Preliminary Hydrology Study

VESTING TTM 72608

Long Beach, CA

Prepared for:

The Long Beach Project, LLC
888 San Clemente, Suite 100
New Port Beach, CA

JUNE 8, 2014

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STATE OF CALIFORNIA

Kimley»Horn

INVESTIGATION REPORT

PURPOSE AND SCOPE

This study has been performed to determine the amount of storm flow that will develop on-site and flow through the proposed project site such that adequate flood protection can be provided for the project. All drainage is conveyed around through the project within the local streets. These streets convey the storm flows to a group of catch basins located at the intersection of 20th and 26th Streets that shall be designed to receive the peak Capital Storm Event and transport these flows to a local retention/detention basin which shall be designed to retain 85th percentile 24□hour runoff event and release flows at no more than the pre-developed storm flow rate.

METHODOLOGY

1. This study was performed using CivilSoft LAR04 Software based on the January 2006 Los Angeles County Department of Public Works Hydrology Manual 50-year Capital Storm event days 1-4 to size the basin and the 25-year Urban Storm Event day 4 to size the storm drain system.
2. The State of California Regional Water Quality Control Board Los Angeles Region Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach Los Angeles County which limits the minimum discharge flow from a basin to the pre-developed Q.
3. The Long Beach Development Services Low Development Design Manual that requires the reduction of measured infiltration rates by a factor of 3.

LOCATION/ON-SITE TRIBUTARY WATERSHED

The project is located in Long Beach California, on the east side of the Los Angeles River and south of West 48th Street. Most if not all off-site drainage is being conveyed around the site into the local Dominguez Gap Barrier Basin and the LADWP Project No. 130 channel improvements. The On-Site watershed, although developed as a Camp for scouts consisting of a parking lot, pool, lodging and recreation hall, will be considered as undeveloped for the purpose of sizing a drainage basin for this project.

The Pre-developed site drains from the northern edge of the lot toward the center into a depressed elevation area that acts as a drainage conveyance to an existing storm culvert under the railroad tracts along the southern boundary of the project. At this point the property is at a sump elevation of 30 with the storm culvert at an invert elevation of 32 feet above sea level, and the neighboring Project 130 channel improvements along the southern edge of the property having a water surface elevation of 31.8 and a flow line of 25.1 at the connection point. Since the site survey and the channel improvement plans are on the same datum, the project will not see channel flows enter onto the site unless the Project 130 channel flows exceed its design elevation of 31.8 and reach 32 or more feet above sea level, which would exceed the Capital Storm event that projects are required to be designed too.

HYDROLOGY

After reviewing the Long Beach 50-year 24-Hour Isohyet Figure –H1.5 (Figure 1), it was determined that the site falls within the 015 soils group and produces 5.9 inches of rainfall in a 24-hour period during the 50-year storm event.

The pre-developed site was analyzed as single water shed draining from the northwest corner of the property to the drainage culvert along the southern property line. The site is approximately 10.5 acres in size. This data was entered into the LAR04 software that calculated the pre-developed 50-year storm flow as a Q of 6.25 cubic feet per second (CFS) and a volume of 0.96 acre feet. (See Figure 5)

The developed on-site watershed was broken down into six (6) subareas dividing the project up into half street flows along “A Street and “C” Street. The area north of C Street is Area A and on the south side of C Street is Subarea B. Subarea C consists of the north portion of B Street and the north half of A Street. Subarea D is the west alleyway and Subarea E is the east alleyway both of which confluence with subarea C to form combined flows on the north side of C Street. The south side of C Street is designated as Subarea F. (See figure 5)

The initial areas for each subarea were entered into the program as overland flow conveyed by a valley channel. These flows then enter street conveyances that confluence with other subareas ultimately combining into pipe flows at the intersection of C Street and A Street where the flows enter into four catch basins.

The 25-year storm event was analyzed to determine street and storm drain capacities. From this analysis it was determined that the 25-year event will produce approximately 16.2 CFS on the 4th day of the storm.

The 50-year storm event was analyzed to determine the retention/detention basin size. From this analysis it was determined that the 50-year event will produce approximately 18.9 CFS on the 4th day of the storm with a volume of 2.86 acre feet.

HYDRAULICS

Figure 10 shows the calculated street capacity for A Street and C Street. B Street and the Alleyways were not analyzed since the flows associated with these conveyances are very small.

From this information this report has been determined that the 25-year and 50-year storm flows will not reach the capacity of the streets. Furthermore, during the 25-year Storm Event, a lane straddling the centerline of the street will be travelable without entering the confluence flows within the gutters.

In summary, Subarea A generates 4.62 cfs along the north half of C Street at the intersection of A Street. The capacity of the north sided of C street has been determined to be 12.32 cfs which is 2.67 times the required capacity.

Subarea B generates 1.98 cfs along the south half of C Street that has a capacity of 9.62 cfs and is almost 5 times the capacity required. Subarea C after the confluence with Subareas D and E generates 5.24 cfs along the North side of A Street that has a capacity of 8.84 cfs and is 1.7 times the required capacity.

Subarea F generates 7.16 cfs along the south side of A Street that has a capacity of 11.25 cfs which is over 1.5 times the capacity required.

The catch basin capacities for the four catch basins located at the intersection of A Street and C Street were evaluated in this report using LACFCD STD D-26 “Catch Basin Capacities for Sump Conditions” and it was determined that a standard three (3) foot wide catch basin in an eight (8) inch curb face would accept 7.58 cfs when the streets are flowing full and 2.71 cfs when the streets are flowing two (3) inches deep. Considering all four (4) catch basins have a capacity of (7.58*4 =) 30.32 cfs, then the system has can accept the 50-year storm flows with a (30.32/18.9 cfs =) 1.6 factor of safety.

RETENTION/DETENTION BASIN

The Basin design is based on the Capital Storm Event per Los Angeles County Hydrology Manual Section 4.2 Capital Flood Protection and Section 4.3 Urban Flood Protection that states the following:

> The Capital Flood level of protection applies to all facilities, including open channels, closed conduits, bridges, dams, and debris basins not under State of California jurisdiction.
>
> All drainage facilities in developed areas not covered under the Capital Flood protection conditions must meet the Urban Flood level of protection. The Urban Flood is runoff from a 25-year frequency design storm falling on a saturated watershed.

The Retention Volume for the basin is governed by the State of California Regional Water Quality Control Board Los Angeles Region Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach Los Angeles County and Long Beach Development Services Low Development Design Manual that state: (Long Beach LID Design Manual)

> At a minimum, peak runoff rates cannot exceed pre-development levels, for developments where the potential for increased storm water discharge rates can result in an increase in downstream erosion potential. (Order No. 99-060 Part 4 Special and Standard Provisions: 1 Special Provisions D Development Planning Item 6. page 17)
>
> Stormwater runoff will be infiltrated, evapotranspired, and/or captured and used through stormwater management techniques…. The onsite stormwater management techniques must be properly sized, at a minimum, to infiltrate, evapotranspire, store for use, without any stormwater runoff leaving the site to the maximum extent feasible, for at least the volume of water produced by the water quality design storm event that results from:
>
> a. The 85th percentile 24-hour runoff event (Figure 2) determined as the maximized capture stormwater volume for the area using a 48 to 72□hour drawdown time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or

b. The volume of annual runoff based on unit basin storage water quality volume, to achieve 80 percent or more volume treatment by the method recommended in the California Stormwater Best Management Practices Handbook –Industrial/Commercial, (2003); or

c. The volume of runoff produced from a 0.75 inch storm event.

In addition, Infiltration rates used for design must be divided by the appropriate factors of safety as expressed in the following equation:

Ksat,design = Ksat,measured/FS

Where:

FS = Infiltration factor of safety = 3

The soils engineer percolation tests determined the infiltration rate as 95gallons/day/sf. This is can be re-expressed as 0.7327 cfs/sf. Reducing this rate by the above factor of safety allows us to use and infiltration rate of (0.7327/3=) 0.2442 cfs/sf.

It was also determined that the 85th percentile 24-hour runoff event produces a 0.75 Isohyet. Based on this a TC Volume calculation determine the required retention volume to be 0.48 acre feet. (see Figure 4)

A HANCOR underground storage infiltration system was used and sized to meet this volume requirement. The system consists of 672 lf of 60 inch perforated storm drain pipe embedded in a gravel backfill.

Using this storage capacity and the unit hydrograph from the 50-year storm event, a retention/detention basin was sized using CivilSoft Retard software. The out flow Q was limited to 85% of the pre-developed storm flow equal to (6.25*0.85=) 5.325 cfs. (see Figure 4, Pre-Developed Storm Q)

The routing calculation is provided here in incorporating all the constraints discussed above. The results show that the area designated on the VTTM for the basin will be sufficient with an above ground detention volume at a depth of 2.5 feet. (see depth vs storage chart Figure 9)

CONCLUSION AND RECOMMENDATIONS

The existing on-site watershed will deliver a 50-year Capital Storm event of approximately 18.9 cubic feet per second (cfs) to a retention/detention basin that has been designed to mitigate the peak Q to 85% the pre-developed Q or 5.325 cfs max and store the LID and SUSMP required 0.48 acre feet of storm water volume. This 50-year storm event will create flood water depths in the streets at less than 66% of their capacity. Four three-foot wide Catch Basin inlets are designed to receive this flow at almost double the capacity required.

Based on the requirements set forth in this report, adequate flood protection has been achieved.

