The downstream ponds will provide further water quality treatment through aeration and settlement of silt and sediments.

As the site is developed in Phase 2, BMP's will be installed to treat the additional area of development. To the extent possible, the master developer should provide BMP's for the design capture volume for the site. It may be necessary for the builders to treat runoff from their pad areas, which could be accomplished by means similar to those employed by the master developer.

For the construction phase of the project, a Storm Water Pollution Prevention Plan (SWPPP) will be required. This plan will specify the BMP's to be deployed during construction of the project to minimize deleterious effects on the quality of stormwater runoff from the project.

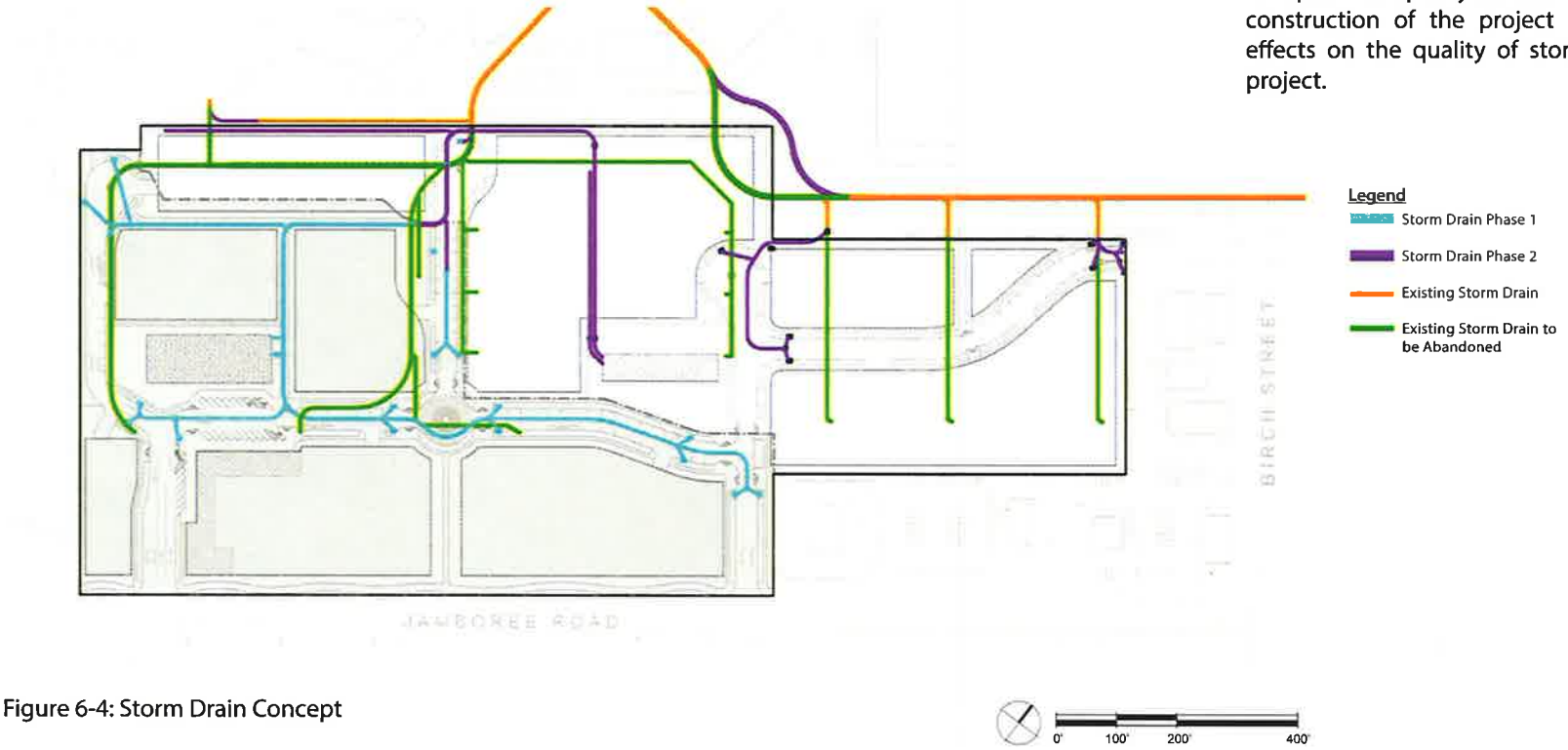
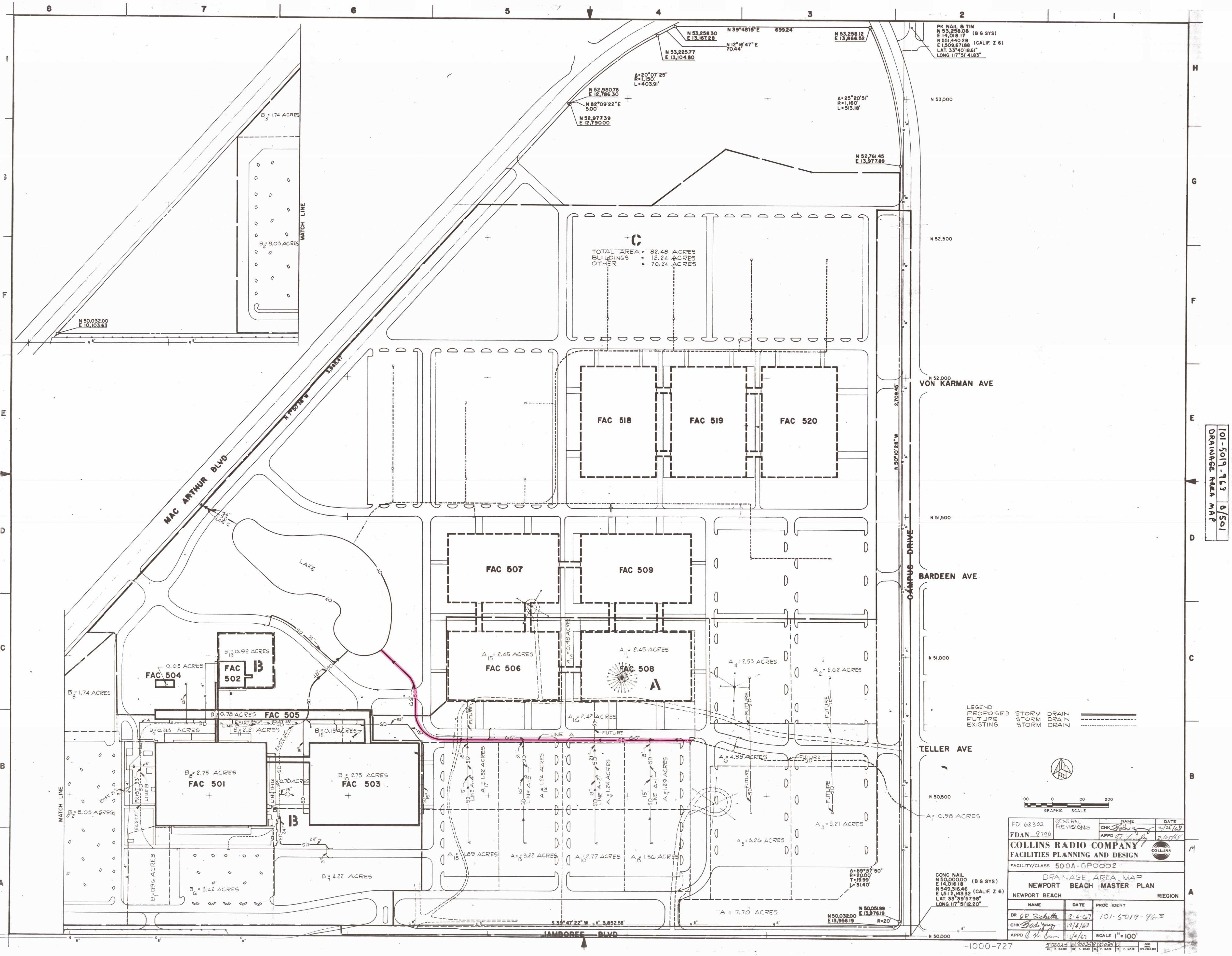
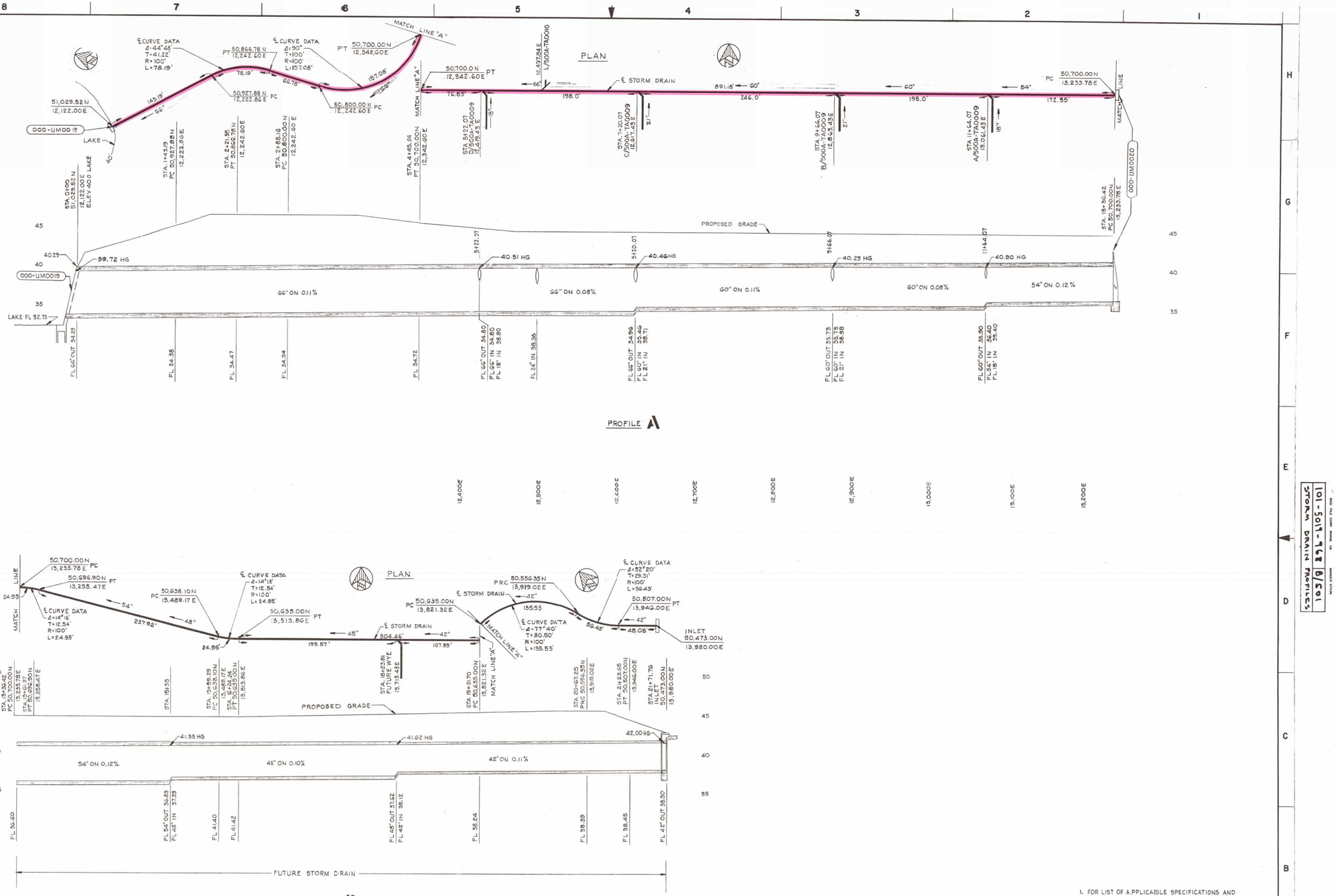


Figure 6-4: Storm Drain Concept

Record Drawings



MAC ARTHUR BLVD
VON KARMAN AVE
BARDEEN AVE
TELLER AVE
CAMPUS DRIVE
JAMBOREE BLVD
LAKE
MATCH LINE
C
TOTAL AREA = 82.48 ACRES
BUILDINGS = 12.24 ACRES
OTHER = 70.24 ACRES
FAC 518
FAC 519
FAC 520
FAC 507
FAC 509
FAC 506
FAC 508
FAC 504
FAC 502
FAC 505
FAC 501
FAC 503
A
B
LEGEND
PROPOSED STORM DRAIN
FUTURE STORM DRAIN
EXISTING STORM DRAIN
GRAPHIC SCALE
FD 68302
FDAN 8790
GENERAL REVISIONS
COLLINS RADIO COMPANY
FACILITIES PLANNING AND DESIGN
FACILITY/CLASS 50:0A-GP0002
DRAINAGE AREA MAP
NEWPORT BEACH MASTER PLAN
NEWPORT BEACH
REGION
DR JR Ricketts 12-4-67
PROC IDENT 101-5019-963
SCALE 1" = 100'
-1000-727
101-5019-963 8/501
DRAINAGE AREA MAP



1. FOR LIST OF APPLICABLE SPECIFICATIONS AND MODULAR STANDARDS: SEE 500A-BA0001 NOTES

FD 68302	GEN REVISIONS	NAME	DATE
FDAN 9713		CHK	4/23/68
		APPD	2/23/68

COLLINS RADIO COMPANY
FACILITIES PLANNING AND DESIGN

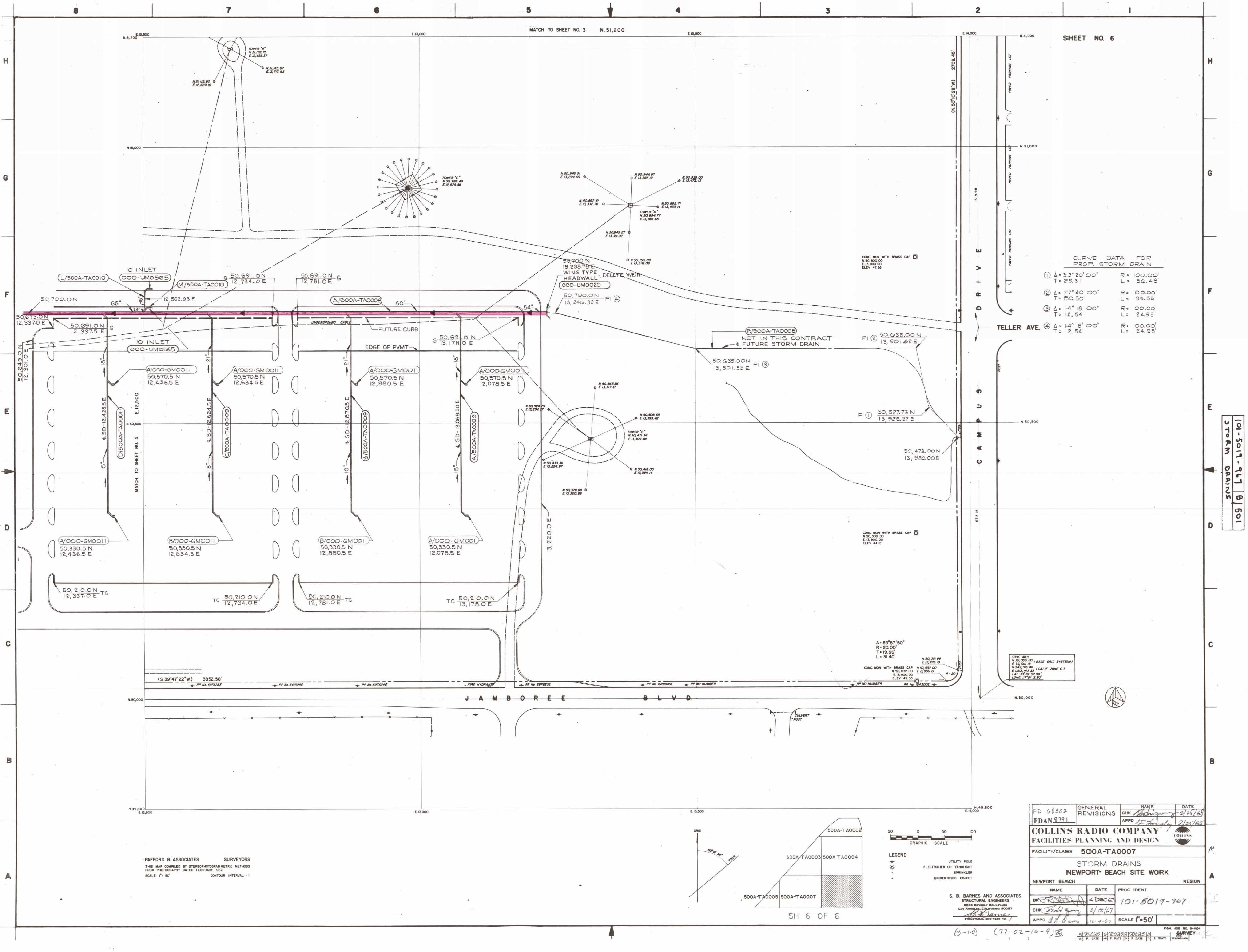
FACILITY/CLASS 500A-TA0008

STORM DRAIN PROFILES
NEWPORT BEACH SITE WORK
NEWPORT BEACH REGION

NAME	DATE	PROC IDENT
DR F.M. Kellaher	12-1-67	101-5019-968
CHK	12/4/67	
APPD	12-4-67	SCALE 1"=40' HORZ, 1"=4' VERT

101-5019-968 | 9/9
STORM DRAIN PROFILES

(3-3.0)



SHEET NO. 6
MATCH TO SHEET NO. 3 N. 51,200
MATCH TO SHEET NO. 5
CURVE DATA FOR PROP. STORM DRAIN
① Δ = 32° 20' 00" T = 29.31' R = 100.00' L = 56.43'
② Δ = 77° 40' 00" T = 80.50' R = 100.00' L = 135.55'
③ Δ = 14° 18' 00" T = 12.54' R = 100.00' L = 24.95'
④ Δ = 14° 18' 00" T = 12.54' R = 100.00' L = 24.95'
TELLER AVE.
CAMPUS DRIVE
JAMBOREE BLVD.
10 INLET
L/500A-TA0010
000-UM0565
M/500A-TA0010
A/500A-TA0008
B/500A-TA0008
NOT IN THIS CONTRACT
℄ FUTURE STORM DRAIN
WING TYPE HEADWALL
DELETE WEIR
000-UM0020
FUTURE CURB
EDGE OF PVMT
UNDERGROUND CABLE
10' INLET
000-UM0565
50,700.0 N
13,233.78 E
50,700.0 N
13,246.32 E PI ④
50,635.00 N
13,501.32 E PI ③
PI ② 50,635.00 N
13,901.82 E
PI ① 50,527.73 N
13,925.27 E
50,473.00 N
13,980.00 E
TOWER "B"
TOWER "C"
TOWER "D"
TOWER "E"
CONC. MON. WITH BRASS CAP
PAFFORD & ASSOCIATES SURVEYORS
THIS MAP COMPILED BY STEREOPHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED FEBRUARY, 1967
SCALE - 1" = 50' CONTOUR INTERVAL = 1'
GRAPHIC SCALE
LEGEND
UTILITY POLE
ELECTROLIER OR YARDLIGHT
SPRINKLER
UNIDENTIFIED OBJECT
500A-TA0002
500A-TA0003
500A-TA0004
500A-TA0005
500A-TA0007
SH 6 OF 6
S. B. BARNES AND ASSOCIATES
STRUCTURAL ENGINEERS
FD 68302
FDAN 87911
GENERAL REVISIONS
CHK 2/25/68
APPD 2/25/68
COLLINS RADIO COMPANY
FACILITIES PLANNING AND DESIGN
COLLINS
FACILITY/CLASS 500A-TA0007
STORM DRAINS
NEWPORT BEACH SITE WORK
NEWPORT BEACH
REGION
NAME
DATE
PROC IDENT
DR 4 DEC 67
CHK 4/12/67
APPD 12-4-67
101-5019-967
SCALE 1"=50'
P.&A. JOB NO. 9-1104
SURVEY
(77-02-16-9)
101-5019-967 B/501
STORM DRAINS

PLAN AND PROFILE
FOR THE IMPROVEMENT OF STREETS WITHIN
AND ADJACENT TO

TRACT Nº 7953

KOLL CENTER NEWPORT

NEWPORT BEACH, CALIFORNIA

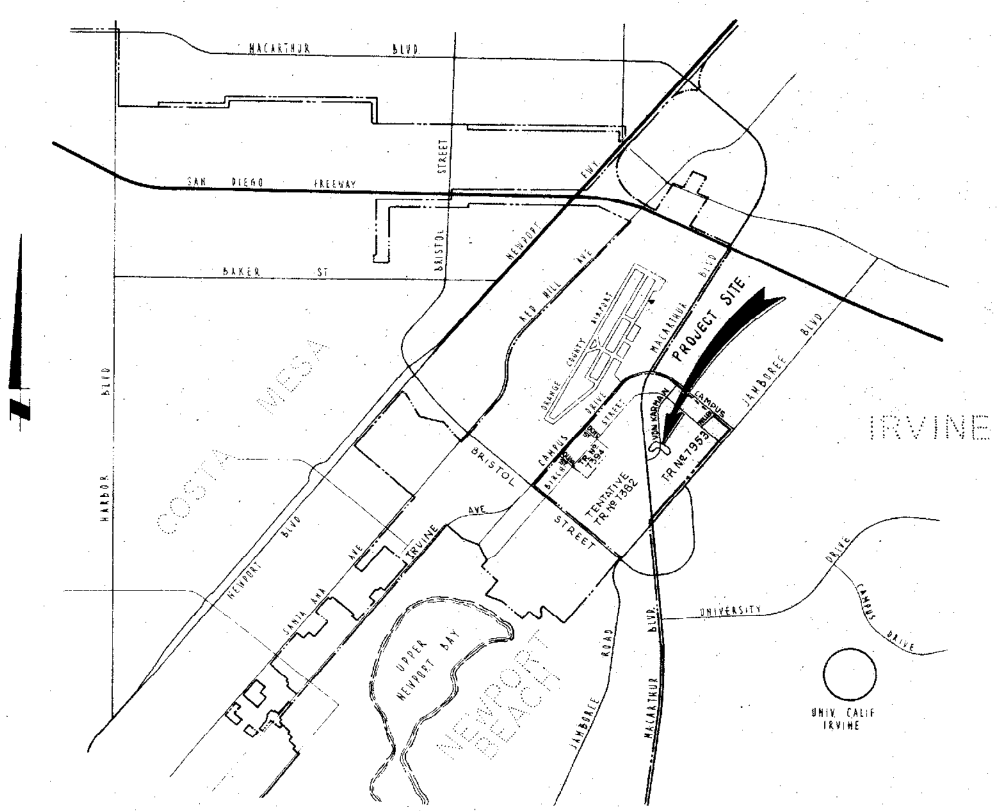
A DEVELOPMENT OF

DON KOLL COMPANY

SHEET INDEX

RECORD DRAWING

THIS IS A RECORD DRAWING OF THE FACILITIES IDENTIFIED IN THE TITLE BLOCK ONLY AND HAS BEEN PREPARED IN PART ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. THE ENGINEER/ARCHITECT AND OWNER(S) WILL NOT BE RESPONSIBLE FOR ANY ERROR(S) OR OMISSION(S) WHICH HAVE BEEN INCORPORATED INTO THIS DRAWING. ACTUAL CONDITIONS WILL VARY SOMEWHAT FROM THE CONDITIONS SHOWN HEREON AND AT SOME LOCATIONS THE VARIANCE MAY BE LARGE. IF THE PRECISE LOCATION OF ANY FACILITY IS REQUIRED, THE FACILITY SHOULD BE FIELD LOCATED IN THE PRESENCE OF AN EMPLOYEE OF THE DISTRICT OR THE OWNER(S) OF THE UTILITIES INVOLVED.



VICINITY MAP
NOT TO SCALE

PLAN LEGEND

- 8" VCP MH — SAN SEWER LINE
- 48" RCP SDMH — STORM DRAIN W/MANHOLE & CATCH BASIN
- 8"W — WATER MAIN
- 8"W — GATE VALVE
- FH — FIRE HYDRANT ASSEMBLY
- T.C. — TOP OF CURB
- F.L. — FLOW LINE
- E.P. — EDGE OF PAVEMENT
- F.S. — FINISH SURFACE
- 2+80 — SAN. SEWER STATION
- SIZE OF DUCTS / NO. OF DUCTS — UNDERGROUND ELECTRICAL DUCTS
- △ — STREET SURVEY MONUMENT
- (6+32.40) — STORM DRAIN STATIONING
- 2" — IRRIGATION SERVICE WITH METER

GENERAL NOTES

1. THE CONSTRUCTION OF ALL PUBLIC IMPROVEMENTS SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPROPRIATE STANDARD DRAWINGS OF THE CITY OF NEWPORT BEACH (ADOPTED APRIL 13, 1970).
2. STATIONING REFERS TO CENTERLINE OF STREETS
3. CURB DATA REFERS TO FACE OF CURB.
4. PAVING SECTIONS SHOWN ARE MINIMUM AND SUBJECT TO REVISION AND APPROVAL OF THE CITY AS REQUIRED BY THE SOIL TESTS TAKEN AFTER COMPLETION OF ROUGH GRADING.
5. ALL UNDERGROUND WORK SHALL BE COMPLETED PRIOR TO PAVING OF STREETS.
6. ALL SEWER LINES SHALL HAVE PLASTIC COMPRESSION JOINTS.
7. ALL PORTLAND CEMENT CONCRETE SHALL BE CLASS 564-C-3000
8. ALL DRAINAGE STRUCTURES AND RETAINING WALL FOOTINGS SHALL BE CONSTRUCTED OF CLASS 564 B-2500 CONCRETE: $f'c$ = 2500 P.S.I., f_s = 18,000 P.S.I., UNLESS OTHERWISE INDICATED ON PLANS.
9. EXISTING UNDERGROUND UTILITIES ARE SHOWN AS PER AVAILABLE RECORDS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION AND ELEVATION IN THE FIELD PRIOR TO BEGINNING CONSTRUCTION OF THE NEW UTILITIES
10. PAVING CONTRACTOR SHALL ACCEPT EXISTING STREET SUBGRADE CONDITIONS UNLESS WRITTEN NOTIFICATION IS GIVEN TO OWNER PRIOR TO BEGINNING WORK.
11. ALL EXPOSED CONCRETE SURFACES SHALL CONFORM IN GRADE, COLOR, AND FINISH TO ALL ADJOINING CURBS AND WALKS.
12. ALL EXPOSED FERROUS METAL PARTS TO BE GALVANIZED PER STD. SPECS AFTER FABRICATION
13. SEWER LINE LENGTH SHOWN ON PLAN AND IN PROFILE IS THE HORIZONTAL DISTANCE MEASURED FROM ℄ OF MANHOLE
14. STORM DRAIN LENGTH SHOWN IS THE HORIZONTAL DISTANCE MEASURED FROM END OF PIPE.
15. STATIONS SHOWN THUS [0+00] ARE SEWER LINE STATIONS. STATIONS SHOWN THUS (0+00) ARE STORM DRAIN STATIONS. BOTH SEWER LINE STATIONS AND STORM DRAIN STATIONS ARE INDEPENDENT OF STREET CENTERLINE STATIONING.
16. BEDDING MATERIAL SHALL BE USED IN ALL UTILITY TRENCHES, INCLUDING WATER MAINS.
17. ALL WATER MAINS SHALL BE ASBESTOS CEMENT PIPE CLASS 150 MIN.; WATER SERVICE LINES SHALL BE ... AS SHOWN; GATE VALVES ADJACENT TO BENDS AND TEES SHALL BE FLANGED BY RING-TITE AND SHALL BE CONNECTED FLANGE TO FLANGE WITH SUCH APPURTENANCES, AS PER IRVINE RANCH WATER DISTRICT SPEC'S, SECTIONS A-9 & A-10 OF WATER MANUAL BY I.R.W.D.
18. FIRE HYDRANTS, WATER METERS & STREET LIGHT STANDARDS SHALL BE LOCATED AT THE BACK OF WALK BETWEEN THE SIDEWALK AND ℄ WHERE SIDEWALK IS CONSTRUCTED ADJACENT TO CURB. IF SIDEWALK IS CONSTRUCTED FOR THE FULL WIDTH OF THE PARKWAY, FIRE HYDRANTS AND STREET LIGHT STANDARDS SHALL BE LOCATED AT THE NORMAL LOCATION BEHIND THE CURB
19. STREET LIGHTS SHALL BE SHIELDED AS INDICATED ON PLANS
20. ALL R.C.P. SHALL BE CAST OR CENTRIFUGALLY SPUN R.C. PIPE OR A.C. PIPE OF LOADS SHOWN ON PLANS (A.C.P. "D"-LOAD = 1.5 R.C.P. "D" LOAD)
21. SEWER MANHOLES SHALL BE LEFT BELOW PAVEMENT GRADE AND BROUGHT TO FINISH GRADE AFTER PAVEMENT IS IN PLACE.
22. THE CONTRACTOR SHALL MAKE THE NECESSARY ARRANGEMENTS WITH THE IRWD FOR THE SHUTTING DOWN & DRAINING OF THE EXISTING WATER LINES IN ORDER TO FACILITATE THE PROPOSED CONNECTIONS
23. V.C.P. STUBS AND THE FIRST JOINT OUT OF ALL MANHOLES SHALL BE A MAXIMUM OF ONE (1) FOOT MEASURED FROM THE INSIDE WALL OF THE MANHOLE.
24. WROUGHT IRON STEPS IN SEWER MANHOLES WILL BE ALLOWED PROVIDED THAT THE MANHOLE MANUFACTURER CERTIFIES IN WRITING THAT THE STEPS INSTALLED ARE WROUGHT IRON FABRICATED FROM 3/4" DIAMETER ROUND BAR AND CONFORMS TO THE REQUIREMENTS OF A.S.T.M. A 207, LATEST REVISION.
25. THE SEAL COAT SHALL CONSIST OF SS-1h ASPHALTIC EMULSION (PAVING ASPHALT GRADE 60-70) AND SHALL BE APPLIED A MINIMUM OF 30 DAYS AFTER THE AC PAVEMENT CONSTRUCTION (AS PART OF THE CLEANUP OPERATION) AT THE RATE OF 0.10 GAL/SQ.YD
26. Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this Project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this Project, excepting for liability arising from the sole negligence of the Owner or the Engineer.