APPENDIX

Figure 1

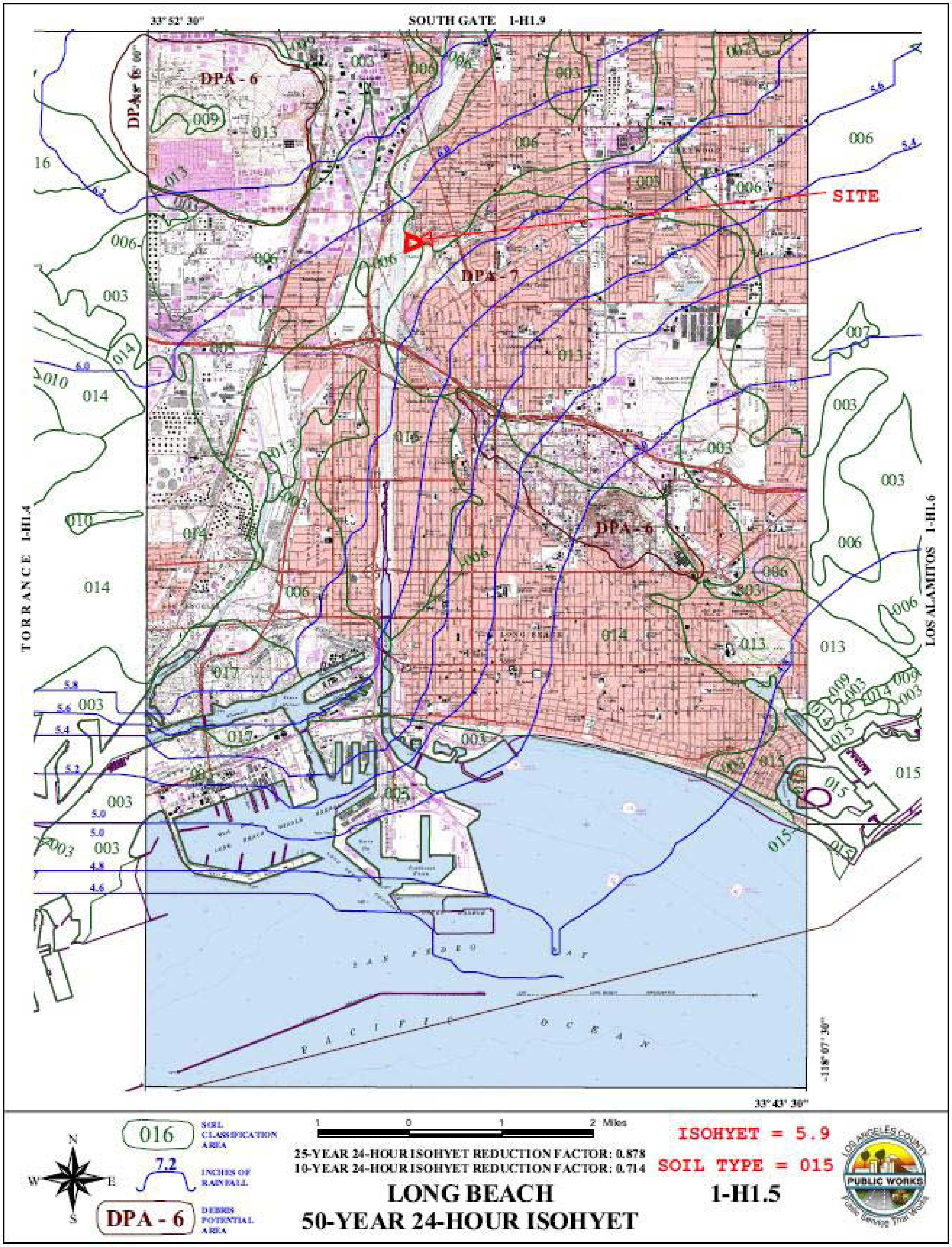
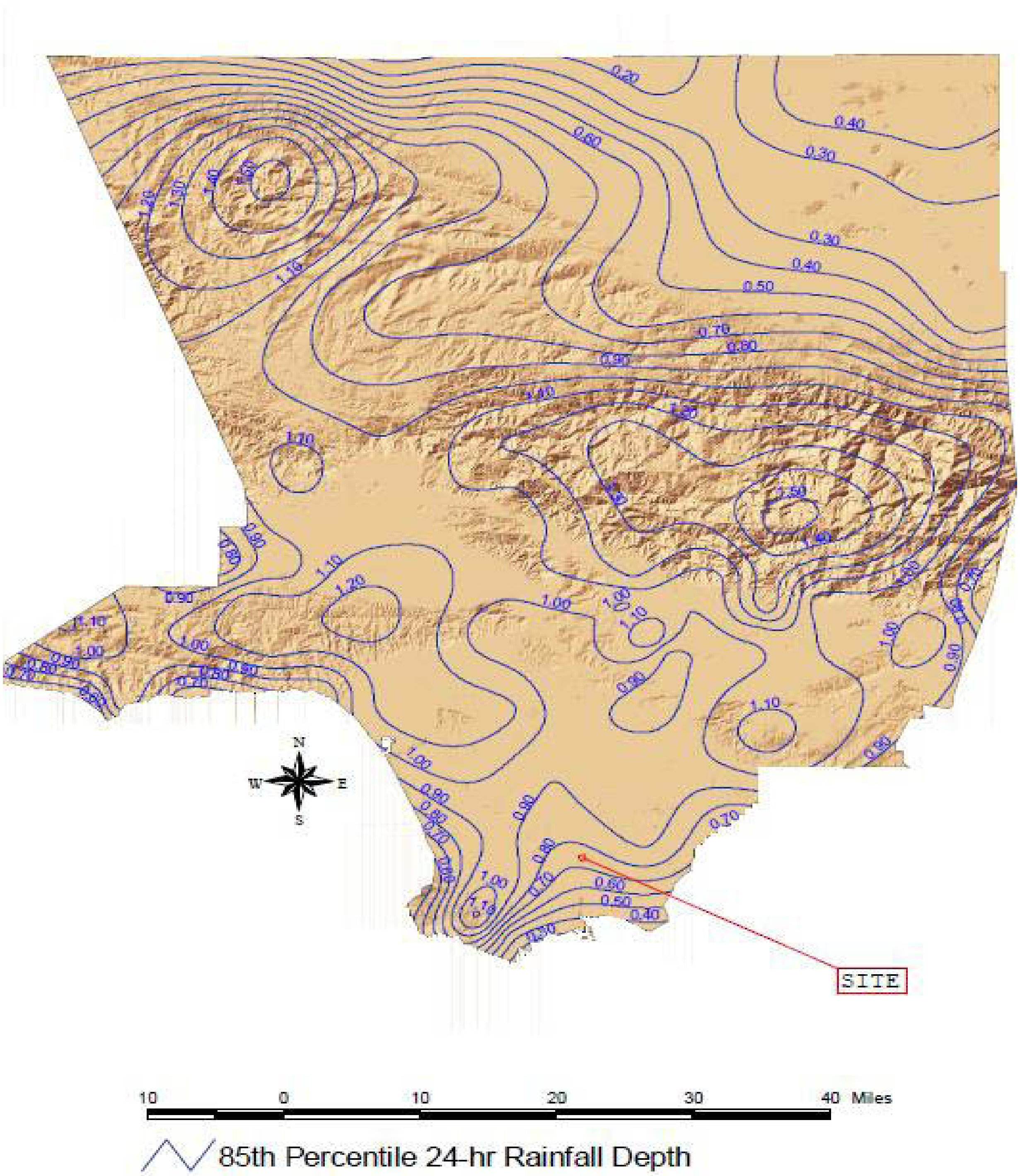

33° 52' 30"
SOUTH GATE 1-H1.9
DPA - 6
DPA - 7
SITE
TORRANCE 1-H1.4
LOS ALAMITOS 1-H1.6
LONG BEACH
SAN PEDRO BAY
PACIFIC OCEAN
-118° 07' 30"
33° 43' 30"
016 SOIL CLASSIFICATION AREA
7.2 INCHES OF RAINFALL
DPA - 6 DEBRIS POTENTIAL AREA
1 0 1 2 Miles
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714
ISOHYET = 5.9
SOIL TYPE = 015
LONG BEACH
50-YEAR 24-HOUR ISOHYET
1-H1.5
N
S
E
W
LOS ANGELES COUNTY PUBLIC WORKS

Figure 2

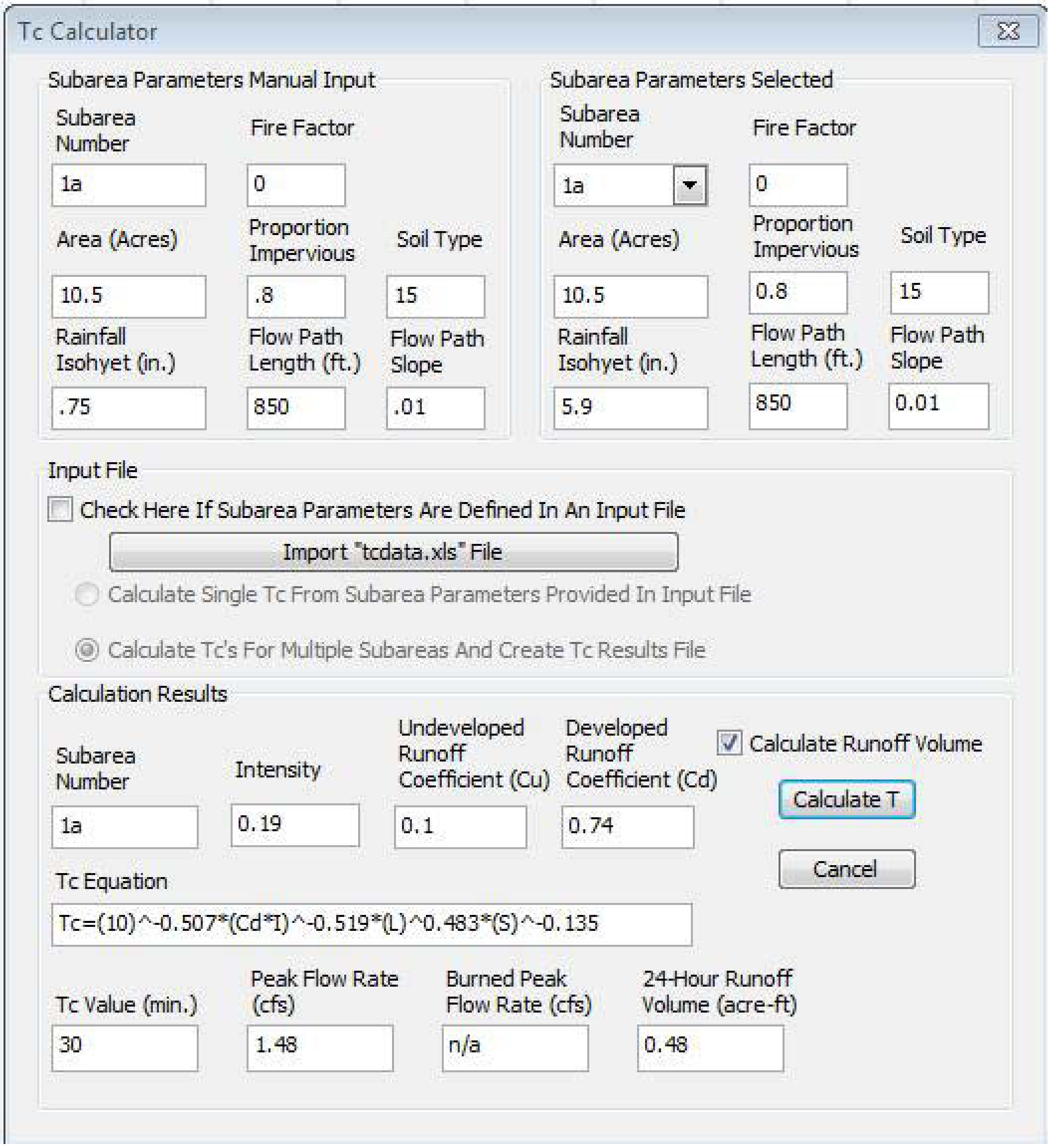
85th Percentile 24-hr Rainfall Isohyetal Map



DAISY

Figure 3

LID / SUSUMP STORAGE REQUIREMENT



Subarea Parameters Manual Input

Subarea Number	Fire Factor	
1a	0	
Area (Acres)	Proportion Impervious	Soil Type
10.5	.8	15
Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
.75	850	.01

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0	
Area (Acres)	Proportion Impervious	Soil Type
10.5	0.8	15
Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
5.9	850	0.01

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

● Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
1a	0.19	0.1	0.74

☑ Calculate Runoff Volume

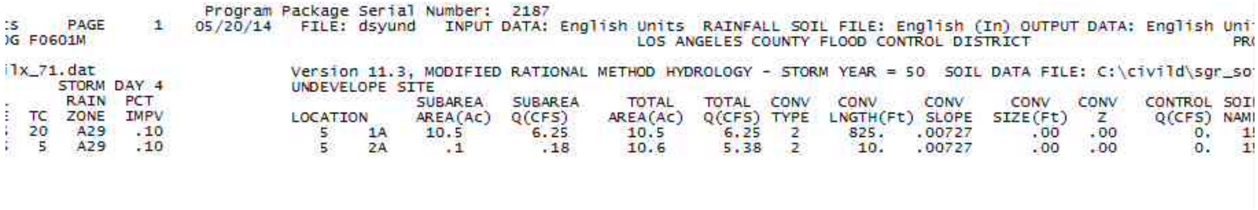
Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
30	1.48	n/a	0.48

Figure 4

Pre-Developed Storm Q and Hydrograph



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G F0601M                                                              LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                PR