BENCH MARK:
ALUMINUM DISK STAMPED 35-6-71 0.61 MILES NLY ALONG MACARTHUR BLVD. FROM THE JUNCTION OF BRISTOL STREET FORMERLY PALISADES ROAD, AND MACARTHUR BLVD ABOUT 47' EAST OF THE ℄ OF MACARTHUR, ABOUT 482' NLY OF ENTRANCE TO COLLINS RADIO CO. AT A DROP INLET. SET IN TOP OF THE WEST END OF THE NORTH WEST CORNER OF DROP INLET 35' SLY OF END OF CURB.

ELEV 43.259 M.S.L.

IRVINE RANCH WATER DISTRICT
WATER SYSTEM APPROVAL
DATE

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED, NOT INDICATED ON THE PUBLIC RECORDS EXAMINED, LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

RBF
RAUB · BEIN · FROST AND ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
LAND SURVEYORS AND PLANNERS
136 ROCHESTER STREET
COSTA MESA, CALIFORNIA
TEL (714) 548-7723
(714) 542-1022
ROBERT W BEIN
DATE 20 APR 73
RCE NO. 12758

DATE	BY	DESCRIPTION	APP'D	DATE
6-11-73	H.S.H.	⚠ GENERAL REVISION		

REVISIONS

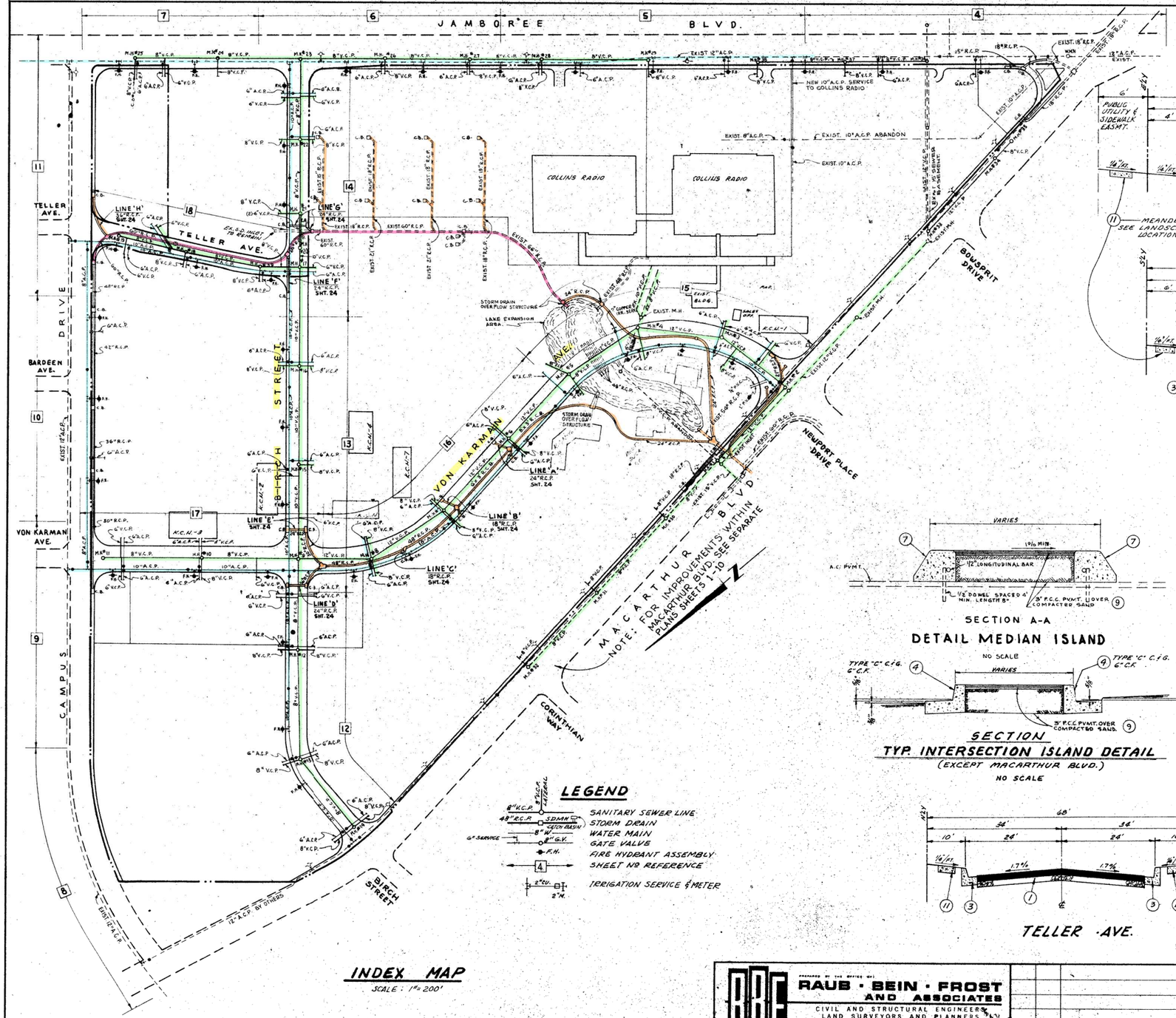
APPROVED
ASST PUBLIC WORKS DIRECTOR
RCE NO. 12806

DESIGNED H.S.H.
DRAWN R.B.
CHECKED R.S.M.
DATE 4-18-73

TRACT Nº 7953
TITLE SHEET

SHEET 1 OF 25

033

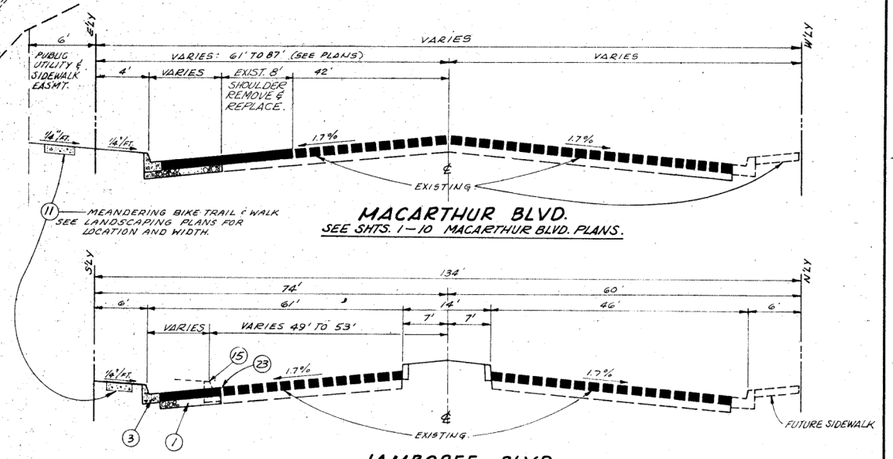


LEGEND

- SANITARY SEWER LINE
- STORM DRAIN
- WATER MAIN
- GATE VALVE
- FIRE HYDRANT ASSEMBLY
- SHEET NO REFERENCE
- IRRIGATION SERVICE & METER

INDEX MAP

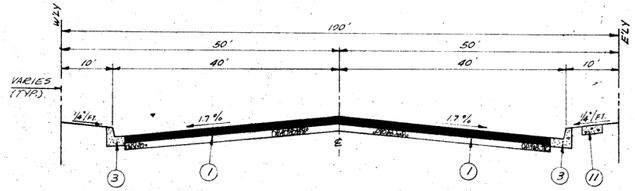
SCALE : 1"= 200'



MACARTHUR BLVD.

SEE SHTS. 1 – 10 MACARTHUR BLVD. PLANS.

JAMBOREE BLVD.



VON KARMAN AVE.

SECTION A-A

DETAIL MEDIAN ISLAND

NO SCALE

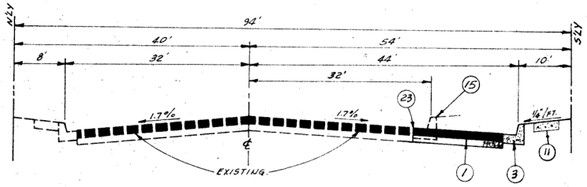
SECTION

TYP. INTERSECTION ISLAND DETAIL

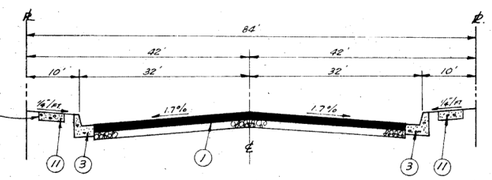
(EXCEPT MACARTHUR BLVD.)

NO SCALE

TELLER AVE.



CAMPUS DRIVE



BIRCH STREET
TELLER AVENUE

RBF

PREPARED BY THE OFFICE OF:
RAUB · BEIN · FROST AND ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
LAND SURVEYORS AND PLANNERS
136 ROCHESTER STREET | TEL: (714) 548-7723
COSTA MESA, CALIFORNIA | (714) 542-1022
Robert W. Bein DATE 3-2-73
ROBERT W. BEIN RCE NO. 2756

DATE	BY	REVISIONS	BSM	APPD. DATE
6-11-73	H.S.H	⚠ GENERAL REVISION	BSM	6-13-73

APPROVED
B. L. Nolan
ASST PUBLIC WORKS DIRECTOR
R.C.E. NO. 12806
DATE 5-24-73

FIELD BOOK	SCALE AS SHOWN
DESIGNED H.S.H.	DRAWN R.B.
CHECKED R.S.M.	DATE 4-18-73

INDEX MAP AND STREET SECTIONS TRACT № 7953

CITY OF NEWPORT BEACH
PUBLIC WORKS DEPARTMENT

SHEET 2 OF 25

033

TOP OF N'LY CURB

FINISHED GRADE @ ℄

MATCH LINE

TOP OF S'LY CURB

PROFILE SCALE
HORIZ. 1" = 40'
VERT. 1" = 4'

PLAN SCALE
1" = 40'

TELLER AVENUE
SEE SHEET Nº 18

JAMBOREE BLVD
SEE SHEET Nº 6

SEE SHEET Nº 13
MATCH LINE

BIRCH STREET

LINE "F" SHT. 24

LINE "G" SHT. 24

P.H. & STUB RE-LOCATED SEE SEPARATE SHEET

32+54.70 BIRCH STREET
230+00.30 JAMBOREE BLVD

32+04.70 E.M.H. Nº 23

CURVE DATA

	Δ	R	L	T
A	90° 00' 00"	350'	549.8'	—
B	180° 00' 00"	150'	471'	—

RBF

PREPARED IN THE OFFICE OF:
RAUB · BEIN · FROST AND ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
LAND SURVEYORS AND PLANNERS
136 ROCHESTER STREET, COSTA MESA, CALIFORNIA
TEL: (714) 548-7723 (714) 542-1022

Robert W. Bein
ROBERT W. BEIN
DATE 20 APR 73
RCE NO. 12758

DATE	BY	DESCRIPTION	APP'D.	DATE
6-11-73	H.S.H	⚠ GENERAL REVISION	D.B.M	6-13-73

REVISIONS

APPROVED
ASST PUBLIC WORKS DIRECTOR
R.C.E. NO. 12806
DATE 5-14-73

FIELD BOOK
SCALE AS SHOWN
DESIGNED H.S.H
DRAWN M.V., J.B
CHECKED A.S.M.
DATE 4-18-73

PLAN AND PLANDE FOR THE IMPROVEMENT OF
BIRCH STREET
FROM STA. 22+00.00 TO STA. 32+54.70
TRACT Nº 7953
CITY OF NEWPORT BEACH
PUBLIC WORKS DEPARTMENT

SHEET 14 OF 25

033

MICROFILMED

GENERAL NOTES

GENERAL:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE GRADING CODE OF THE CITY OF NEWPORT BEACH, THE RECOMMENDATIONS OF THE PROJECT SOILS REPORT AND ANY SPECIAL REQUIREMENTS OF THE PERMIT.
2. DUST SHALL BE CONTROLLED BY WATERING AND/OR DUST PALLIATIVE.
3. SANITARY FACILITIES SHALL BE MAINTAINED ON THE SITE DURING THE CONSTRUCTION PERIOD.
4. WORK HOURS SHALL BE LIMITED TO 7:00 A.M. TO 6:30 P.M. MONDAY THROUGH FRIDAY; 8:00 A.M. TO 6:00 P.M. SATURDAYS; AND 10:00 A.M. TO 6:00 P.M. SUNDAYS AND HOLIDAYS.
5. THE CONTRACTOR SHALL CONTROL NOISE, EXCAVATION, DELIVERY AND REMOVAL ITEMS IN ACCORDANCE WITH THE CITY MUNICIPAL CODE, CHAPTER 10.28.
6. THE STAMPED SET OF APPROVED PLANS SHALL BE ON THE JOB SITE AT ALL TIMES.
7. THE PERMITTEE AND THE CONTRACTOR ARE RESPONSIBLE FOR LOCATION AND PROTECTION OF ALL UTILITIES.
8. APPROVED TEMPORARY DRAINAGE PROVISIONS AND PROTECTIVE MEASURES MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING THE GRADING OPERATION.
9. EXISTING CESSPOOLS AND SEPTIC TANKS SHALL BE ABANDONED IN COMPLIANCE WITH THE UNIFORM PLUMBING CODE AND APPROVED BY THE BUILDING OFFICIAL.
10. WHEN IMPORT OR EXPORT OF MATERIALS IS REQUIRED, HAUL ROUTES TO AND FROM THE SITE SHALL BE APPROVED BY THE CITY TRAFFIC ENGINEER AND HAULING PROCEDURES SHALL BE IN ACCORDANCE WITH THE TRANSPORTATION OF MATERIALS SECTION OF THE CITY GRADING CODE.
11. POSITIVE DRAINAGE SHALL BE MAINTAINED AWAY FROM ALL BUILDING AND SLOPE AREAS.
12. FAILURE TO REQUEST INSPECTIONS AND/OR HAVE REMOVABLE EROSION CONTROL DEVICES ON-SITE AT THE APPROPRIATE TIMES SHALL RESULT IN FORFEITURE OF THE CONSTRUCTION SITE CLEANUP DEPOSIT.

EROSION CONTROL:

1. TEMPORARY EROSION CONTROL PLANS ARE REQUIRED FROM OCTOBER 15 TO MAY 15.
2. BETWEEN OCTOBER 15 AND MAY 15, EROSION CONTROL MEASURES SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHENEVER THE FIVE-DAY PROBABILITY OF RAIN EXCEEDS 30%. DURING THE REMAINDER OF THE YEAR, THEY SHALL BE IN PLACE AT THE END OF THE WORKING DAY WHENEVER THE DAILY RAINFALL PROBABILITY EXCEEDS 50%.
3. LANDSCAPING PLANS SHALL BE SUBMITTED FOR APPROVAL, WORK COMPLETED AND A CERTIFICATE OF CONFORMANCE RECEIVED BY THE CITY GRADING ENGINEER PRIOR TO CLOSURE OF PERMIT, UNLESS A WAIVER OF THIS REQUIREMENT HAS BEEN OBTAINED FROM THE CITY GRADING ENGINEER.
4. TEMPORARY DESILTING BASINS, WHEN REQUIRED, SHALL BE INSTALLED AND MAINTAINED FOR THE DURATION OF THE PROJECT.

REQUIRED INSPECTIONS:

1. A PRE-GRADING MEETING SHALL BE SCHEDULED 48 HOURS PRIOR TO START OF GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, GRADING CONTRACTOR, DESIGN CIVIL ENGINEER, SOILS ENGINEER, GEOLOGIST, CITY GRADING ENGINEER OR THEIR REPRESENTATIVES. REQUIRED FIELD INSPECTIONS WILL BE OUTLINED AT THE MEETING.
2. A PRE-PAVING MEETING SHALL BE SCHEDULED 48 HOURS PRIOR TO START OF THE SUB-GRADE PREPARATION FOR THE PAVING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, PAVING CONTRACTOR, DESIGN CIVIL ENGINEER, SOILS ENGINEER, CITY GRADING ENGINEER OR THEIR REPRESENTATIVES. REQUIRED FIELD INSPECTIONS WILL BE OUTLINED AT THE MEETING.

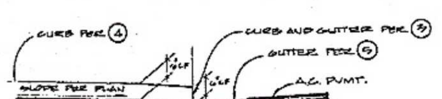
GRADING FILLS/CUTS:

1. CUT SLOPES SHALL BE NO STEEPER THAN 2 HORIZONTAL TO 1 VERTICAL.
2. FILL SLOPES SHALL BE NO STEEPER THAN 2 HORIZONTAL TO 1 VERTICAL AND SHALL HAVE NOT LESS THAN 90% RELATIVE COMPACTION OUT TO THE FINISHED SURFACE.
3. FILLS SHALL BE COMPACTED THROUGHOUT TO A MINIMUM OF 90% RELATIVE COMPACTION AS DETERMINED BY ASTM TEST METHOD 1557, AND APPROVED BY THE SOILS ENGINEER. COMPACTION TESTS SHALL BE PERFORMED APPROXIMATELY EVERY 2 FEET IN VERTICAL HEIGHT AND OF SUFFICIENT QUANTITY TO ATTEST TO THE OVERALL COMPACTION EFFORT APPLIED TO THE FILL AREAS.
4. AREAS TO RECEIVE FILL SHALL BE CLEARED OF ALL VEGETATION AND DEBRIS, SCARIFIED AND APPROVED BY THE SOILS ENGINEER PRIOR TO PLACING OF THE FILL.
5. FILLS SHALL BE KEYED OR BENCHED INTO COMPETENT MATERIAL.
6. ALL EXISTING FILLS SHALL BE APPROVED BY THE SOILS ENGINEER OR REMOVED BEFORE ANY ADDITIONAL FILLS ARE ADDED.
7. ANY EXISTING IRRIGATION LINES AND CISTERNS SHALL BE REMOVED, OR CRUSHED IN PLACE AND BACKFILLED, AND APPROVED BY THE SOILS ENGINEER.
8. THE ENGINEERING GEOLOGIST AND SOILS ENGINEER SHALL, AFTER CLEARING AND PRIOR TO THE PLACMENT OF FILL IN CANYONS, INSPECT EACH CANYON FOR AREAS OF ADVERSE STABILITY AND DETERMINE THE PRESENCE OF, OR POSSIBILITY OF FUTURE ACCUMULATION OF, SUB-SURFACE WATER OR SPRING FLOW. IF NEEDED, DRAINS WILL BE DESIGNED AND CONSTRUCTED PRIOR TO THE PLACEMENT OF FILL IN EACH RESPECTIVE CANYON.
9. THE EXACT LOCATION OF THE SUBDRAINS SHALL BE SURVEYED IN THE FIELD FOR LINE AND GRADE.
10. ALL TRENCH BACKFILLS SHALL BE COMPACTED THROUGHOUT TO A MINIMUM OF 90% RELATIVE COMPACTION, AND APPROVED BY THE SOILS ENGINEER.
11. THE STOCKPILING OF EXCESS MATERIAL SHALL BE APPROVED BY THE CITY GRADING ENGINEER.
12. LANDSCAPING OF ALL SLOPES AND PADS SHALL BE IN ACCORDANCE WITH THE CITY GRADING CODE AND ORDINANCE NO. 1831.
13. ALL CUT SLOPES SHALL BE INVESTIGATED BOTH DURING AND AFTER GRADING BY AN ENGINEERING GEOLOGIST TO DETERMINE IF ANY STABILITY PROBLEM EXISTS. SHOULD EXCAVATION DISCLOSE ANY GEOLOGICAL HAZARDS OR POTENTIAL GEOLOGICAL HAZARDS, THE ENGINEERING GEOLOGIST SHALL RECOMMEND NECESSARY TREATMENT TO THE CITY GRADING ENGINEER FOR APPROVAL.
14. WHERE SUPPORT OR BUTTRESSING OF CUT AND NATURAL SLOPES IS DETERMINED TO BE NECESSARY BY THE ENGINEERING GEOLOGIST AND SOILS ENGINEER, THE SOILS ENGINEER WILL SUBMIT DESIGN, LOCATION AND CALCULATIONS TO THE CITY GRADING ENGINEER PRIOR TO CONSTRUCTION.
15. THE ENGINEERING GEOLOGIST AND SOILS ENGINEER SHALL INSPECT AND TEST THE CONSTRUCTION OF ALL BUTTRESS FILLS, AND ATTEST TO THE STABILITY OF THE SLOPE AND ADJACENT STRUCTURES UPON COMPLETION.
16. WHEN CUT PADS ARE BROUGHT TO NEAR GRADE, THE ENGINEERING GEOLOGIST SHALL DETERMINE IF THE BEDROCK IS EXTENSIVELY FRACTURED OR FAULTED AND WILL READILY TRANSMIT WATER. IF CONSIDERED NECESSARY BY THE ENGINEERING GEOLOGIST AND SOILS ENGINEER, A COMPACTED FILL BLANKET WILL BE PLACED.
17. THE ENGINEERING GEOLOGIST SHALL PERFORM PERIODIC INSPECTION DURING GRADING.
18. NOTIFICATION OF NON-COMPLIANCE: IF, IN THE COURSE OF FULFILLING THEIR RESPONSIBILITY, THE CIVIL ENGINEER, THE SOILS ENGINEER, THE ENGINEERING GEOLOGIST OR THE TESTING AGENCY FINDS THAT THE WORK IS NOT BEING DONE IN CONFORMANCE WITH THE APPROVED GRADING PLANS, THE DISCREPANCIES SHALL BE REPORTED IMMEDIATELY IN WRITING TO THE PERSON IN CHARGE OF THE GRADING WORK AND TO THE CITY GRADING ENGINEER. RECOMMENDATIONS FOR CORRECTIVE MEASURES, IF NECESSARY, SHALL BE SUBMITTED TO THE CITY GRADING ENGINEER FOR APPROVAL.

DOCUMENTATION:

1. AN AS-BUILT GRADING PLAN PREPARED BY THE CIVIL ENGINEER; INCLUDING ORIGINAL GROUND SURFACE ELEVATIONS, AS-GRADED GROUND SURFACE ELEVATIONS, LOT DRAINAGE PATTERNS AND LOCATIONS, AND ELEVATIONS OF ALL SURFACE AND SUB-SURFACE DRAINAGE FACILITIES. HE SHALL PROVIDE WRITTEN APPROVAL THAT THE WORK WAS DONE IN ACCORDANCE WITH THE FINAL APPROVED GRADING PLAN, AND STATE THE NUMBER OF YARDS OF CUT AND/OR FILL MOVED DURING THE OPERATION.
2. A SOILS GRADING REPORT PREPARED BY THE SOILS ENGINEER; INCLUDING LOCATIONS AND ELEVATIONS OF FIELD DENSITY TESTS, SUMMARIES OF FIELD AND LABORATORY RESULTS AND OTHER SUBSTANTIATING DATA, AND COMMENTS ON ANY CHANGES MADE DURING GRADING AND THEIR EFFECT ON THE RECOMMENDATIONS MADE IN THE SOILS ENGINEERING INVESTIGATION REPORT. HE SHALL PROVIDE WRITTEN APPROVAL AS TO THE ADEQUACY OF THE SITE FOR THE INTENDED USE.
3. A GEOLOGIC GRADING REPORT PREPARED BY THE ENGINEERING GEOLOGIST; INCLUDING A FINAL DESCRIPTION OF THE GEOLOGY OF THE SITE, INCLUDING ANY NEW INFORMATION DISCLOSED DURING THE GRADING, AND THE EFFECT OF SAME ON RECOMMENDATIONS INCORPORATED IN THE APPROVED GRADING PLAN. HE SHALL PROVIDE WRITTEN APPROVAL AS TO THE ADEQUACY OF THE SITE FOR THE INTENDED USE AS AFFECTED BY GEOLOGIC FACTORS.

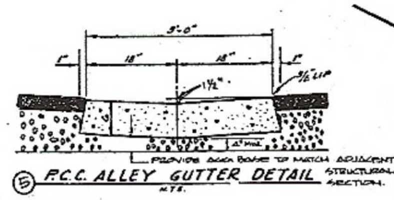
☐ BOX INDICATES GRADING NOTES WHICH APPLY TO THIS PARTICULAR PERMIT FROM THIS LIST OF STANDARD CITY GRADING NOTES.



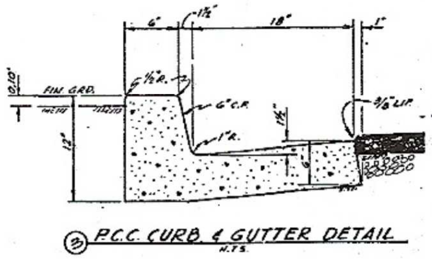
NOTE: ANY CURB WITH LESS THAN 6" FACE WILL BE SUBJECT TO REJECTION BY CITY INSPECTORS.

TYPICAL SECTION AT GUTTER, CURB INTERSECTION

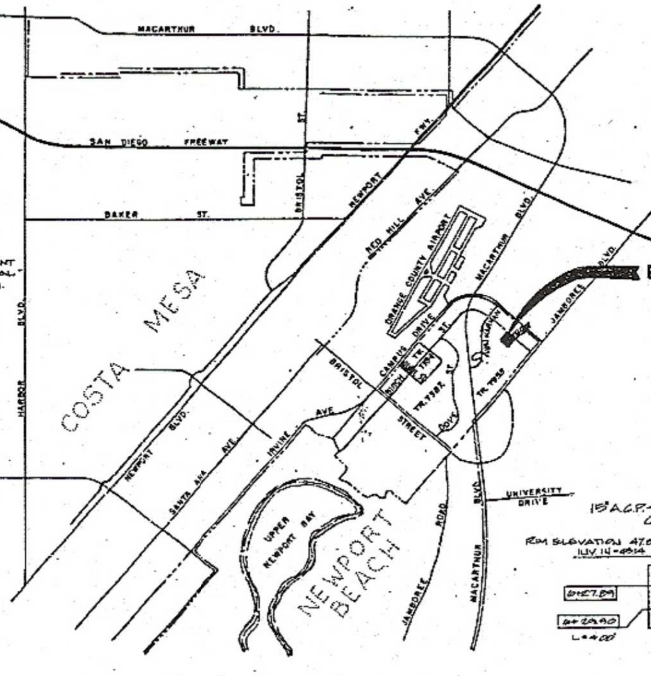
(N.T.S.)



(5) P.C.C. ALLEY GUTTER DETAIL (N.T.S.)

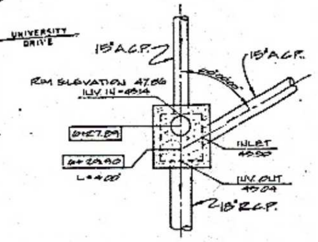


(3) P.C.C. CURB & GUTTER DETAIL (N.T.S.)