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      RAIN  PCT                                           SUBAREA   SUBAREA      TOTAL    TOTAL  CONV   CONV      CONV      CONV    CONV    CONTROL SOI
   TC ZONE  IMPV                           LOCATION       AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)   Z      Q(CFS) NAM
   20  A29   .10                            5     1A      10.5       6.25       10.5      6.25   2     825.    .00727     .00    .00        0.   1
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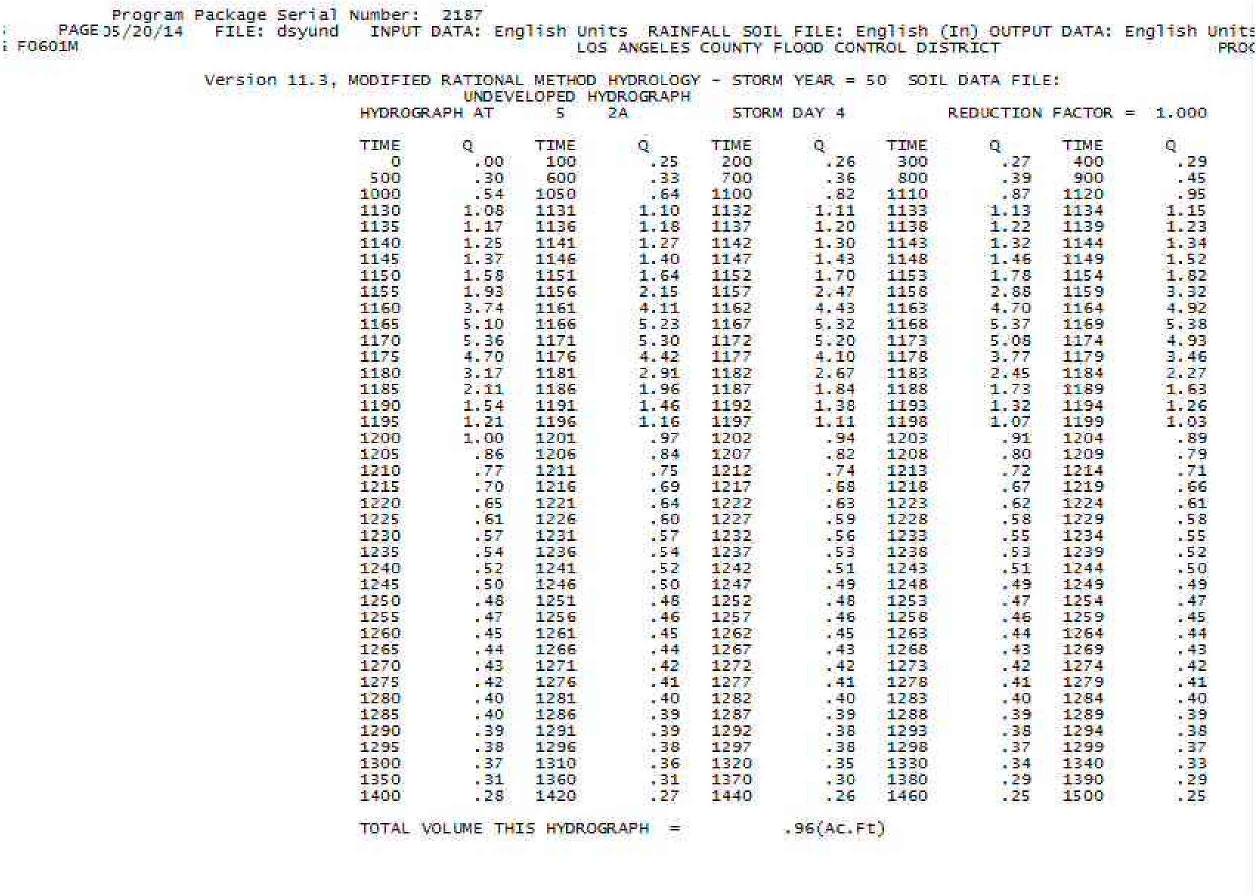

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 F0601M                                                      LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                    PROC

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                                 UNDEVELOPED HYDROGRAPH
                         HYDROGRAPH AT      5    2A          STORM DAY 4          REDUCTION FACTOR =  1.000

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                           0      .00     100       .25     200       .26     300       .27     400       .29
                          500     .30     600       .33     700       .36     800       .39     900       .45
                         1000     .54    1050       .64    1100       .82    1110       .87    1120       .95
                         1130    1.08    1131      1.10    1132      1.11    1133      1.13    1134      1.15
                         1135    1.17    1136      1.18    1137      1.20    1138      1.22    1139      1.23
                         1140    1.25    1141      1.27    1142      1.30    1143      1.32    1144      1.34
                         1145    1.37    1146      1.40    1147      1.43    1148      1.46    1149      1.52
                         1150    1.58    1151      1.64    1152      1.70    1153      1.78    1154      1.82
                         1155    1.93    1156      2.15    1157      2.47    1158      2.88    1159      3.32
                         1160    3.74    1161      4.11    1162      4.43    1163      4.70    1164      4.92
                         1165    5.10    1166      5.23    1167      5.32    1168      5.37    1169      5.38
                         1170    5.36    1171      5.30    1172      5.20    1173      5.08    1174      4.93
                         1175    4.70    1176      4.42    1177      4.10    1178      3.77    1179      3.46
                         1180    3.17    1181      2.91    1182      2.67    1183      2.45    1184      2.27
                         1185    2.11    1186      1.96    1187      1.84    1188      1.73    1189      1.63
                         1190    1.54    1191      1.46    1192      1.38    1193      1.32    1194      1.26
                         1195    1.21    1196      1.16    1197      1.11    1198      1.07    1199      1.03
                         1200    1.00    1201       .97    1202       .94    1203       .91    1204       .89
                         1205     .86    1206       .84    1207       .82    1208       .80    1209       .79
                         1210     .77    1211       .75    1212       .74    1213       .72    1214       .71
                         1215     .70    1216       .69    1217       .68    1218       .67    1219       .66
                         1220     .65    1221       .64    1222       .63    1223       .62    1224       .61
                         1225     .61    1226       .60    1227       .59    1228       .58    1229       .58
                         1230     .57    1231       .57    1232       .56    1233       .55    1234       .55
                         1235     .54    1236       .54    1237       .53    1238       .53    1239       .52
                         1240     .52    1241       .52    1242       .51    1243       .51    1244       .50
                         1245     .50    1246       .50    1247       .49    1248       .49    1249       .49
                         1250     .48    1251       .48    1252       .48    1253       .47    1254       .47
                         1255     .47    1256       .46    1257       .46    1258       .46    1259       .45
                         1260     .45    1261       .45    1262       .45    1263       .44    1264       .44
                         1265     .44    1266       .44    1267       .43    1268       .43    1269       .43
                         1270     .43    1271       .42    1272       .42    1273       .42    1274       .42
                         1275     .42    1276       .41    1277       .41    1278       .41    1279       .41
                         1280     .40    1281       .40    1282       .40    1283       .40    1284       .40
                         1285     .40    1286       .39    1287       .39    1288       .39    1289       .39
                         1290     .39    1291       .39    1292       .38    1293       .38    1294       .38
                         1295     .38    1296       .38    1297       .38    1298       .37    1299       .37
                         1300     .37    1310       .36    1320       .35    1330       .34    1340       .33
                         1350     .31    1360       .31    1370       .30    1380       .29    1390       .29
                         1400     .28    1420       .27    1440       .26    1460       .25    1500       .25

                         TOTAL VOLUME THIS HYDROGRAPH  =         .96(Ac.Ft)
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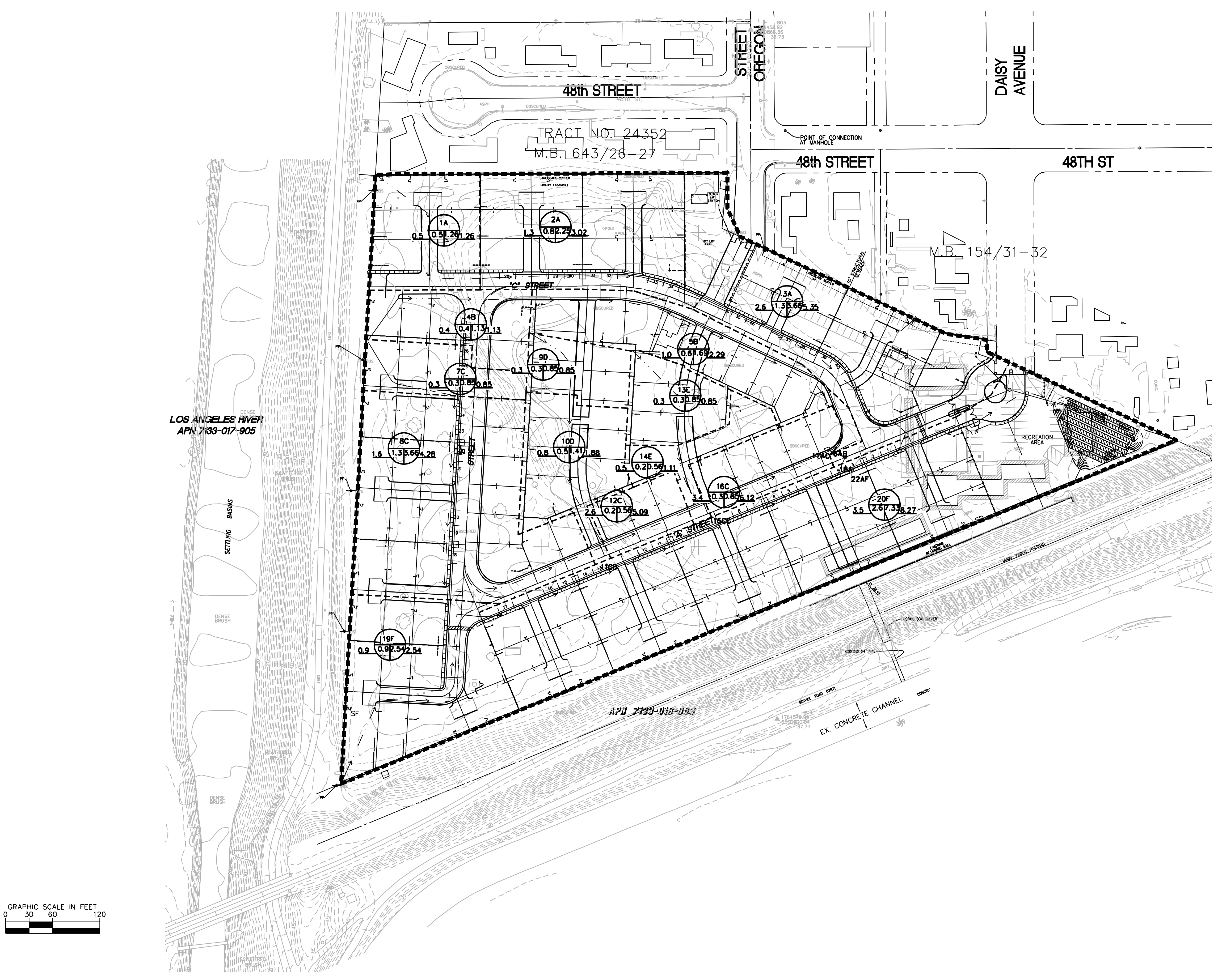
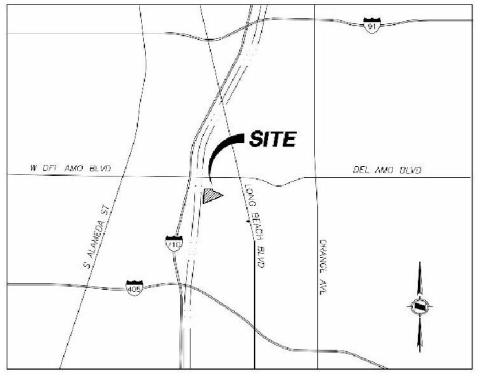
Figure 5

SEE ATTACHED HYDROLOGY MAP

HYDROLOGY WATERSHED MAP





LEGEND:

- SUBAREA NAME
- TOTAL SYSTEM FLOW RATE (CFS)
- SUBAREA FLOW RATE (CFS)
- SUBAREA AREA (ACRES)
- TOTAL SYSTEM AREA (ACRES)