VICINITY MAP

NOT TO SCALE



(22) JUNCTION STRUCTURE DETAIL

SCALE: 1" = 6'

PAVING NOTES

1. A PRE-PAVING MEETING SHALL BE REQUIRED AT THE SITE PRIOR TO THE COMMENCEMENT OF ANY PAVING WORK WITH THE FOLLOWING PEOPLE PRESENT: OWNER, PAVING CONTRACTOR, DESIGN CIVIL ENGINEER, SOILS ENGINEER, BUILDING OFFICIAL OR THEIR REPRESENTATIVES.
2. ALL TRENCH BACKFILLS SHALL BE COMPACTED THROUGHOUT TO A MINIMUM OF 90% RELATIVE COMPACTION, AND APPROVED BY THE SOILS ENGINEER PRIOR TO SUBGRADE PREPARATION.
3. THE PERMITTEE OR HIS AGENT SHALL NOTIFY THE BUILDING OFFICIAL WHEN THE PAVING OPERATION IS READY FOR EACH OF THE FOLLOWING INSPECTIONS:
   - A. INITIAL INSPECTION. WHEN THE PERMITTEE IS READY TO BEGIN WORK, BUT NOT LESS THAN TWO DAYS BEFORE ANY GRADING COMMENCES.
   - B. SUBGRADE INSPECTION. AFTER THE SOIL SURFACE HAS BEEN COMPACTED, TESTED, LINE AND GRADE ESTABLISHED, BUT PRIOR TO AGGREGATE BASE PLACEMENT.
   - C. AGGREGATE BASE INSPECTION. AFTER THE AGGREGATE BASE HAS BEEN COMPACTED, TESTED, LINE AND GRADE ESTABLISHED, BUT PRIOR TO ASPHALT CONCRETE PLACEMENT.
   - D. FINAL INSPECTION. AFTER RECEIPT OF LINE AND GRADE CERTIFICATION BY THE DESIGN CIVIL ENGINEER AND REPORT BY THE SOILS ENGINEER.
4. THE SOILS ENGINEER SHALL SUBMIT THE PROJECT'S STRUCTURAL SECTION RECOMMENDATION(S) TO THE BUILDING OFFICIAL, BASED ON THE FINAL 'R' VALUE(S) AND TRAFFIC INDEX(ES), FOR APPROVAL PRIOR TO ESTABLISHMENT OF FINAL SUBGRADE ELEVATIONS.
5. SUBGRADE SHALL BE COMPACTED TO A MINIMUM OF 90% RELATIVE COMPACTION, AND UNYIELDING PRIOR TO PLACEMENT OF AGGREGATE BASE; APPROVED BY THE SOILS ENGINEER, AND THE DESIGN CIVIL ENGINEER.
6. AGGREGATE BASE SHALL CONFORM TO PROVISIONS FOR *CLASS 2* BASE AS STATED IN THE CURRENT EDITION OF THE STANDARD SPECIFICATION, *STATE OF CALIF. DIV. OF HIGHWAYS.*
7. AGGREGATE BASE PLACEMENT SHALL BE APPROVED BY THE SOILS ENGINEER PERTINENT TO COMPACTION, MINIMUM OF 95% RELATIVE COMPACTION, AND CONFORMANCE TO DESIGN THICKNESS(ES) PRIOR TO PLACEMENT OF ASPHALT CONCRETE.
8. A PRIME COAT IS REQUIRED PRIOR TO PLACEMENT OF ASPHALT CONCRETE. AS REQUIRED, THE SURFACE OF THE UNTREATED AGGREGATE BASE SHALL BE COATED WITH 0.25 GAL/YD² OF SC-70 OR SC-250 LIQUID ASPHALT.
9. TACK COAT AND ASPHALT CONCRETE SHALL CONFORM TO PROVISIONS AS STATED IN THE CURRENT EDITION OF THE STANDARD SPECIFICATION, *(CALTRANS) TYPE B, 1/2" MAX MEDIUM.*
10. PLACEMENT OF ASPHALT CONCRETE SHALL BE INSPECTED AND APPROVED BY EITHER A REPRESENTATIVE OF THE SOILS ENGINEER OR A QUALIFIED PAVEMENT INSPECTION SPECIALIST; RELEVANT TO EQUIPMENT USED, TEMPERATURE OF LOADS, AND DEPTH OF DENSIFIED ASPHALT CONCRETE.
11. A FOG SEAL COAT IS REQUIRED AND THE COAT SHALL CONFORM TO THE PROVISIONS AS STATED IN THE STANDARD SPECIFICATIONS. (0.10 GAL./YD.²)
12. STRIPING SHALL CONFORM TO PROVISIONS AS STATED IN THE CURRENT EDITION OF STANDARD SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION.
13. THE BUILDING OFFICIAL WILL GIVE A FINAL RELEASE WHEN THE FOLLOWING HAS BEEN APPROVED:
   - A. DESIGN CIVIL ENGINEER'S CERTIFICATION OF LINE AND GRADE.
   - B. SOILS ENGINEER'S REPORT.
   - C. BUILDING OFFICIAL'S FIELD INSPECTION (IF NECESSARY, THE PAVEMENT SHALL BE WATER TESTED TO VERIFY PROPER DRAINAGE).
14. FAILURE TO REQUEST INSPECTIONS AT THE APPROPRIATE TIME WILL RESULT IN FORFEITURE OF THE CONSTRUCTION SITE CLEANUP DEPOSIT.

LANDSCAPING NOTES

1. FOR DEMOLITION OF EXISTING IRRIGATION LINES SEE LANDSCAPE ARCHITECT'S PLAN.
2. BLEND PROPOSED GRADES TO SMOOTH TRANSITION WITH EXISTING.
3. CONTRACTOR SHALL PROTECT AND MAINTAIN, WHERE FEASIBLE, ALL EXISTING PLANTING WITHIN LIMITS OF CONSTRUCTION.
4. SEE LANDSCAPE PLANS FOR TREE RELOCATION/PRESERVATION AND FINISHED GRADES WITHIN PLANTER AREAS.
5. SELECTED EXISTING TREES ARE TO BE BOXED, STORED ON SITE, MAINTAINED DURING CONSTRUCTION, AND RELOCATED PER DIRECTION OF LANDSCAPE ARCHITECT.
   32 SYCAMORES (APPROXIMATELY 48" BOX) AND 10 PINES (APPROXIMATELY 54-60" BOX) ARE TO BE BOXED AND RELOCATED.
6. ALL RELOCATION WORK IS TO BE COORDINATED WITH LANDSCAPE ARCHITECT PRIOR TO SITE DEMOLITION AND GRADING.

ESTIMATE OF EARTHWORK QUANTITIES

EXCAVATION	40,700	CU. YDS.
EMBANKMENT	4,400	CU. YDS.
EXPORT	36,300	CU. YDS.

ALL EXCESS EARTH SHALL BE DISPOSED OF AT A COUNTY DUMP OR OTHER SITE SUBJECT TO THE APPROVAL OF THE GRADING INSPECTOR.

LEGEND

- NEW A.C. OVERLAY
- P.C.C. PAVEMENT
- ASPHALT CONCRETE PAVEMENT
- PROPOSED BUILDING
- T.C. TOP OF CURB
- FL FLOW LINE
- F.S. FINISH SURFACE
- C.F. CURB FACE
- E.P. EDGE OF PAVEMENT
- G.B. GRADE BREAK
- H.P. HIGH POINT
- EXIST. CONTOUR
- P.A. PLANTER AREA
- R RIDGE
- SAWCUT PVMT.
- LIMIT OF CONST.
  NOTE: REMOVE ALL EXISTING SURFACE IMPROVEMENTS WITHIN LIMIT LINE - DO NOT REMOVE PVMT. IN AREAS DESIGNATED AS A.C. OVERLAY.
- RETAINING WALL (SEE ARCH'L. - SEPARATE PERMIT REQ'D.)
- EXIST. P.C.C. CURB TO BE REMOVED

S.D. STORM DRAIN
O.D. OVERFLOW DRAIN
P.O.C. POINT OF CONNECTION
INV. INVERT ELEVATION
(48.70) EXISTING SPOT ELEVATION
47.20 NEW SPOT ELEVATION

INDEX TO SHEETS

* NOTE: WEAKENED PLANE & EXPANSION JOINTS IN P.C.C. SIDEWALKS SHALL CONFORM TO THE REQUIREMENTS OF CITY OF NEWPORT BEACH STD. - 180-L.

CONSTRUCTION NOTES & ESTIMATED QUANTITIES

ITEM NO.	ITEM	AMOUNT	UNIT
1	CONST. 3" A.C. W/SEALCOAT OVER 6" CLASS 2 A.B. W/PRIMECOAT. SEE PAVING NOTE NO. 4.	△ 146,200	S.F.
2	CONST. 3" A.C. W/SEALCOAT OVER 4" CLASS 2 A.B. W/PRIMECOAT. SEE PAVING NOTE NO. 4.	△ 64,360	S.F.
3	CONST. P.C.C. CURB & GUTTER PER DETAIL THIS SHEET.	△ 1,900	L.F.
4	CONST. P.C.C. CURB TYPE "B" PER CITY OF N.B. STD-182-L.	△ 8,850	L.F.
5	CONST. P.C.C. GUTTER (3' WIDE) PER PCC DETAIL THIS SHT.	△ 2,720	L.F.
6	CONST. COMMERCIAL DRIVEWAY APPROACH TYPE II PER CITY OF N.B. STD. -161-L.	1,107	S.F.
7	CONST. PARTIAL COMMERCIAL DRIVEWAY APPROACH TYPE II PER CITY OF N.B. STD-161-L.	104	S.F.
8*	CONST. 4" P.C.C. SIDEWALK W/SURFACE PER ARCHITECT DRAWINGS	4,134	S.F.
9	CONST. VARIABLE THICKNESS A.C. OVERLAY.	816	S.F.
10	CONST. WHEELCHAIR RAMP PER CALTRANS NO. NB-B, SEE DETAIL ON SHT. C-2	△ 9	EA.
11	CONST. 8" P.C.C. CURB & GUTTER PER N.B. STD. 182-L.	70	L.F.
12	CONST. 8" A.C. OVER NATIVE SOIL.	282	S.F.
13	CONST. STD. COMM'L. DRIVE APP. TYPE I PER N.B. STD-160-L.	△ 392	S.F.
15	CONST. 12" A.C.P. (2000 D) OR 12" PVC (SDR 35) △3	110	L.F.
16	CONST. PRECAST CONC. C.B. BROOKS NO. 1212 W/6" P.C.C. BOTTOM OR APPROVED EQUAL	△ 4	EA.
17	CONST. 4" PVC (SDR 35)	△ 17	L.F.
18	CONST. 8" A.C.P. (2000 D) OR 8" PVC (SDR 35) △3	△ 240 △3	L.F.
19	CONST. 6" A.C.P. (2000 D) OR 6" PVC (SDR 35)	△ 1371	L.F.
20	CONST. 18" R.C.P. (2000-D) OR 18" A.C.P. (3000-D.)	△ 280 △3	L.F.
21	CONST. 15" R.C.P. (2000-D) OR 15" A.C.P. (3000-D.)	△ 1120	L.F.
22	CONST. JUNCTION STRUCTURE NO. 1 PER N.B. STD. -310-L. NOTE: CONST. PIPE AS REQ'D. TO CONNECT TO EXIST. SYSTEM.	△ 3	EA.
23	CONST. CURB INLET TYPE OL-A PER N.B. STD -305-L WITH LOCAL DEPRESSION PER N.B. STD. 304-L (H&L AS SHOWN)	△ 11 △3	EA.
24	REMOVE EXIST. CATCH BASIN.	5	EA.
25	CONST. PIPE CONNECTION ASSEMBLY PER N.B. STD 312-L.	△ 25	EA.
26	CONST. JUNCTION STRUCTURE NO. 2 PER N.B. STD. 311-L.	1	EA.
27	CONST. CONC. PIPE COLLAR PER N.B. STD. -313-L.	4	EA.
28	CONST. 24" R.C.P. (2000 D) OR 24" A.C.P. (3000 D).	△ 238	L.F.
29	CONST. 6" DIAM. AREA DRAIN "SPEE-D-BASIN" AS MFD. NATIONAL DRAIN SUPPLIES, INC. OR APPROVED EQUAL. CONNECT TO DRAIN LINE WITH 6" A.C.P. PROVIDE DOME-TOP GRATES EXCEPT IN PAVED OR TURF AREAS.	△ 45	EA.
30	CONST. MANHOLE I PER N.B. STD. - 401-L.	△ 10	EA.
31	CONST. CLEANOUT PER N.B. STD. -406-L.	△ 6	EA.
32	CONST. 6" V.C.P.	△ 795	L.F.
33	CONST. 4" V.C.P.	△ 20	L.F.
34	CONST. 8" V.C.P.	△ 335	L.F.
35	CONNECT TO EXIST. 8" V.C.P. STUB	△ 1	EA.
40	CONST. 6" DOUBLE CHECK BACK FLOW PREVENTER. SEE DETAIL SHT. NO. C-2.	△2 1	EA.
41	CONST. 4" TURBO WATER METER PER I.R.W.D. STD. W-12.	△2 1	EA.
42	CONST. 6" A.C.P. (CLASS 150)	△2 661	L.F.
43	CONNECT TO EXIST. 6" A.C.P. STUB.	△2 3	EA.
44	CONST. 8" A.C.P. (CLASS 150)	△2 1676	L.F.
45	INSTALL 8" GATE VALVE PER N.B. STD. -508-L	△2 1	EA.
46	INSTALL FIRE HYDRANT PER N.B. STD. -500-L	△2 4	EA.

CITY OF NEWPORT BEACH
FIRE MARSHAL

APPROVED BY: Thomas [signature] 1-25-84 DATE

2 of 143

1530-82

APC. NO. 1486-81

BENCHMARK

O.C.S.B.M. STAMPED U-148 RESET 1970 ABOUT 29 FEET WESTERLY OF THE CENTERLINE OF AIRPORT WAY SOUTH, AT ORANGE COUNTY AIRPORT, ABOUT 100 FEET NORTHEAST OF THE MARTIN AVIATION FLIGHT CENTER, 102 FEET SOUTH OF THE AIRPORT BEACON TOWER, 15 FEET NORTH OF A FIRE HYDRANT, 8 FEET NORTH OF A LIGHT POLE (NUMBER 1), SET IN TOP OF THE SOUTHEAST CORNER OF A CONCRETE SLAB AROUND A DROP INLET. 1979 ELEV. = 46.16

BASIS OF BEARINGS

THE BEARINGS HEREON ARE BASED ON THE CENTERLINE OF BIRCH STREET BEING N 49°21'34" W PER TRACT 7953 M.M. 310/7-11, RECORDS OF ORANGE COUNTY, CALIF.

OWNER

KOLL CO. & AETNA LIFE INSURANCE CO.
4490 VON KARMAN AVE.
NEWPORT BEACH, CA. 92660
(714) 833-3030

JOB ADDRESS

5000 BIRCH ST.
NEWPORT BEACH, CA.

SOILS ENGINEER

LEROY CRANDALL & ASSOC.
711 N. ALVARADO ST.
LOS ANGELES, CA. 90026
(213) 413-3330

J.D. KIRKGAARD R.C.E. 10441
JAMES L. VAN BEVEREN R.C.E. 17783

Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this Project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this Project, excepting for liability arising from the sole negligence of the Owner or the Engineer.

UNDERGROUND STRUCTURES

ALL UNDERGROUND UTILITIES OR STRUCTURES REPORTED BY THE OWNER OR OTHERS AND THOSE SHOWN ON THE RECORDS EXAMINED ARE INDICATED WITH THEIR APPROXIMATE LOCATION AND EXTENT. THE OWNER BY ACCEPTING THESE PLANS OR PROCEEDING WITH IMPROVEMENTS PURSUANT THERETO AGREES TO ASSUME LIABILITY AND TO HOLD UNDERSIGNED HARMLESS FOR ANY DAMAGES RESULTING FROM THE EXISTENCE OF UNDERGROUND UTILITIES OR STRUCTURES NOT REPORTED TO THE UNDERSIGNED; NOT INDICATED ON THE PUBLIC RECORDS EXAMINED; LOCATED AT VARIANCE WITH THAT REPORTED OR SHOWN ON RECORDS EXAMINED. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES OR STRUCTURES SHOWN AND ANY OTHER UTILITIES OR STRUCTURES FOUND AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNERS OF THE UTILITIES OR STRUCTURES CONCERNED BEFORE STARTING WORK.

Robert Bein, William Frost & Associates
PROFESSIONAL ENVIRONMENTAL ENGINEERS & PLANNERS

Langdon&Wilson Architects

Robert E. Langdon Jr. A.I.A.
Ernest C. Wilson Jr. A.I.A.
Hans Mumper A.I.A.
Robert S. Kraft A.I.A.

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Los Angeles California 90010
213/380-9930

4320 Von Karman Avenue
Newport Beach California 92660
714/833-9193

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Consulting Structural Engineers, Inc.
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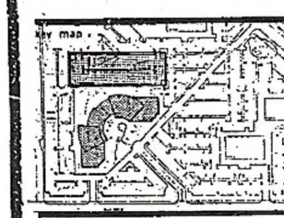
Cohen and Pascoe, Inc.
Consulting Electrical Engineers
2400 Michelson Drive
Irvine, CA. 92715 714/955-0460

Robert Bein, William Frost & Associates
PROFESSIONAL ENVIRONMENTAL ENGINEERS & PLANNERS

[signature] DATE
ROBERT W. BEIN R.C.E. 11799

Koll Center Newport Building 14

Newport Beach, California



revisions
△ ADDENDUM #2
△ ADDENDUM #4
△ BULLETIN #1

Issued for Construction 2/3/83

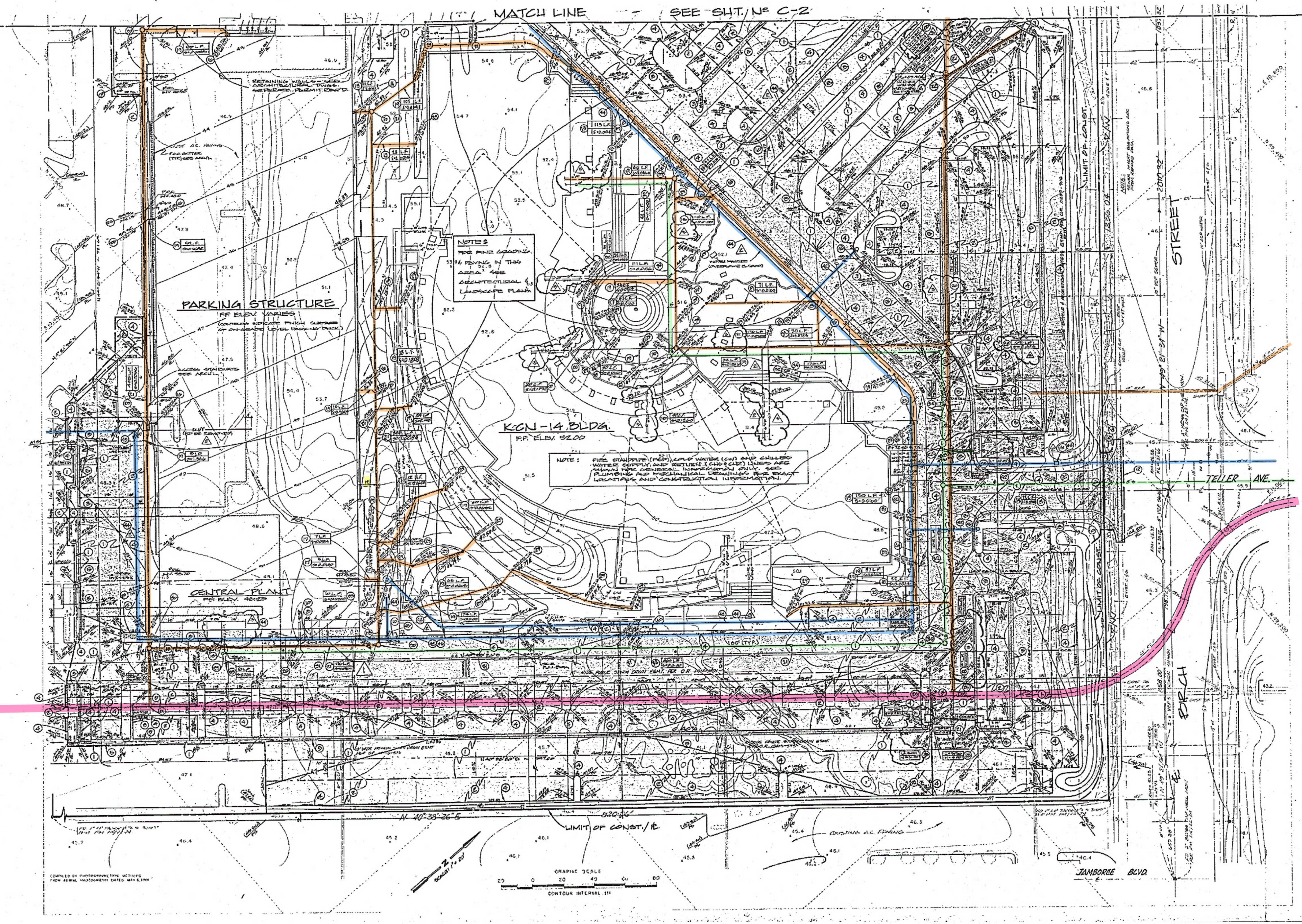
sheet title
TITLE SHEET

approved/architect

checked
drawn

date 11-16-81
job number 7242-14

sheet number
C-1



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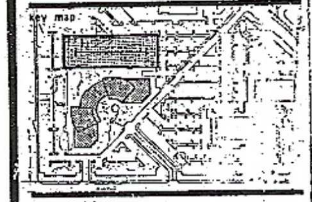
Robert Bein, William Frost & Associates

ROBERT W. BEIN DATE
R.C.E. 12750

Koll Center Newport Building 14

Newport Beach, California

key map



revisions

12/10/81	⚠ ADDENDUM # 2
12/30/81	⚠ ADDENDUM # 4
3/5/82	⚠ BULLETIN # 1

Issued For Construction 3/31/82

sheet title

FINISH GRADING, PAVING & DRAINAGE PLAN

approved/architect

checked

drawn

date 11-16-81

job number 7242-14

sheet number

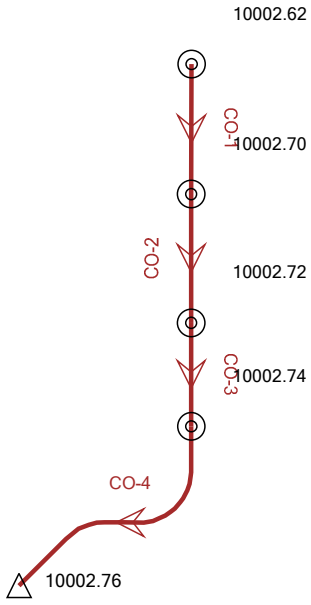
C-3

1530-82

4 of 143

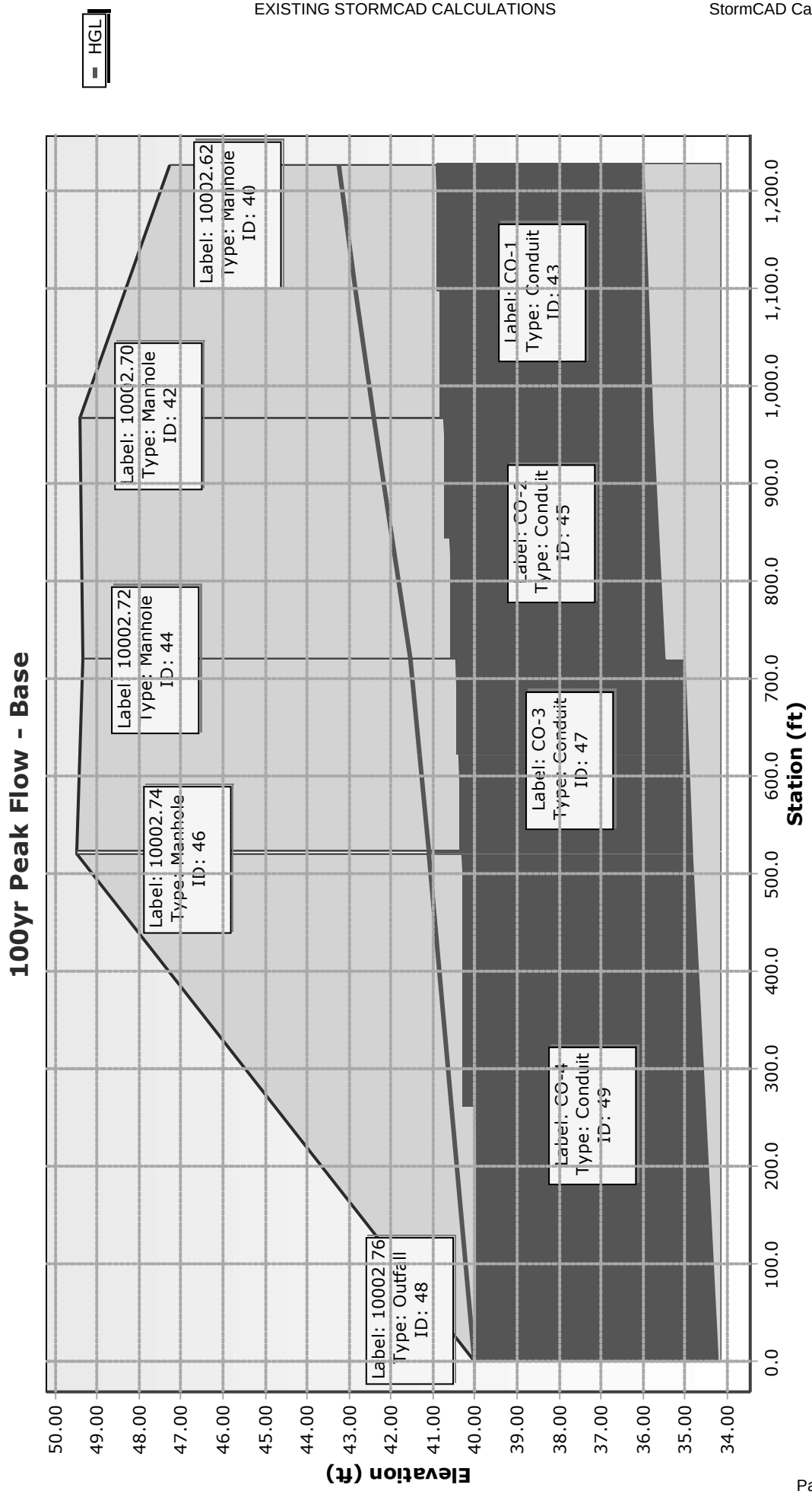
Existing Pipe Network Drawing, Calculations, & Profile

Scenario: Base



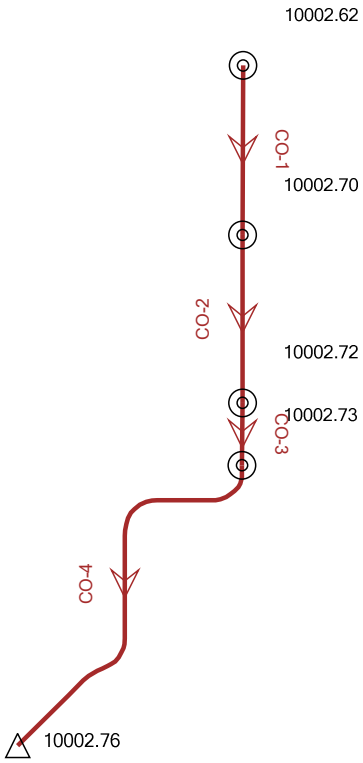
Conduit FlexTable: HGL Report

Label	-Node- Upstm/ Dnstm	-Depth- Upstm/ Dnstm (ft)	-EGL- Upstm/ Dnstm (ft)	-Ground- Upstm/ Dnstm (ft)	-HGL- Upstm/ Dnstm (ft)	-Invert- Upstm/ Dnstm (ft)	Flow (cfs)	Manning's n	Froude No. (Normal)	Velocity (ft/s)	Depth (Normal) (ft)
CO-1	10002.62	7.30	44.11	47.26	43.24	35.94	146.60	0.013	0.589	7.47	(N/A)
	10002.70	6.69	43.28	49.41	42.42	35.73					
CO-2	10002.70	6.69	43.39	49.41	42.42	35.73	155.38	0.013	0.624	7.91	(N/A)
	10002.72	6.58	42.51	49.35	41.54	34.96					
CO-3	10002.72	6.58	42.21	49.35	41.54	34.96	155.38	0.013	0.492	6.54	(N/A)
	10002.74	6.32	41.78	49.48	41.12	34.80					
CO-4	10002.74	6.32	41.78	49.48	41.12	34.80	155.38	0.013	0.492	6.54	(N/A)
	10002.76	(N/A)	(N/A)	40.00	40.00	34.18					


HGL
100yr Peak Flow - Base
Elevation (ft)
Station (ft)
50.00
49.00
48.00
47.00
46.00
45.00
44.00
43.00
42.00
41.00
40.00
39.00
38.00
37.00
36.00
35.00
34.00
0.0
100.0
200.0
300.0
400.0
500.0
600.0
700.0
800.0
900.0
1,000.0
1,100.0
1,200.0
Label: 10002.62
Type: Manhole
ID: 40
Label: 10002.70
Type: Manhole
ID: 42
Label: 10002.72
Type: Manhole
ID: 44
Label: 10002.74
Type: Manhole
ID: 46
Label: 10002.76
Type: Outfall
ID: 48
Label: CO-1
Type: Conduit
ID: 43
Label: CO-2
Type: Conduit
ID: 45
Label: CO-3
Type: Conduit
ID: 47
Label: CO-4
Type: Conduit
ID: 49