FIGURE 5

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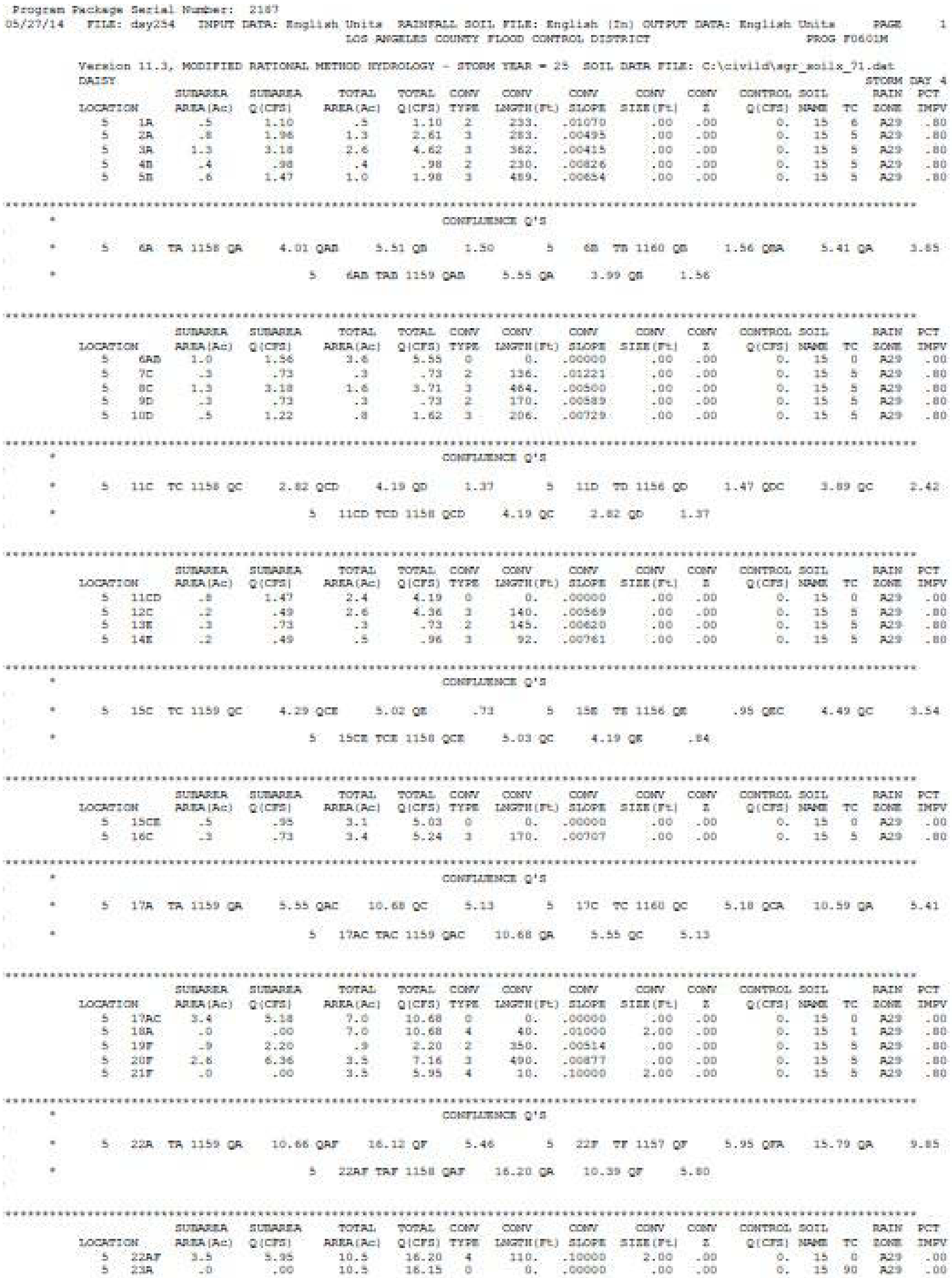
6800 Owensmouth Avenue, Suite 410
Canoga Park, California 91303 (747) 900-8400

Figure 6

24-Year 4th Day Developed Storm Q



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                                              LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                       PROG F0601M

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       LOCATION    AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
          5    1A      .5        1.10        .5     1.10   2     233.   .01070      .00   .00        0.    15   6   A29   .80
          5    2A      .8        1.96       1.3     2.61   3     283.   .00495      .00   .00        0.    15   5   A29   .80
          5    3A     1.3        3.18       2.6     4.62   3     362.   .00415      .00   .00        0.    15   5   A29   .80
          5    4B      .4         .98        .4      .98   2     230.   .00826      .00   .00        0.    15   5   A29   .80
          5    5B      .6        1.47       1.0     1.98   3     489.   .00654      .00   .00        0.    15   5   A29   .80

*****************************************************************************************************************
    *                                                   CONFLUENCE Q'S

    *     5    6A  TA 1158 QA     4.01 QAB     5.51 QB      1.50         5    6B  TB 1160 QB      1.56 QBA     5.41 QA     3.85

    *                                 5    6AB TAB 1159 QAB     5.55 QA     3.99 QB      1.56

*****************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV     CONV     CONV    CONV   CONTROL SOIL       RAIN  PCT
       LOCATION    AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
          5    6AB    1.0        1.56       3.6     5.55   0       0.   .00000      .00   .00        0.    15   0   A29   .00
          5    7C      .3         .73        .3      .73   2     136.   .01221      .00   .00        0.    15   5   A29   .80
          5    8C     1.3        3.18       1.6     3.71   3     464.   .00500      .00   .00        0.    15   5   A29   .80
          5    9D      .3         .73        .3      .73   2     170.   .00589      .00   .00        0.    15   5   A29   .80
          5   10D      .5        1.22        .8     1.62   3     206.   .00729      .00   .00        0.    15   5   A29   .80

*****************************************************************************************************************
    *                                                   CONFLUENCE Q'S

    *     5   11C  TC 1158 QC     2.82 QCD     4.19 QD      1.37         5   11D  TD 1156 QD      1.47 QDC     3.89 QC     2.42

    *                                 5   11CD TCD 1158 QCD     4.19 QC     2.82 QD      1.37

*****************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV     CONV     CONV    CONV   CONTROL SOIL       RAIN  PCT
       LOCATION    AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
          5   11CD     .8        1.47       2.4     4.19   0       0.   .00000      .00   .00        0.    15   0   A29   .00
          5   12C      .2         .49       2.6     4.36   3     140.   .00569      .00   .00        0.    15   5   A29   .80
          5   13E      .3         .73        .3      .73   2     145.   .00620      .00   .00        0.    15   5   A29   .80
          5   14E      .2         .49        .5      .96   3      92.   .00761      .00   .00        0.    15   5   A29   .80

*****************************************************************************************************************
    *                                                   CONFLUENCE Q'S

    *     5   15C  TC 1159 QC     4.29 QCE     5.02 QE       .73         5   15E  TE 1156 QE       .95 QEC     4.49 QC     3.54

    *                                 5   15CE TCE 1158 QCE     5.03 QC     4.19 QE       .84

*****************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV     CONV     CONV    CONV   CONTROL SOIL       RAIN  PCT
       LOCATION    AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
          5   15CE     .5         .95       3.1     5.03   0       0.   .00000      .00   .00        0.    15   0   A29   .00
          5   16C      .3         .73       3.4     5.24   3     170.   .00707      .00   .00        0.    15   5   A29   .80

*****************************************************************************************************************
    *                                                   CONFLUENCE Q'S

    *     5   17A  TA 1159 QA     5.55 QAC    10.68 QC      5.13         5   17C  TC 1160 QC      5.18 QCA    10.59 QA     5.41

    *                                 5   17AC TAC 1159 QAC    10.68 QA     5.55 QC      5.13

*****************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV     CONV     CONV    CONV   CONTROL SOIL       RAIN  PCT
       LOCATION    AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
          5   17AC    3.4        5.18       7.0    10.68   0       0.   .00000      .00   .00        0.    15   0   A29   .00
          5   18A      .0         .00       7.0    10.68   4      40.   .01000     2.00   .00        0.    15   1   A29   .80
          5   19F      .9        2.20        .9     2.20   2     350.   .00514      .00   .00        0.    15   5   A29   .80
          5   20F     2.6        6.36       3.5     7.16   3     490.   .00877      .00   .00        0.    15   5   A29   .80
          5   21F      .0         .00       3.5     5.95   4      10.   .10000     2.00   .00        0.    15   5   A29   .80

*****************************************************************************************************************
    *                                                   CONFLUENCE Q'S

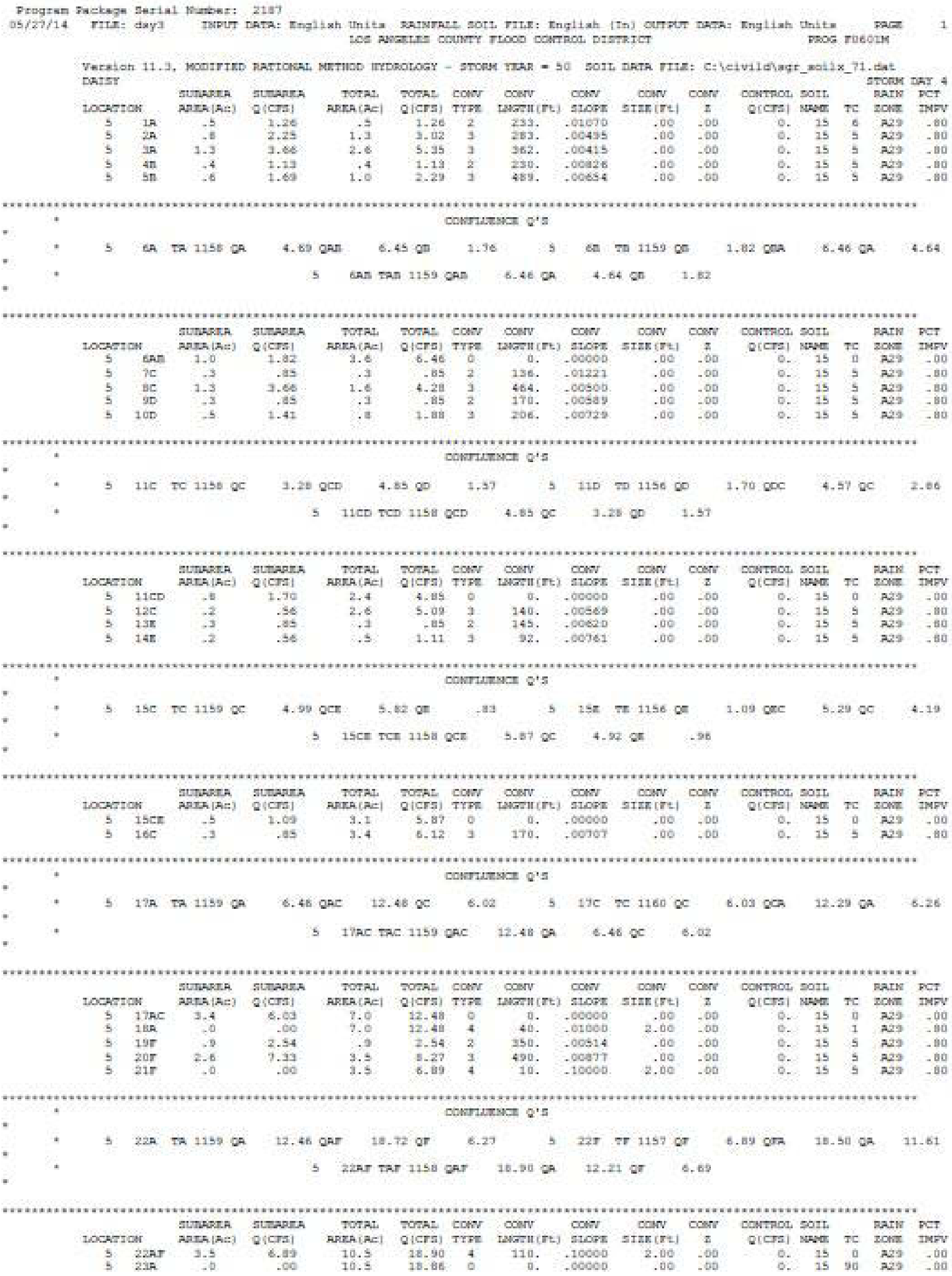
    *     5   22A  TA 1159 QA    10.66 QAF    16.12 QF      5.46         5   22F  TF 1157 QF      5.95 QFA    15.79 QA     9.85