Proposed Pipe Network Drawing, Calculations, & Profile

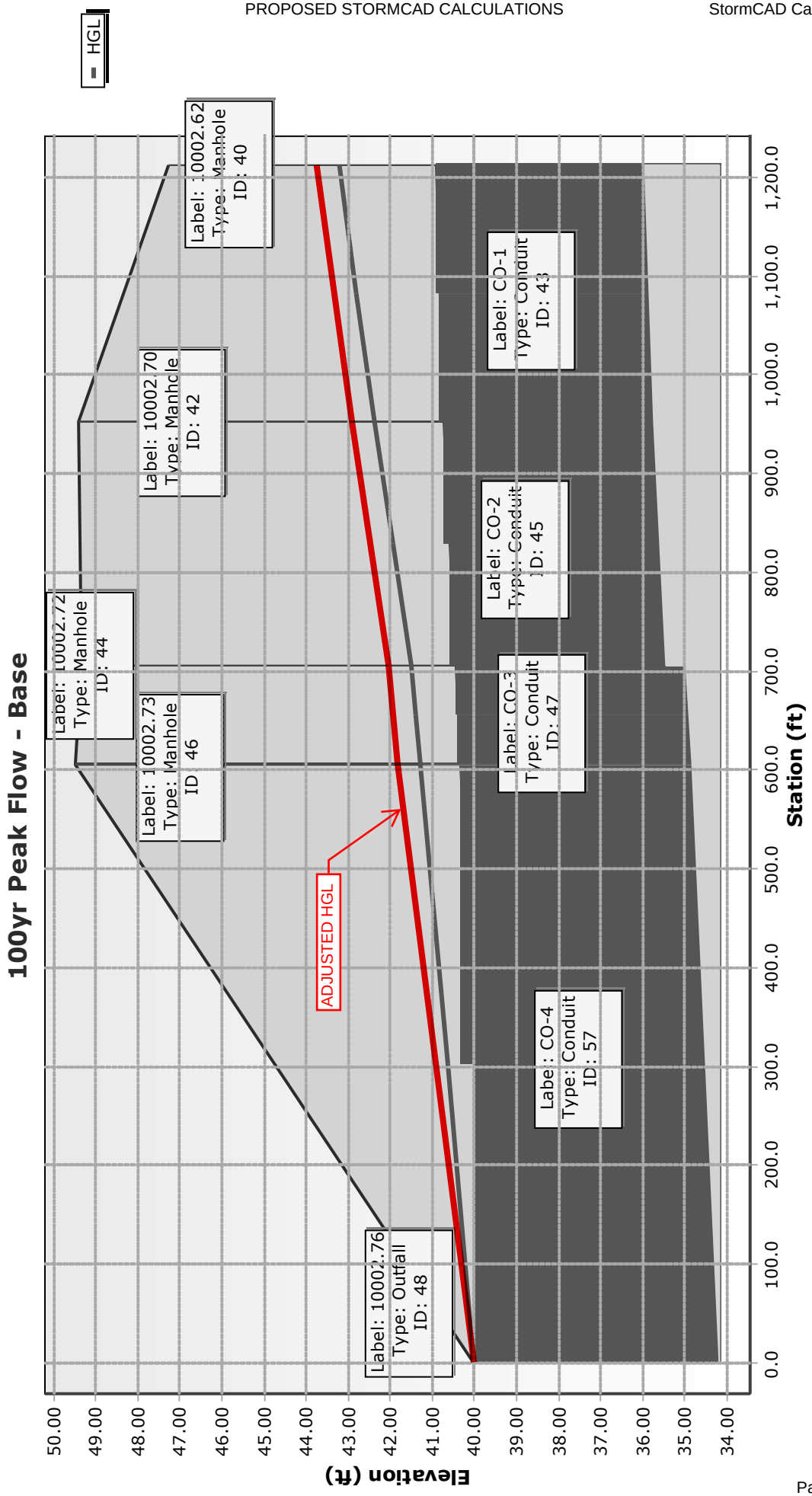
Scenario: Base



Conduit FlexTable: HGL Report

Label	-Node- Upstm/ Dnstm	-Depth- Upstm/ Dnstm (ft)	-EGL- Upstm/ Dnstm (ft)	-Ground- Upstm/ Dnstm (ft)	-HGL- Upstm/ Dnstm (ft)	-Invert- Upstm/ Dnstm (ft)	Flow (cfs)	Manning's n	Froude No. (Normal)	Velocity (ft/s)	Depth (Normal) (ft)
CO-1	10002.62	7.27	44.08	47.26	43.21	35.94	146.60	0.013	0.589	7.47	(N/A)
	10002.70	6.66	43.25	49.41	42.39	35.73					
CO-2	10002.70	6.66	43.36	49.41	42.39	35.73	155.38	0.013	0.624	7.91	(N/A)
	10002.72	6.55	42.48	49.35	41.51	34.96					
CO-3	10002.72	6.55	42.18	49.35	41.51	34.96	155.38	0.013	0.492	6.54	(N/A)
	10002.73	6.45	41.96	49.48	41.30	34.85					
CO-4	10002.73	6.45	41.96	49.48	41.30	34.85	155.38	0.013	0.492	6.54	(N/A)
	10002.76	(N/A)	(N/A)	40.00	40.00	34.18					

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA
+1-203-755-1666


HGL
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Elevation (ft)
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50.00
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40.00
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38.00
37.00
36.00
35.00
34.00
0.0
100.0
200.0
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Label: CO-2
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ID: 45
Label: CO-3
Type: Conduit
ID: 47
Label: CO-4
Type: Conduit
ID: 57
ADJUSTED HGL

Minor Bend Loss Calculations

DAVID EVANS
AND ASSOCIATES INC.

quality of life
Improving the 40 YEARS

PROJECT: **KOLL CENTER RESIDENCES NEWPORT**
JOB NUMBER: **SHOPOLF2100**
DATE: **12/13/16**
BY: **ANDREW RAPPÉ, PE**

Minor Bend Loss Calculations

Per the Orange County Flood Control District Design Manual head losses through curves should be calculated using the following formula:

$$h_L = 0.25K_b\left(\frac{V^2}{2g}\right)$$

Where:

$$K_b = \sqrt{\frac{\Delta}{90}}$$

Δ = Central bend angle in degrees

V = Average velocity of flow (ft./sec.)

g = Acceleration of gravity (32.2 ft./sec.^{2})

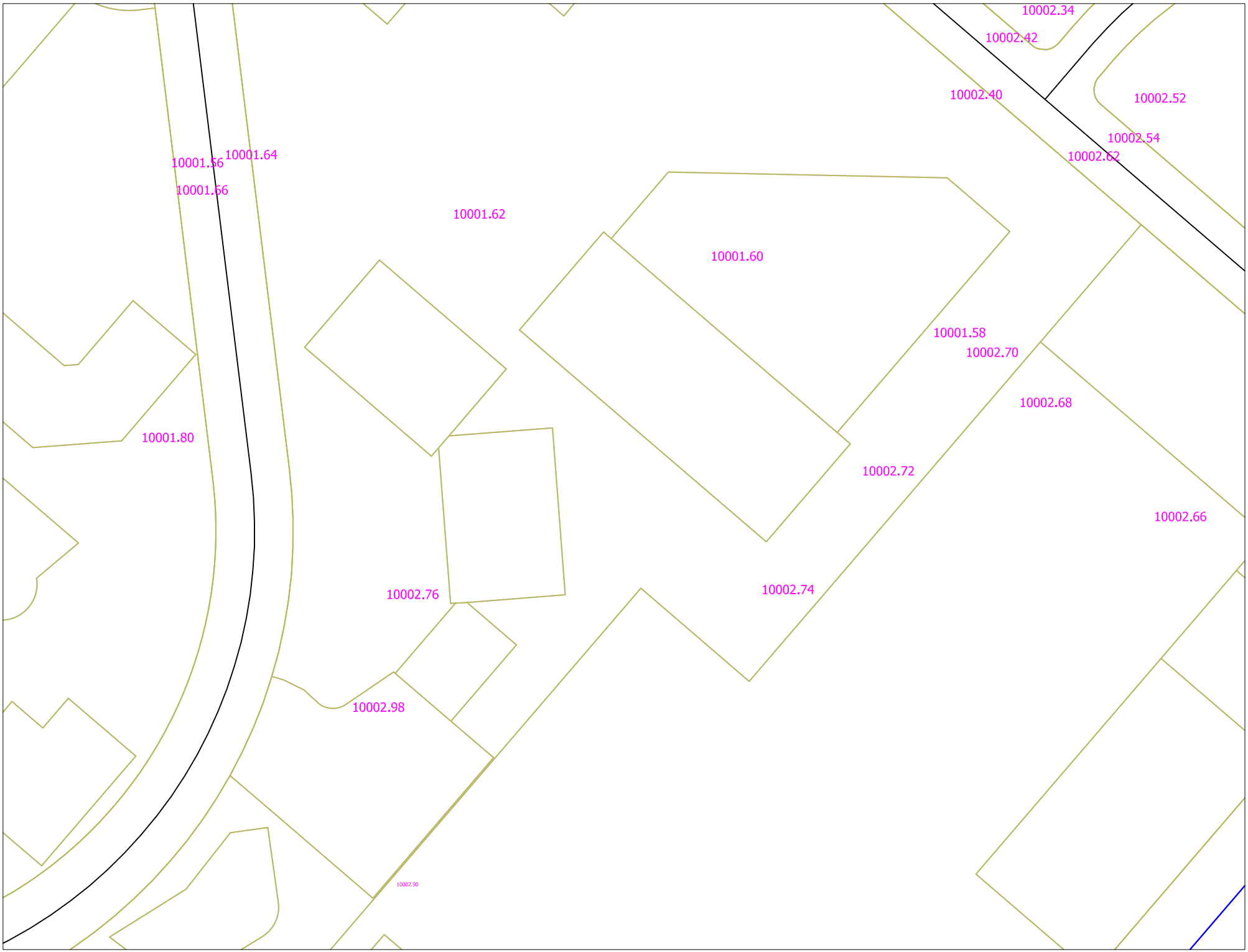
The proposed realigned storm pipe section will contain 3 bends. The average velocity of flow for each node is provided by the StormCAD calculations performed by DEA dated 10/5/2016. The following table summarizes the input variables and results for each bend within the pipe.

Table 1, Curve Losses Input & Results

Pipe	Bend No.	Δ	V	K_b	h_L
-	-	degrees	ft/sec	-	ft
CO-4	1	90.00	6.54	1.00	0.17
CO-4	2	90.00	6.54	1.00	0.17
CO-4	3	69.62	6.54	0.88	0.15
CO-4	4	24.42	6.54	0.52	0.09
				Total h_L	0.56

The total head losses due to curves is **0.56 feet**

1999 City of Newport Beach SD Master Plan Calculations


10002.34
10002.42
10002.40
10002.52
10002.54
10002.62
10001.56
10001.64
10001.66
10001.62
10001.60
10001.58
10002.70
10002.68
10001.80
10002.72
10002.66
10002.76
10002.74
10002.98
10002.90

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
               (Reference: 1986 OCEMA HYDROLOGY CRITERION)
          (c) Copyright 1983-98 Advanced Engineering Software (aes)
               Ver. 7.1  Release Date: 01/01/98  License ID 1242

                            Analysis prepared by:

                          John M. Tettemer & Associates
                          3151 Airway Avenue, Suite Q-1
                              Costa Mesa, CA  92626
                                  (714) 434-9080

 ************************** DESCRIPTION OF STUDY **************************
* City of Newport Beach Storm Drain Master Plan                           *
* Subarea 10001                                                           *
* 100-year Rational Method Analysis                                       *
 **************************************************************************

  FILE NAME: 10001H.DAT
  TIME/DATE OF STUDY:  9:58   5/12/1999
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)   (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ======  =====  =======
  1   30.0     20.0     .018/ .018/ .020    .67    2.00 .03125 .1670 .01500

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =   .00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE  10001.00 TO NODE  10001.02 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =     49.50  DOWNSTREAM(FEET) =     48.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
```

```
 AREA-AVERAGED Ap =    .10
 EFFECTIVE STREAM AREA(ACRES) =   11.71
 TOTAL STREAM AREA(ACRES) =   11.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.48

 ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)     NODE
     1      80.67  20.21    2.784    .22(  .02)  .10     30.3    10002.00
     1      79.81  16.42    3.141    .22(  .02)  .10     26.2    10002.20
     2      39.48  12.05    3.750    .30(  .03)  .10     11.7    10002.36

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)     NODE
     1     112.82  16.42    3.141    .25(  .02)  .10     38.0    10002.20
     2     109.89  20.21    2.784    .24(  .02)  .10     42.0    10002.00
     3     109.49  12.05    3.750    .25(  .03)  .10     31.0    10002.36

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    112.82    Tc(MIN.) =    16.42
 EFFECTIVE AREA(ACRES) =    37.96   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     42.02
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.44 =  2795.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.44 TO NODE  10002.62 IS CODE =  42
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    35.80
 DOWNSTREAM NODE ELEVATION(FEET) =    35.70
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 USER SPECIFIED PIPE SYSTEM UNDER PRESSURE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
 PIPE-FLOW(CFS) =     80.29
 PIPEFLOW TRAVEL TIME(MIN.) =     .41    Tc(MIN.) =  16.83

 *DEFICIENCY ANALYSIS(BASED ON REPLACEMENT SYSTEM HYDROLOGY):
 *REPLACEMENT PIPE SYSTEM (MANNING'S N = .013):
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  54.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.11
 PIPE-FLOW(CFS) =    112.82
 PIPEFLOW TRAVEL TIME(MIN.) =     .33    Tc(MIN.) =  16.74

 *PARALLEL PIPE SYSTEM (MANNING'S N = .013):
 PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.62 =  2895.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE  10002.62 TO NODE  10002.62 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  16.74
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.105
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        8.75       .20         .10    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    8.75      SUBAREA RUNOFF(CFS) =   24.29
 EFFECTIVE AREA(ACRES) =   46.71   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .24  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =    50.77       PEAK FLOW RATE(CFS) =     129.52

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity   Fp(Fm)      Ap   Ae      HEADWATER
  NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)     NODE
     1    129.52  16.74    3.105   .24(  .02)   .10    46.7   10002.20
     2    125.00  20.54    2.759   .24(  .02)   .10    50.8   10002.00
     3    130.88  12.38    3.685   .24(  .02)   .10    39.7   10002.36
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =    130.88  Tc(MIN.) =  12.38
 AREA-AVERAGED Fm(INCH/HR) =   .02  AREA-AVERAGED Fp(INCH/HR) =   .24
 AREA-AVERAGED Ap =   .10  EFFECTIVE AREA(ACRES) =     39.73

****************************************************************************
 FLOW PROCESS FROM NODE  10002.62 TO NODE  10002.62 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  12.38
 RAINFALL INTENSITY(INCH/HR) =   3.68
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .24
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   39.73
 TOTAL STREAM AREA(ACRES) =   50.77
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    130.88

****************************************************************************
 FLOW PROCESS FROM NODE  10002.46 TO NODE  10002.48 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =     51.50  DOWNSTREAM(FEET) =     49.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.755
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.825
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D         .76       .20        .10    91    7.75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA RUNOFF(CFS) =      3.29
 TOTAL AREA(ACRES) =       .76   PEAK FLOW RATE(CFS) =      3.29

****************************************************************************
 FLOW PROCESS FROM NODE  10002.48 TO NODE  10002.50 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     49.00  DOWNSTREAM(FEET) =     47.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   200.00   CHANNEL SLOPE =    .0100
 CHANNEL BASE(FEET) =  100.00   "Z" FACTOR =     .500
 MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      3.29
 FLOW VELOCITY(FEET/SEC) =     .98   FLOW DEPTH(FEET) =     .03
 TRAVEL TIME(MIN.) =   3.39   Tc(MIN.) =  11.14
 LONGEST FLOWPATH FROM NODE  10002.46 TO NODE  10002.50 =   500.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.50 TO NODE  10002.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  11.14
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.932
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B         1.26       .30        .10    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA AREA(ACRES) =     1.26      SUBAREA RUNOFF(CFS) =     4.42
 EFFECTIVE AREA(ACRES) =     2.02   AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =    .26  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =      2.02       PEAK FLOW RATE(CFS) =       7.10