    *                                 5   22AF TAF 1158 QAF    16.20 QA    10.39 QF      5.80

*****************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV     CONV     CONV    CONV   CONTROL SOIL       RAIN  PCT
       LOCATION    AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
          5   22AF    3.5        5.95      10.5    16.20   4     110.   .10000     2.00   .00        0.    15   0   A29   .00
          5   23A      .0         .00      10.5    16.15   0       0.   .00000      .00   .00        0.    15  90   A29   .00
```

Figure 7

50-Year Days 1-4 Developed Storm Q



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 Program Package Serial Number:  2187
05/27/14   FILE: day3     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units      PAGE     1
                                                      LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                        PROG F0601M

          Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\sgr_soilx_71.dat
          DAISY                                                                                                    STORM DAY 4
                           SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL      RAIN  PCT
          LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
             5    1A         .5        1.26         .5      1.26   2     233.   .01070      .00   .00        0.   15   6   A29   .80
             5    2A         .8        2.25        1.3      3.02   3     283.   .00495      .00   .00        0.   15   5   A29   .80
             5    3A        1.3        3.66        2.6      5.35   3     362.   .00415      .00   .00        0.   15   5   A29   .80
             5    4B         .4        1.13         .4      1.13   2     230.   .00826      .00   .00        0.   15   5   A29   .80
             5    5B         .6        1.69        1.0      2.29   3     489.   .00654      .00   .00        0.   15   5   A29   .80

**************************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *     5    6A  TA 1158 QA      4.69 QAB      6.45 QB       1.76        5    6B  TB 1159 QB      1.82 QBA      6.46 QA     4.64
*
      *                                 5    6AB TAB 1159 QAB     6.46 QA      4.64 QB      1.82
*

**************************************************************************************************************************
                           SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL      RAIN  PCT
          LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
             5    6AB       1.0        1.82        3.6      6.46   0       0.   .00000      .00   .00        0.   15   0   A29   .00
             5    7C         .3         .85         .3       .85   2     136.   .01221      .00   .00        0.   15   5   A29   .80
             5    8C        1.3        3.66        1.6      4.28   3     464.   .00500      .00   .00        0.   15   5   A29   .80
             5    9D         .3         .85         .3       .85   2     170.   .00589      .00   .00        0.   15   5   A29   .80
             5   10D         .5        1.41         .8      1.88   3     206.   .00729      .00   .00        0.   15   5   A29   .80

**************************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *     5   11C  TC 1158 QC      3.28 QCD      4.85 QD       1.57        5   11D  TD 1156 QD      1.70 QDC      4.57 QC     2.86
*
      *                                 5   11CD TCD 1158 QCD     4.85 QC      3.28 QD      1.57
*

**************************************************************************************************************************
                           SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL      RAIN  PCT
          LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
             5   11CD        .6        1.70        2.4      4.85   0       0.   .00000      .00   .00        0.   15   0   A29   .00
             5   12C         .2         .56        2.6      5.09   3     140.   .00569      .00   .00        0.   15   5   A29   .80
             5   13E         .3         .85         .3       .85   2     145.   .00620      .00   .00        0.   15   5   A29   .80
             5   14E         .2         .56         .5      1.11   3      92.   .00761      .00   .00        0.   15   5   A29   .80

**************************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *     5   15C  TC 1159 QC      4.99 QCE      5.82 QE        .83        5   15E  TE 1156 QE      1.09 QEC      5.29 QC     4.19
*
      *                                 5   15CE TCE 1158 QCE     5.87 QC      4.92 QE       .96
*

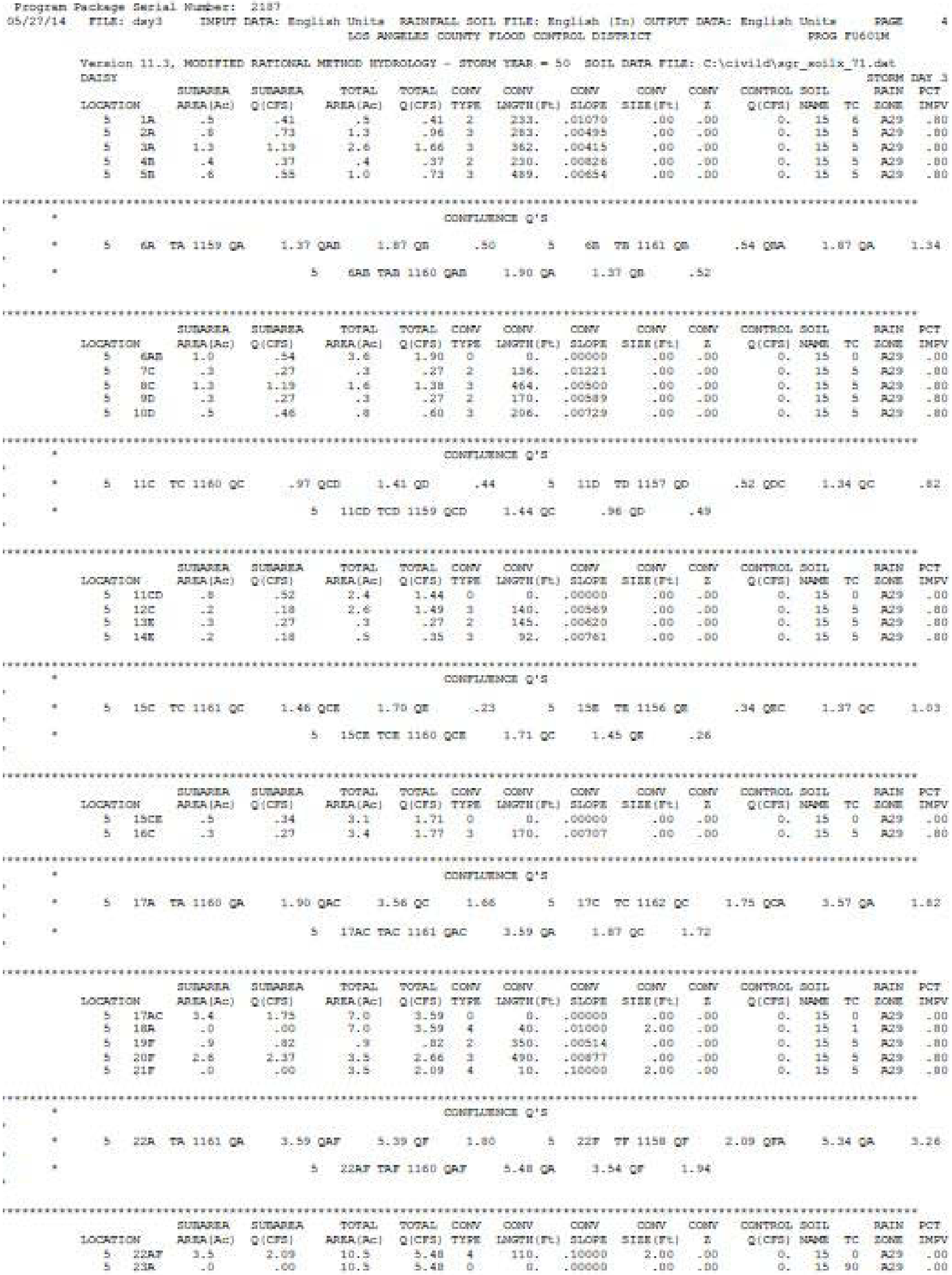
**************************************************************************************************************************
                           SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL      RAIN  PCT
          LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
             5   15CE        .5        1.09        3.1      5.87   0       0.   .00000      .00   .00        0.   15   0   A29   .00
             5   16C         .3         .85        3.4      6.12   3     170.   .00707      .00   .00        0.   15   5   A29   .80

**************************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *     5   17A  TA 1159 QA      6.46 QAC     12.48 QC       6.02        5   17C  TC 1160 QC      6.03 QCA     12.29 QA     6.26
*
      *                                 5   17AC TAC 1159 QAC    12.48 QA      6.46 QC      6.02
*

**************************************************************************************************************************
                           SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL      RAIN  PCT
          LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
             5   17AC       3.4        6.03        7.0     12.48   0       0.   .00000      .00   .00        0.   15   0   A29   .00
             5   18A         .0         .00        7.0     12.48   4      40.   .01000     2.00   .00        0.   15   1   A29   .80
             5   19F         .9        2.54         .9      2.54   2     350.   .00514      .00   .00        0.   15   5   A29   .80
             5   20F        2.6        7.33        3.5      8.27   3     490.   .00877      .00   .00        0.   15   5   A29   .80
             5   21F         .0         .00        3.5      6.89   4      10.   .10000     2.00   .00        0.   15   5   A29   .80

**************************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *     5   22A  TA 1159 QA     12.46 QAF     18.72 QF       6.27        5   22F  TF 1157 QF      6.89 QFA     18.50 QA    11.61
*
      *                                 5   22AF TAF 1158 QAF    18.90 QA     12.21 QF      6.69
*

**************************************************************************************************************************
                           SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV      CONV      CONV   CONV   CONTROL SOIL      RAIN  PCT
          LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
             5   22AF       3.5        6.89       10.5     18.90   4     110.   .10000     2.00   .00        0.   15   0   A29   .00
             5   23A         .0         .00       10.5     18.86   0       0.   .00000      .00   .00        0.   15  90   A29   .00
```



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 Program Package Serial Number:  2187
05/27/14   FILE: day3     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     4
                                                   LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                        PROG FU601M

        Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\sgr_soilx_71.dat
        DAISY                                                                                                    STORM DAY 3
                        SUBAREA   SUBAREA     TOTAL   TOTAL  CONV    CONV       CONV      CONV    CONV   CONTROL SOIL        RAIN  PCT
        LOCATION        AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC   ZONE  IMPV
            5    1A        .5        .41        .5       .41   2      233.   .01070       .00    .00        0.   15    6   A29   .80
            5    2A        .8        .73       1.3       .96   3      283.   .00495       .00    .00        0.   15    5   A29   .80
            5    3A       1.3       1.19       2.6      1.66   3      362.   .00415       .00    .00        0.   15    5   A29   .80
            5    4B        .4        .37        .4       .37   2      230.   .00826       .00    .00        0.   15    5   A29   .80
            5    5B        .6        .55       1.0       .73   3      489.   .00654       .00    .00        0.   15    5   A29   .80

**********************************************************************************************************************
     *                                                      CONFLUENCE Q'S
'
     *      5   6A  TA 1159 QA     1.37 QAB     1.87 QB       .50        5    6B  TB 1161 QB      .54 QBA     1.87 QA     1.34
'
     *                                  5   6AB TAB 1160 QAB     1.90 QA     1.37 QB      .52
'

**********************************************************************************************************************
                        SUBAREA   SUBAREA     TOTAL   TOTAL  CONV    CONV       CONV      CONV    CONV   CONTROL SOIL        RAIN  PCT
        LOCATION        AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC   ZONE  IMPV
            5    6AB      1.0        .54       3.6      1.90   0        0.   .00000       .00    .00        0.   15    0   A29   .00
            5    7C        .3        .27        .3       .27   2      136.   .01221       .00    .00        0.   15    5   A29   .80
            5    8C       1.3       1.19       1.6      1.38   3      464.   .00500       .00    .00        0.   15    5   A29   .80
            5    9D        .3        .27        .3       .27   2      170.   .00589       .00    .00        0.   15    5   A29   .80
            5   10D        .5        .46        .8       .60   3      206.   .00729       .00    .00        0.   15    5   A29   .80

**********************************************************************************************************************
     *                                                      CONFLUENCE Q'S
'
     *      5  11C  TC 1160 QC      .97 QCD     1.41 QD       .44        5   11D  TD 1157 QD      .52 QDC     1.34 QC      .82
'
     *                                  5   11CD TCD 1159 QCD     1.44 QC      .96 QD      .49
'

**********************************************************************************************************************
                        SUBAREA   SUBAREA     TOTAL   TOTAL  CONV    CONV       CONV      CONV    CONV   CONTROL SOIL        RAIN  PCT
        LOCATION        AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC   ZONE  IMPV
            5   11CD       .8        .52       2.4      1.44   0        0.   .00000       .00    .00        0.   15    0   A29   .00
            5   12C        .2        .18       2.6      1.49   3      140.   .00569       .00    .00        0.   15    5   A29   .80
            5   13E        .3        .27        .3       .27   2      145.   .00620       .00    .00        0.   15    5   A29   .80
            5   14E        .2        .18        .5       .35   3       92.   .00761       .00    .00        0.   15    5   A29   .80

**********************************************************************************************************************
     *                                                      CONFLUENCE Q'S
'
     *      5  15C  TC 1161 QC     1.46 QCE     1.70 QE       .23        5   15E  TE 1156 QE      .34 QEC     1.37 QC     1.03
'
     *                                  5   15CE TCE 1160 QCE     1.71 QC     1.45 QE      .26
'

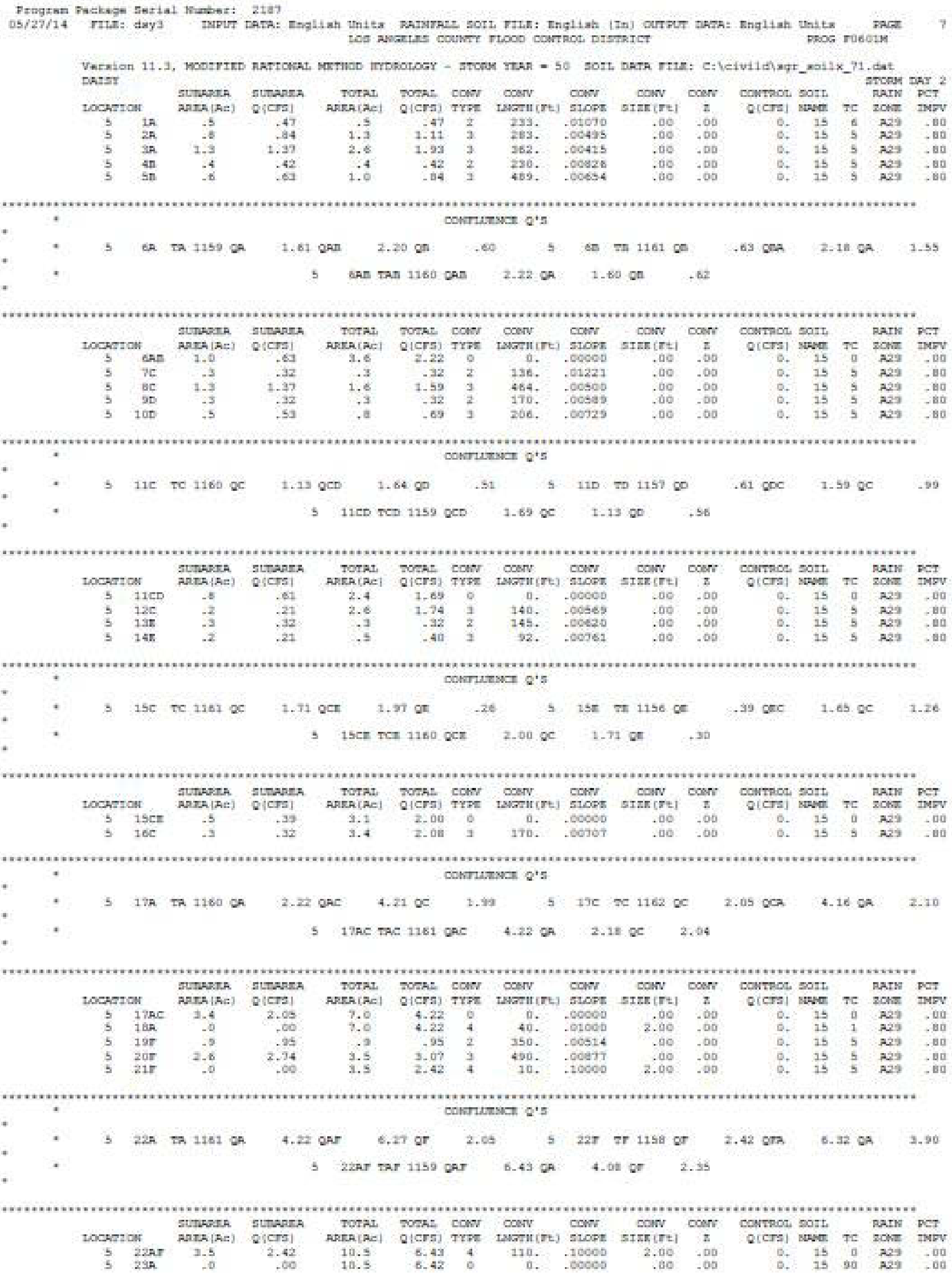
**********************************************************************************************************************
                        SUBAREA   SUBAREA     TOTAL   TOTAL  CONV    CONV       CONV      CONV    CONV   CONTROL SOIL        RAIN  PCT
        LOCATION        AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC   ZONE  IMPV
            5   15CE       .5        .34       3.1      1.71   0        0.   .00000       .00    .00        0.   15    0   A29   .00
            5   16C        .3        .27       3.4      1.77   3      170.   .00707       .00    .00        0.   15    5   A29   .80

**********************************************************************************************************************
     *                                                      CONFLUENCE Q'S
'
     *      5  17A  TA 1160 QA     1.90 QAC     3.56 QC      1.66        5   17C  TC 1162 QC     1.75 QCA     3.57 QA     1.82
'
     *                                  5   17AC TAC 1161 QAC     3.59 QA     1.87 QC     1.72
'

**********************************************************************************************************************
                        SUBAREA   SUBAREA     TOTAL   TOTAL  CONV    CONV       CONV      CONV    CONV   CONTROL SOIL        RAIN  PCT
        LOCATION        AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC   ZONE  IMPV
            5   17AC      3.4       1.75       7.0      3.59   0        0.   .00000       .00    .00        0.   15    0   A29   .00
            5   18A        .0        .00       7.0      3.59   4       40.   .01000      2.00    .00        0.   15    1   A29   .80
            5   19F        .9        .82        .9       .82   2      350.   .00514       .00    .00        0.   15    5   A29   .80
            5   20F       2.8       2.37       3.5      2.66   3      490.   .00877       .00    .00        0.   15    5   A29   .80
            5   21F        .0        .00       3.5      2.09   4       10.   .10000      2.00    .00        0.   15    5   A29   .80

**********************************************************************************************************************
     *                                                      CONFLUENCE Q'S
'
     *      5  22A  TA 1161 QA     3.59 QAF     5.39 QF      1.80        5   22F  TF 1158 QF     2.09 QFA     5.34 QA     3.26
'
     *                                  5   22AF TAF 1160 QAF     5.48 QA     3.54 QF     1.94
'