****************************************************************************
 FLOW PROCESS FROM NODE  10002.50 TO NODE  10002.52 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     47.00  DOWNSTREAM(FEET) =     46.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE =    .0067
 CHANNEL BASE(FEET) =  100.00   "Z" FACTOR =     .500
 MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      7.10
 FLOW VELOCITY(FEET/SEC) =    1.22   FLOW DEPTH(FEET) =     .06
 TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =  13.19
 LONGEST FLOWPATH FROM NODE  10002.46 TO NODE  10002.52 =   650.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE  10002.52 TO NODE  10002.52 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  13.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.561
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       1.90       .30        .10     76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
  SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =     6.04
  EFFECTIVE AREA(ACRES) =     3.92    AREA-AVERAGED Fm(INCH/HR) =    .03
  AREA-AVERAGED Fp(INCH/HR) =    .28  AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =     3.92        PEAK FLOW RATE(CFS) =       12.46

****************************************************************************
  FLOW PROCESS FROM NODE  10002.52 TO NODE  10002.54 IS CODE =  42
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    46.00
  DOWNSTREAM NODE ELEVATION(FEET) =    41.70
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  .013

  USER SPECIFIED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  DEPTH OF FLOW IN  54.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.44
  PIPE-FLOW(CFS) =     12.46
  *NOTE: USER SPECIFIED PIPE SYSTEM CAN CARRY TOTAL UPSTREAM FLOW*
  PIPEFLOW TRAVEL TIME(MIN.) =     .06    Tc(MIN.) =  13.25
  LONGEST FLOWPATH FROM NODE  10002.46 TO NODE  10002.54 =   700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  10002.54 TO NODE  10002.54 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  13.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.552
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       1.13       .30        .10     76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
  SUBAREA AREA(ACRES) =     1.13      SUBAREA RUNOFF(CFS) =     3.58
  EFFECTIVE AREA(ACRES) =     5.05    AREA-AVERAGED Fm(INCH/HR) =    .03
  AREA-AVERAGED Fp(INCH/HR) =    .28  AREA-AVERAGED Ap =    .10
  TOTAL AREA(ACRES) =     5.05        PEAK FLOW RATE(CFS) =       16.02

****************************************************************************
  FLOW PROCESS FROM NODE  10002.54 TO NODE  10002.62 IS CODE =  42
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    41.70
 DOWNSTREAM NODE ELEVATION(FEET) =    35.70
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 DEPTH OF FLOW IN  54.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.55
 PIPE-FLOW(CFS) =     16.02
 *NOTE: USER SPECIFIED PIPE SYSTEM CAN CARRY TOTAL UPSTREAM FLOW*
 PIPEFLOW TRAVEL TIME(MIN.) =    .08    Tc(MIN.) =  13.32
 LONGEST FLOWPATH FROM NODE  10002.46 TO NODE  10002.62 =   770.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.62 TO NODE  10002.62 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  13.32
 RAINFALL INTENSITY(INCH/HR) =   3.54
 AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .28
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =    5.05
 TOTAL STREAM AREA(ACRES) =    5.05
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.02

 ** CONFLUENCE DATA **
  STREAM     Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER   (CFS)  (MIN.)  (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1    129.52  16.74     3.105    .24(  .02)  .10     46.7    10002.20
     1    125.00  20.54     2.759    .24(  .02)  .10     50.8    10002.00
     1    130.88  12.38     3.685    .24(  .02)  .10     39.7    10002.36
     2     16.02  13.32     3.542    .28(  .03)  .10      5.1    10002.46

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc    Intensity   Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER   (CFS)  (MIN.)  (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1    146.37  12.38     3.685    .25(  .02)  .10     44.4    10002.36
     2    143.54  16.74     3.105    .24(  .02)  .10     51.8    10002.20
     3    137.45  20.54     2.759    .24(  .02)  .10     55.8    10002.00
     4    146.60  13.32     3.542    .24(  .02)  .10     46.3    10002.46

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    146.60    Tc(MIN.) =    13.32
 EFFECTIVE AREA(ACRES) =    46.29   AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .24  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =     55.82
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.62 =  2895.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE  10002.62 TO NODE  10002.70 IS CODE =  42
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    35.70
 DOWNSTREAM NODE ELEVATION(FEET) =    35.44
 FLOW LENGTH(FEET) =   260.00   MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 USER SPECIFIED PIPE SYSTEM UNDER PRESSURE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.09
 PIPE-FLOW(CFS) =     80.29
 PIPEFLOW TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =  14.38

 *DEFICIENCY ANALYSIS(BASED ON REPLACEMENT SYSTEM HYDROLOGY):
 *REPLACEMENT PIPE SYSTEM (MANNING'S N = .013):
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  58.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.52
 PIPE-FLOW(CFS) =    146.60
 PIPEFLOW TRAVEL TIME(MIN.) =    .79    Tc(MIN.) =  14.11

 *PARALLEL PIPE SYSTEM (MANNING'S N = .013):
 PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.70 =  3155.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.70 TO NODE  10002.70 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  14.11
 RAINFALL INTENSITY(INCH/HR) =   3.43
 AREA-AVERAGED Fm(INCH/HR) =   .02
 AREA-AVERAGED Fp(INCH/HR) =   .24
 AREA-AVERAGED Ap =   .10
 EFFECTIVE STREAM AREA(ACRES) =   46.29
 TOTAL STREAM AREA(ACRES) =   55.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    146.60

****************************************************************************
 FLOW PROCESS FROM NODE  10002.64 TO NODE  10002.66 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   250.00
 ELEVATION DATA: UPSTREAM(FEET) =    48.00  DOWNSTREAM(FEET) =    47.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.349
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.649
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        1.30       .30        .10     76    8.35
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA RUNOFF(CFS) =       5.40
 TOTAL AREA(ACRES) =       1.30   PEAK FLOW RATE(CFS) =       5.40

****************************************************************************
 FLOW PROCESS FROM NODE  10002.66 TO NODE  10002.68 IS CODE =  42
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =     44.00
 DOWNSTREAM NODE ELEVATION(FEET) =     39.10
 FLOW LENGTH(FEET) =    200.00   MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =    1
 DEPTH OF FLOW IN  18.0 INCH PIPE IS    7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    8.18
 PIPE-FLOW(CFS) =       5.40
 *NOTE: USER SPECIFIED PIPE SYSTEM CAN CARRY TOTAL UPSTREAM FLOW*
 PIPEFLOW TRAVEL TIME(MIN.) =     .41    Tc(MIN.) =    8.76
 LONGEST FLOWPATH FROM NODE  10002.64 TO NODE  10002.68 =    450.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.68 TO NODE  10002.68 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =    8.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.528
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B         .87       .30        .10     76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA AREA(ACRES) =      .87      SUBAREA RUNOFF(CFS) =     3.52
 EFFECTIVE AREA(ACRES) =     2.17   AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =    .30  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     2.17       PEAK FLOW RATE(CFS) =        8.78

****************************************************************************
 FLOW PROCESS FROM NODE  10002.68 TO NODE  10002.70 IS CODE =  42
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =     39.10
 DOWNSTREAM NODE ELEVATION(FEET) =     35.44
 FLOW LENGTH(FEET) =    150.00   MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =    1
 DEPTH OF FLOW IN  21.0 INCH PIPE IS    8.8 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.24
 PIPE-FLOW(CFS) =      8.78
 *NOTE: USER SPECIFIED PIPE SYSTEM CAN CARRY TOTAL UPSTREAM FLOW*
 PIPEFLOW TRAVEL TIME(MIN.) =    .27    Tc(MIN.) =   9.03
 LONGEST FLOWPATH FROM NODE  10002.64 TO NODE  10002.70 =   600.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.70 TO NODE  10002.70 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   9.03
 RAINFALL INTENSITY(INCH/HR) =   4.45
 AREA-AVERAGED Fm(INCH/HR) =    .03
 AREA-AVERAGED Fp(INCH/HR) =    .30
 AREA-AVERAGED Ap =    .10
 EFFECTIVE STREAM AREA(ACRES) =    2.17
 TOTAL STREAM AREA(ACRES) =    2.17
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.78

 ** CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity    Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1     146.37  13.16     3.565    .25(  .02)  .10     44.4    10002.36
     1     143.54  17.54     3.016    .24(  .02)  .10     51.8    10002.20
     1     137.45  21.34     2.698    .24(  .02)  .10     55.8    10002.00
     1     146.60  14.11     3.428    .24(  .02)  .10     46.3    10002.46
     2       8.78   9.03     4.448    .30(  .03)  .10      2.2    10002.64

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity    Fp(Fm)      Ap    Ae      HEADWATER
  NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1     153.39  13.16     3.565    .25(  .02)  .10     46.6    10002.36
     2     153.36  14.11     3.428    .25(  .02)  .10     48.5    10002.46
     3     149.48  17.54     3.016    .24(  .02)  .10     53.9    10002.20
     4     142.76  21.34     2.698    .24(  .02)  .10     58.0    10002.00
     5     134.21   9.03     4.448    .25(  .02)  .10     32.6    10002.64

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    153.39    Tc(MIN.) =    13.16
 EFFECTIVE AREA(ACRES) =    46.59   AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     57.99
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.70 =  3155.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.70 TO NODE  10002.72 IS CODE =  42
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
```

```
 UPSTREAM NODE ELEVATION(FEET) =     35.44
 DOWNSTREAM NODE ELEVATION(FEET) =     35.20
 FLOW LENGTH(FEET) =    250.00    MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =    1
 USER SPECIFIED PIPE SYSTEM UNDER PRESSURE
 PIPE-FLOW VELOCITY(FEET/SEC.) =    4.00
 PIPE-FLOW(CFS) =     78.67
 PIPEFLOW TRAVEL TIME(MIN.) =    1.04     Tc(MIN.) =  14.20

 *DEFICIENCY ANALYSIS(BASED ON REPLACEMENT SYSTEM HYDROLOGY):
 *REPLACEMENT PIPE SYSTEM (MANNING'S N = .013):
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =    1
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  61.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    5.44
 PIPE-FLOW(CFS) =    153.39
 PIPEFLOW TRAVEL TIME(MIN.) =     .77     Tc(MIN.) =  13.93

 *PARALLEL PIPE SYSTEM (MANNING'S N = .013):
 PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =    1
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.72 =  3405.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.72 TO NODE  10002.72 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.454
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        1.37       .30        .10    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =    .30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =    .10
 SUBAREA AREA(ACRES) =     1.37      SUBAREA RUNOFF(CFS) =     4.22
 EFFECTIVE AREA(ACRES) =    47.96    AREA-AVERAGED Fm(INCH/HR) =    .02
 AREA-AVERAGED Fp(INCH/HR) =    .25  AREA-AVERAGED Ap =    .10
 TOTAL AREA(ACRES) =     59.36       PEAK FLOW RATE(CFS) =     153.39
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE  10002.72 TO NODE  10002.74 IS CODE =  42
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =     35.20
 DOWNSTREAM NODE ELEVATION(FEET) =     35.00
 FLOW LENGTH(FEET) =    200.00    MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =    1
 USER SPECIFIED PIPE SYSTEM UNDER PRESSURE
 PIPE-FLOW VELOCITY(FEET/SEC.) =    4.35
 PIPE-FLOW(CFS) =    103.53
 PIPEFLOW TRAVEL TIME(MIN.) =     .77     Tc(MIN.) =  14.69
```

```
 *DEFICIENCY ANALYSIS(BASED ON REPLACEMENT SYSTEM HYDROLOGY):
 *REPLACEMENT PIPE SYSTEM (MANNING'S N = .013):
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.54
 PIPE-FLOW(CFS) =    153.39
 PIPEFLOW TRAVEL TIME(MIN.) =    .60    Tc(MIN.) =  14.53

 *PARALLEL PIPE SYSTEM (MANNING'S N = .013):
 PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.74 =  3605.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.74 TO NODE  10002.74 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.53
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.368
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  B        1.77       .30        .10    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA AREA(ACRES) =    1.77      SUBAREA RUNOFF(CFS) =    5.32
 EFFECTIVE AREA(ACRES) =   49.73   AREA-AVERAGED Fm(INCH/HR) =   .03
 AREA-AVERAGED Fp(INCH/HR) =   .25  AREA-AVERAGED Ap =   .10
 TOTAL AREA(ACRES) =   61.13       PEAK FLOW RATE(CFS) =     153.39
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE  10002.74 TO NODE  10002.76 IS CODE =  42
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>USING USER-SPECIFIED PIPESIZE(PARALLEL/REPLACEMENT PIPESIZE ESTIMATED)<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    35.00
 DOWNSTREAM NODE ELEVATION(FEET) =    34.50
 FLOW LENGTH(FEET) =   500.00   MANNING'S N =  .013

 USER SPECIFIED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 USER SPECIFIED PIPE SYSTEM UNDER PRESSURE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
 PIPE-FLOW(CFS) =    103.53
 PIPEFLOW TRAVEL TIME(MIN.) =   1.91    Tc(MIN.) =  16.45

 *DEFICIENCY ANALYSIS(BASED ON REPLACEMENT SYSTEM HYDROLOGY):
 *REPLACEMENT PIPE SYSTEM (MANNING'S N = .013):
 ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
 DEPTH OF FLOW IN  78.0 INCH PIPE IS  60.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.54
 PIPE-FLOW(CFS) =    153.39
 PIPEFLOW TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =  16.03

 *PARALLEL PIPE SYSTEM (MANNING'S N = .013):
 PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
```

```
 LONGEST FLOWPATH FROM NODE  10002.00 TO NODE  10002.76 =  4105.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.76 TO NODE  10002.76 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE  10002.80 TO NODE  10002.82 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =     52.00  DOWNSTREAM(FEET) =     46.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.648
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.340
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  D        2.16      .20        .10     91    6.65
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
 SUBAREA RUNOFF(CFS) =     10.34
 TOTAL AREA(ACRES) =      2.16   PEAK FLOW RATE(CFS) =     10.34

****************************************************************************
 FLOW PROCESS FROM NODE  10002.82 TO NODE  10002.90 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     46.60  DOWNSTREAM(FEET) =     34.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =   .0182
 CHANNEL BASE(FEET) =  100.00   "Z" FACTOR =    .500
 MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     10.34
 FLOW VELOCITY(FEET/SEC) =   1.84   FLOW DEPTH(FEET) =    .06
 TRAVEL TIME(MIN.) =   5.90   Tc(MIN.) =  12.54
 LONGEST FLOWPATH FROM NODE  10002.80 TO NODE  10002.90 =   950.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  10002.90 TO NODE  10002.90 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  12.54
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.654
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        9.18      .20        .10     91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   .20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   .10
```