**********************************************************************************************************************
                        SUBAREA   SUBAREA     TOTAL   TOTAL  CONV    CONV       CONV      CONV    CONV   CONTROL SOIL        RAIN  PCT
        LOCATION        AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC   ZONE  IMPV
            5   22AF      3.5       2.09      10.5      5.48   4      110.   .10000      2.00    .00        0.   15    0   A29   .00
            5   23A        .0        .00      10.5      5.48   0        0.   .00000       .00    .00        0.   15   90   A29   .00
```



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 Program Package Serial Number:  2187
05/27/14   FILE: day3     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units      PAGE     7
                                                   LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                            PROG F0601M

          Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\sgr_soilx_71.dat
          DAISY                                                                                                     STORM DAY 2
                          SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV      CONV      CONV    CONV    CONTROL SOIL       RAIN  PCT
          LOCATION        AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC  ZONE  IMPV
              5    1A        .5        .47         .5        .47   2     233.   .01070       .00   .00        0.    15   6   A29   .80
              5    2A        .8        .84        1.3       1.11   3     283.   .00495       .00   .00        0.    15   5   A29   .80
              5    3A       1.3       1.37        2.6       1.93   3     362.   .00415       .00   .00        0.    15   5   A29   .80
              5    4B        .4        .42         .4        .42   2     230.   .00828       .00   .00        0.    15   5   A29   .80
              5    5B        .6        .63        1.0        .84   3     489.   .00654       .00   .00        0.    15   5   A29   .80

*********************************************************************************************************************************
      *                                                       CONFLUENCE Q'S
*
      *      5    6A  TA 1159 QA     1.61 QAB     2.20 QB      .60        5    6B  TB 1161 QB      .63 QBA     2.18 QA     1.55
*
      *                                   5    6AB TAB 1160 QAB     2.22 QA     1.60 QB      .62
*

*********************************************************************************************************************************
                          SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV      CONV      CONV    CONV    CONTROL SOIL       RAIN  PCT
          LOCATION        AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC  ZONE  IMPV
              5    6AB      1.0        .63        3.6       2.22   0       0.   .00000       .00   .00        0.    15   0   A29   .00
              5    7C        .3        .32         .3        .32   2     136.   .01221       .00   .00        0.    15   5   A29   .80
              5    8C       1.3       1.37        1.6       1.59   3     464.   .00500       .00   .00        0.    15   5   A29   .80
              5    9D        .3        .32         .3        .32   2     170.   .00589       .00   .00        0.    15   5   A29   .80
              5   10D        .5        .53         .8        .69   3     206.   .00729       .00   .00        0.    15   5   A29   .80

*********************************************************************************************************************************
      *                                                       CONFLUENCE Q'S
*
      *      5   11C  TC 1160 QC     1.13 QCD     1.64 QD      .51        5   11D  TD 1157 QD      .61 QDC     1.59 QC      .99
*
      *                                   5   11CD TCD 1159 QCD     1.69 QC     1.13 QD      .56
*

*********************************************************************************************************************************
                          SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV      CONV      CONV    CONV    CONTROL SOIL       RAIN  PCT
          LOCATION        AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC  ZONE  IMPV
              5   11CD       .8        .61        2.4       1.69   0       0.   .00000       .00   .00        0.    15   0   A29   .00
              5   12C        .2        .21        2.6       1.74   3     140.   .00569       .00   .00        0.    15   5   A29   .80
              5   13E        .3        .32         .3        .32   2     145.   .00620       .00   .00        0.    15   5   A29   .80
              5   14E        .2        .21         .5        .40   3      92.   .00761       .00   .00        0.    15   5   A29   .80

*********************************************************************************************************************************
      *                                                       CONFLUENCE Q'S
*
      *      5   15C  TC 1161 QC     1.71 QCE     1.97 QE      .26        5   15E  TE 1156 QE      .39 QEC     1.65 QC     1.26
*
      *                                   5   15CE TCE 1160 QCE     2.00 QC     1.71 QE      .30
*

*********************************************************************************************************************************
                          SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV      CONV      CONV    CONV    CONTROL SOIL       RAIN  PCT
          LOCATION        AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC  ZONE  IMPV
              5   15CE       .5        .39        3.1       2.00   0       0.   .00000       .00   .00        0.    15   0   A29   .00
              5   16C        .3        .32        3.4       2.08   3     170.   .00707       .00   .00        0.    15   5   A29   .80

*********************************************************************************************************************************
      *                                                       CONFLUENCE Q'S
*
      *      5   17A  TA 1160 QA     2.22 QAC     4.21 QC     1.99        5   17C  TC 1162 QC     2.05 QCA     4.16 QA     2.10
*
      *                                   5   17AC TAC 1161 QAC     4.22 QA     2.18 QC     2.04
*

*********************************************************************************************************************************
                          SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV      CONV      CONV    CONV    CONTROL SOIL       RAIN  PCT
          LOCATION        AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC  ZONE  IMPV
              5   17AC      3.4       2.05        7.0       4.22   0       0.   .00000       .00   .00        0.    15   0   A29   .00
              5   18A        .0        .00        7.0       4.22   4      40.   .01000      2.00   .00        0.    15   1   A29   .80
              5   19F        .9        .95         .9        .95   2     350.   .00514       .00   .00        0.    15   5   A29   .80
              5   20F       2.6       2.74        3.5       3.07   3     490.   .00877       .00   .00        0.    15   5   A29   .80
              5   21F        .0        .00        3.5       2.42   4      10.   .10000      2.00   .00        0.    15   5   A29   .80

*********************************************************************************************************************************
      *                                                       CONFLUENCE Q'S
*
      *      5   22A  TA 1161 QA     4.22 QAF     6.27 QF     2.05        5   22F  TF 1158 QF     2.42 QFA     6.32 QA     3.90
*
      *                                   5   22AF TAF 1159 QAF     6.43 QA     4.08 QF     2.35
*

*********************************************************************************************************************************
                          SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV      CONV      CONV    CONV    CONTROL SOIL       RAIN  PCT
          LOCATION        AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE   SIZE(Ft)    Z      Q(CFS) NAME  TC  ZONE  IMPV
              5   22AF      3.5       2.42       10.5       6.43   4     110.   .10000      2.00   .00        0.    15   0   A29   .00
              5   23A        .0        .00       10.5       6.42   0       0.   .00000       .00   .00        0.    15  90   A29   .00
```

```
 Program Package Serial Number:  2187
05/27/14   FILE: day3     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE    10
                                                   LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                        PROG F0601M

        Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\sgr_soilx_71.dat
        DAISY                                                                                                      STORM DAY 1
                         SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV       CONV       CONV    CONV     CONTROL SOIL      RAIN  PCT
        LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE     SIZE(Ft)    Z       Q(CFS) NAME  TC  ZONE  IMPV
            5    1A         .5        .12        .5        .12   2      233.    .01070        .00    .00         0.    15   6   A29   .80
            5    2A         .8        .21       1.3        .28   3      283.    .00495        .00    .00         0.    15   5   A29   .80
            5    3A        1.3        .33       2.6        .43   3      362.    .00415        .00    .00         0.    15   5   A29   .80
            5    4B         .4        .10        .4        .10   2      230.    .00826        .00    .00         0.    15   5   A29   .80
            5    5B         .6        .15       1.0        .22   3      489.    .00654        .00    .00         0.    15   5   A29   .80

****************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *      5    6A  TA 1162 QA      .29 QAB      .42 QB       .13         5    6B  TB 1165 QB      .14 QBA      .42 QA      .28
*
      *                                 5    6AB TAB 1164 QAB      .42 QA      .28 QB      .14
*

****************************************************************************************************************
                         SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV       CONV       CONV    CONV     CONTROL SOIL      RAIN  PCT
        LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE     SIZE(Ft)    Z       Q(CFS) NAME  TC  ZONE  IMPV
            5    6AB       1.0        .14       3.6        .42   0        0.    .00000        .00    .00         0.    15   0   A29   .00
            5    7C         .3        .08        .3        .08   2      136.    .01221        .00    .00         0.    15   5   A29   .80
            5    8C        1.3        .33       1.6        .33   3      464.    .00500        .00    .00         0.    15   5   A29   .80
            5    9D         .3        .08        .3        .08   2      170.    .00589        .00    .00         0.    15   5   A29   .80
            5   10D         .5        .13        .8        .13   3      206.    .00729        .00    .00         0.    15   5   A29   .80

****************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *      5   11C  TC 1162 QC      .21 QCD      .31 QD       .10         5   11D  TD 1157 QD      .11 QDC      .26 QC      .15
*
      *                                 5   11CD TCD 1162 QCD      .31 QC      .21 QD      .10
*

****************************************************************************************************************
                         SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV       CONV       CONV    CONV     CONTROL SOIL      RAIN  PCT
        LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE     SIZE(Ft)    Z       Q(CFS) NAME  TC  ZONE  IMPV
            5   11CD        .8        .11       2.4        .31   0        0.    .00000        .00    .00         0.    15   0   A29   .00
            5   12C         .2        .05       2.6        .32   3      140.    .00569        .00    .00         0.    15   5   A29   .80
            5   13E         .3        .08        .3        .08   2      145.    .00620        .00    .00         0.    15   5   A29   .80
            5   14E         .2        .05        .5        .05   3       92.    .00761        .00    .00         0.    15   5   A29   .80

****************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *      5   15C  TC 1165 QC      .32 QCE      .32 QE       .00         5   15E  TE    0 QE      .00 QEC      .00 QC      .00
*
      *                                 5   15CE TCE 1165 QCE      .32 QC      .32 QE      .00
*

****************************************************************************************************************
                         SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV       CONV       CONV    CONV     CONTROL SOIL      RAIN  PCT
        LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE     SIZE(Ft)    Z       Q(CFS) NAME  TC  ZONE  IMPV
            5   15CE        .5        .00       3.1        .32   0        0.    .00000        .00    .00         0.    15   0   A29   .00
            5   16C         .3        .08       3.4        .33   3      170.    .00707        .00    .00         0.    15   5   A29   .80

****************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *      5   17A  TA 1164 QA      .42 QAC      .72 QC       .29         5   17C  TC 1168 QC      .32 QCA      .74 QA      .41
*
      *                                 5   17AC TAC 1167 QAC      .74 QA      .42 QC      .32
*

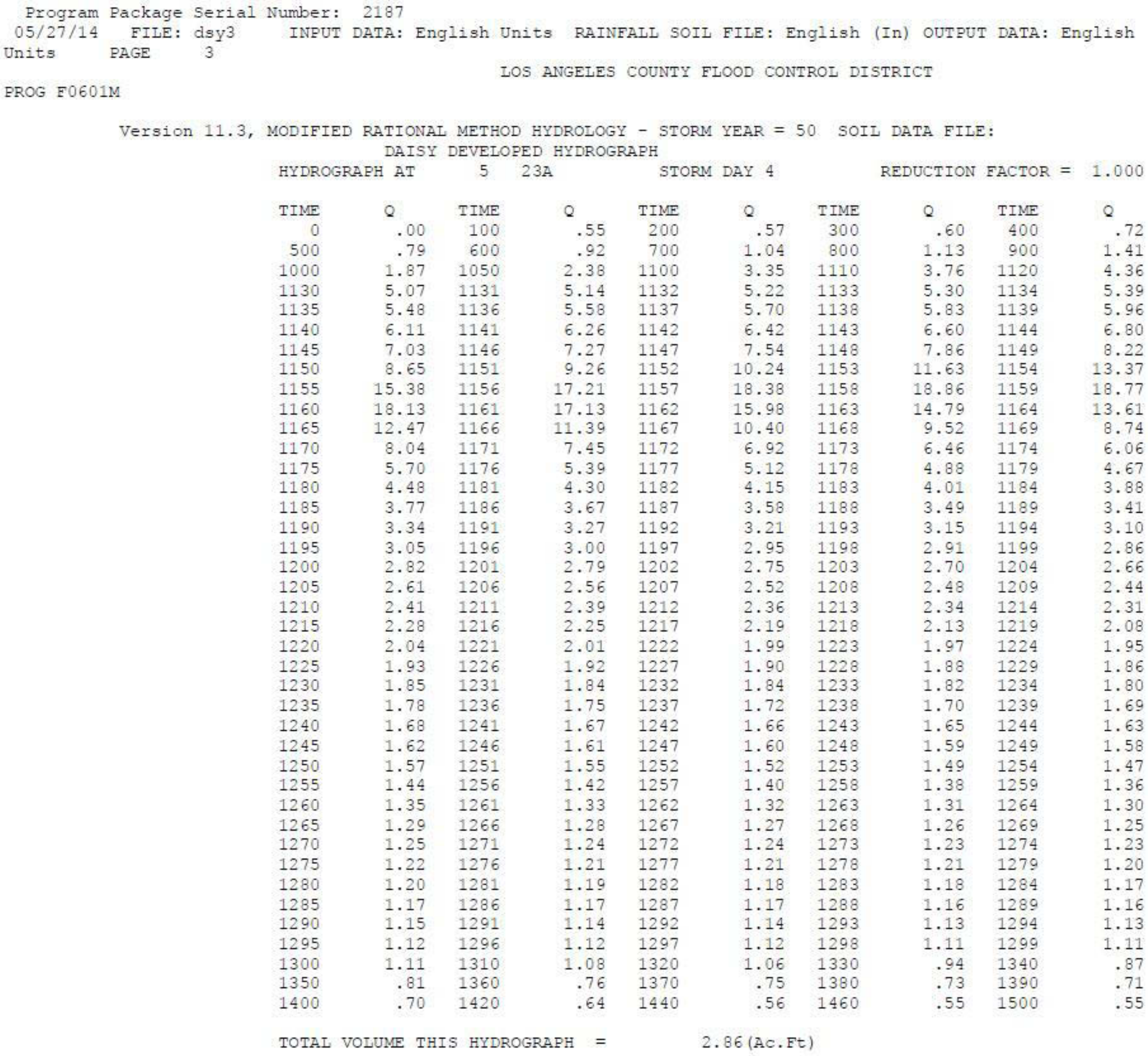
****************************************************************************************************************
                         SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV       CONV       CONV    CONV     CONTROL SOIL      RAIN  PCT
        LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE     SIZE(Ft)    Z       Q(CFS) NAME  TC  ZONE  IMPV
            5   17AC       3.4        .32       7.0        .74   0        0.    .00000        .00    .00         0.    15   0   A29   .00
            5   18A         .0        .00       7.0        .74   4       40.    .01000       2.00    .00         0.    15   1   A29   .80
            5   19F         .9        .23        .9        .23   2      350.    .00514        .00    .00         0.    15   5   A29   .80
            5   20F        2.6        .67       3.5        .69   3      490.    .00877        .00    .00         0.    15   5   A29   .80
            5   21F         .0        .00       3.5        .50   4       10.    .10000       2.00    .00         0.    15   5   A29   .80

****************************************************************************************************************
      *                                                     CONFLUENCE Q'S
*
      *      5   22A  TA 1167 QA      .74 QAF     1.11 QF       .37         5   22F  TF 1160 QF      .50 QFA     1.11 QA      .61
*
      *                                 5   22AF TAF 1163 QAF     1.16 QA      .70 QF      .46
*

****************************************************************************************************************
                         SUBAREA   SUBAREA     TOTAL    TOTAL  CONV    CONV       CONV       CONV    CONV     CONTROL SOIL      RAIN  PCT
        LOCATION         AREA(Ac)  Q(CFS)     AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft)  SLOPE     SIZE(Ft)    Z       Q(CFS) NAME  TC  ZONE  IMPV
            5   22AF       3.5        .50      10.5       1.16   4      110.    .10000       2.00    .00         0.    15   0   A29   .00
            5   23A         .0        .00      10.5       1.16   0        0.    .00000        .00    .00         0.    15  90   A29   .00
```

Figure 8

50-Year Day 4 Developed Storm Volume



```
  Program Package Serial Number:  2187
 05/27/14   FILE: dsy3     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English
Units     PAGE     3
                                               LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
PROG F0601M

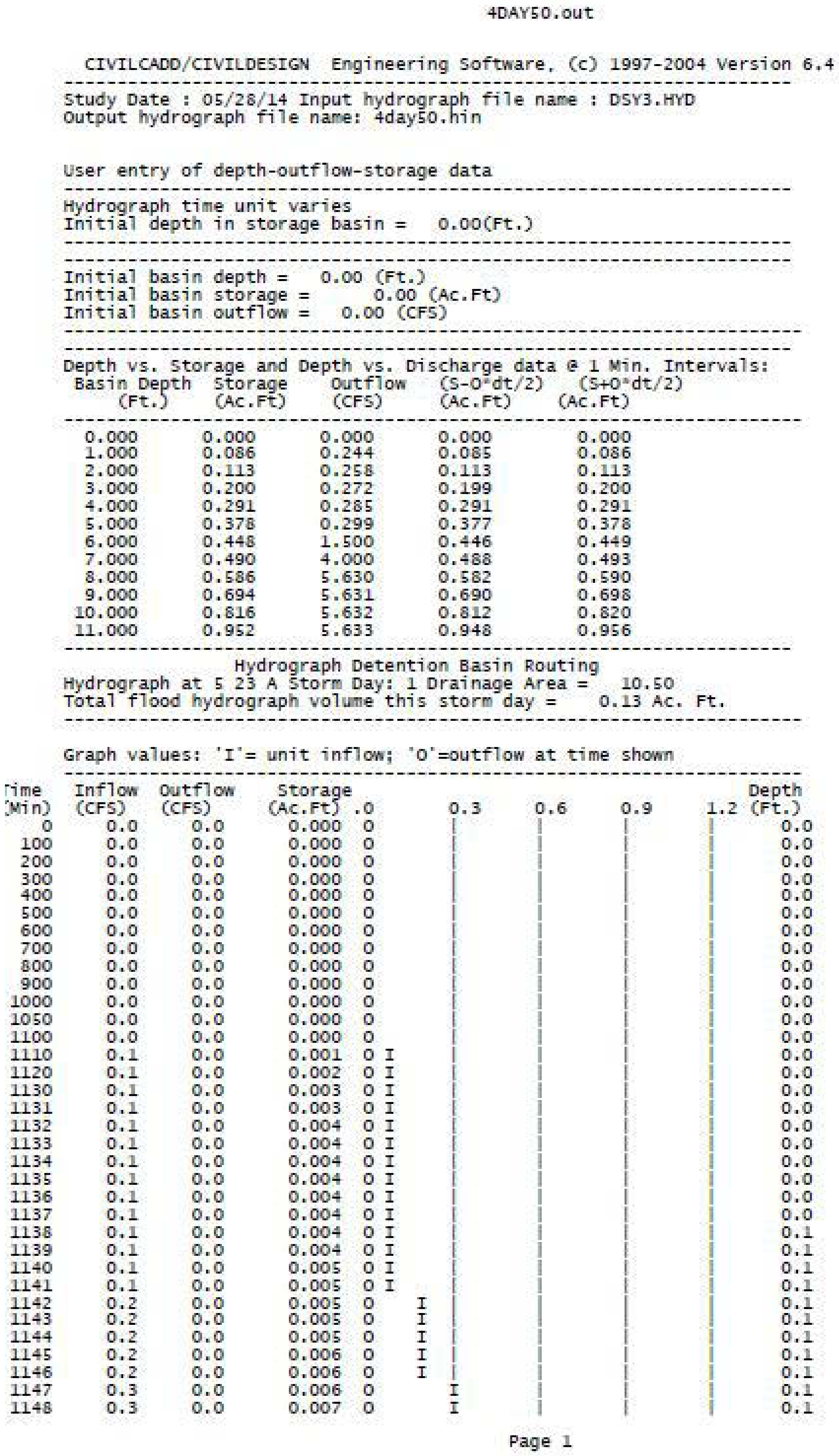
           Version 11.3, MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE:
                                    DAISY DEVELOPED HYDROGRAPH
                          HYDROGRAPH AT      5   23A          STORM DAY 4          REDUCTION FACTOR =  1.000

                          TIME      Q      TIME      Q      TIME      Q      TIME      Q      TIME      Q
                             0       .00    100       .55    200       .57    300       .60    400       .72
                           500       .79    600       .92    700      1.04    800      1.13    900      1.41
                          1000      1.87   1050      2.38   1100      3.35   1110      3.76   1120      4.36
                          1130      5.07   1131      5.14   1132      5.22   1133      5.30   1134      5.39
                          1135      5.48   1136      5.58   1137      5.70   1138      5.83   1139      5.96
                          1140      6.11   1141      6.26   1142      6.42   1143      6.60   1144      6.80
                          1145      7.03   1146      7.27   1147      7.54   1148      7.86   1149      8.22
                          1150      8.65   1151      9.26   1152     10.24   1153     11.63   1154     13.37
                          1155     15.38   1156     17.21   1157     18.38   1158     18.86   1159     18.77
                          1160     18.13   1161     17.13   1162     15.98   1163     14.79   1164     13.61
                          1165     12.47   1166     11.39   1167     10.40   1168      9.52   1169      8.74
                          1170      8.04   1171      7.45   1172      6.92   1173      6.46   1174      6.06
                          1175      5.70   1176      5.39   1177      5.12   1178      4.88   1179      4.67
                          1180      4.48   1181      4.30   1182      4.15   1183      4.01   1184      3.88
                          1185      3.77   1186      3.67   1187      3.58   1188      3.49   1189      3.41
                          1190      3.34   1191      3.27   1192      3.21   1193      3.15   1194      3.10
                          1195      3.05   1196      3.00   1197      2.95   1198      2.91   1199      2.86
                          1200      2.82   1201      2.79   1202      2.75   1203      2.70   1204      2.66
                          1205      2.61   1206      2.56   1207      2.52   1208      2.48   1209      2.44
                          1210      2.41   1211      2.39   1212      2.36   1213      2.34   1214      2.31
                          1215      2.28   1216      2.25   1217      2.19   1218      2.13   1219      2.08
                          1220      2.04   1221      2.01   1222      1.99   1223      1.97   1224      1.95
                          1225      1.93   1226      1.92   1227      1.90   1228      1.88   1229      1.86
                          1230      1.85   1231      1.84   1232      1.84   1233      1.82   1234      1.80
                          1235      1.78   1236      1.75   1237      1.72   1238      1.70   1239      1.69
                          1240      1.68   1241      1.67   1242      1.66   1243      1.65   1244      1.63
                          1245      1.62   1246      1.61   1247      1.60   1248      1.59   1249      1.58
                          1250      1.57   1251      1.55   1252      1.52   1253      1.49   1254      1.47
                          1255      1.44   1256      1.42   1257      1.40   1258      1.38   1259      1.36
                          1260      1.35   1261      1.33   1262      1.32   1263      1.31   1264      1.30
                          1265      1.29   1266      1.28   1267      1.27   1268      1.26   1269      1.25
                          1270      1.25   1271      1.24   1272      1.24   1273      1.23   1274      1.23
                          1275      1.22   1276      1.21   1277      1.21   1278      1.21   1279      1.20
                          1280      1.20   1281      1.19   1282      1.18   1283      1.18   1284      1.17
                          1285      1.17   1286      1.17   1287      1.17   1288      1.16   1289      1.16
                          1290      1.15   1291      1.14   1292      1.14   1293      1.13   1294      1.13
                          1295      1.12   1296      1.12   1297      1.12   1298      1.11   1299      1.11
                          1300      1.11   1310      1.08   1320      1.06   1330       .94   1340       .87
                          1350       .81   1360       .76   1370       .75   1380       .73   1390       .71
                          1400       .70   1420       .64   1440       .56   1460       .55   1500       .55

                          TOTAL VOLUME THIS HYDROGRAPH  =         2.86(Ac.Ft)
```

Figure 9

50-Year Days 1-4 Basin Volume



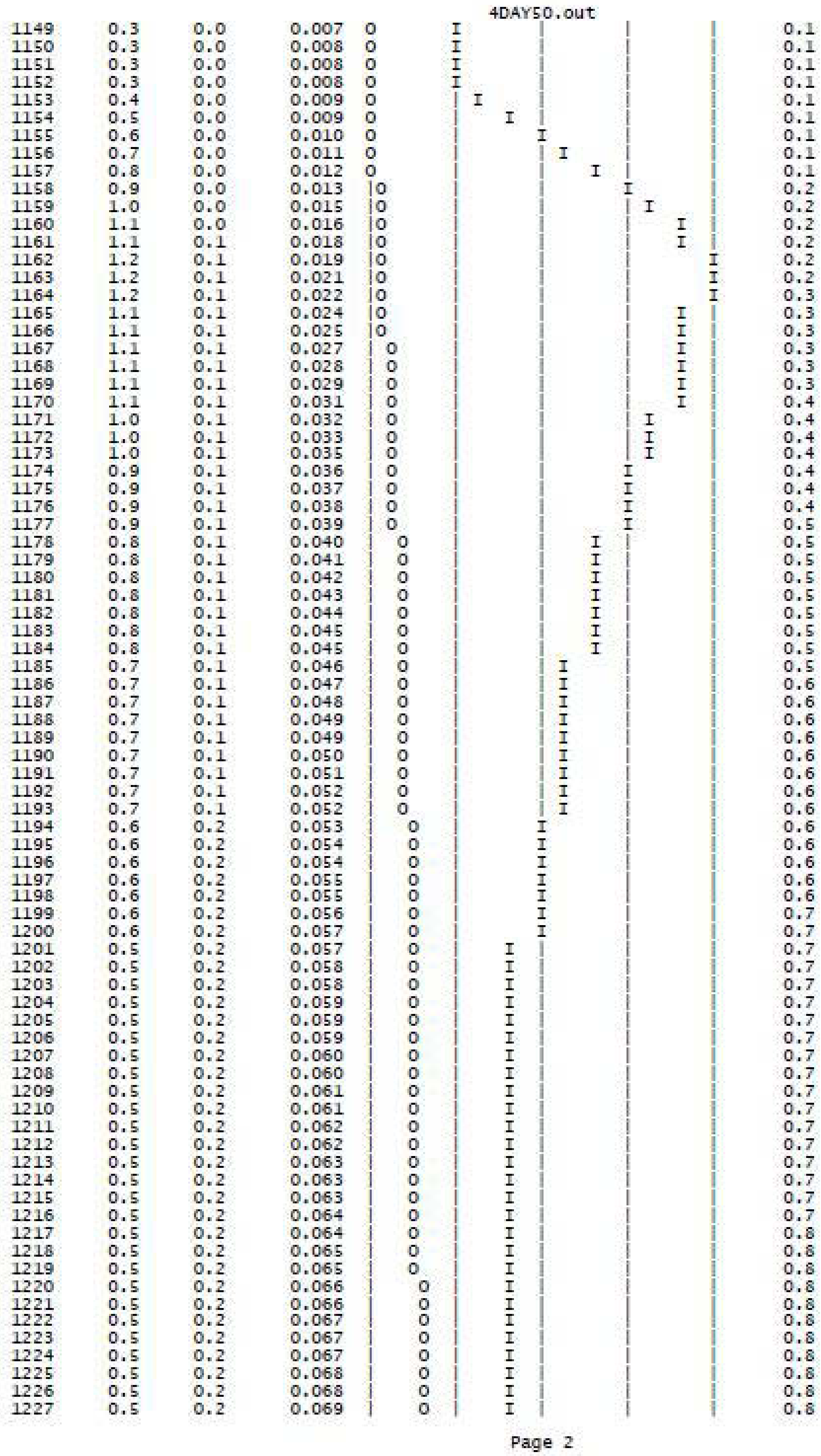
```
                                                   4DAY50.out

         CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1997-2004 Version 6.4
       -----------------------------------------------------------------------------
       Study Date : 05/28/14 Input hydrograph file name : DSY3.HYD
       Output hydrograph file name: 4day50.hin


       User entry of depth-outflow-storage data
       -----------------------------------------------------------------------------
       Hydrograph time unit varies
       Initial depth in storage basin =   0.00(Ft.)
       -----------------------------------------------------------------------------
       -----------------------------------------------------------------------------
       Initial basin depth =   0.00 (Ft.)
       Initial basin storage =      0.00 (Ac.Ft)
       Initial basin outflow =   0.00 (CFS)
       ------------------------------------------------------------------------------
       -----------------------------------------------------------------------------
       Depth vs. Storage and Depth vs. Discharge data @ 1 Min. Intervals:
        Basin Depth   Storage      Outflow    (S-O*dt/2)     (S+O*dt/2)
            (Ft.)     (Ac.Ft)      (CFS)      (Ac.Ft)     (Ac.Ft)
       ------------------------------------------------------------------------------
         0.000       0.000        0.000       0.000         0.000
         1.000       0.086        0.244       0.085         0.086
         2.000       0.113        0.258       0.113         0.113
         3.000       0.200        0.272       0.199         0.200
         4.000       0.291        0.285       0.291         0.291
         5.000       0.378        0.299       0.377         0.378
         6.000       0.448        1.500       0.446         0.449
         7.000       0.490        4.000       0.488         0.493
         8.000       0.586        5.630       0.582         0.590
         9.000       0.694        5.631       0.690         0.698
        10.000       0.816        5.632       0.812         0.820
        11.000       0.952        5.633       0.948         0.956
       -----------------------------------------------------------------------------
                         Hydrograph Detention Basin Routing
       Hydrograph at 5 23 A Storm Day: 1 Drainage Area =   10.50
       Total flood hydrograph volume this storm day =    0.13 Ac. Ft.
       ------------------------------------------------------------------------------

       Graph values: 'I'= unit inflow; 'O'=outflow at time shown
       ------------------------------------------------------------------------------
 ime    Inflow   Outflow     Storage                                          Depth
 Min)   (CFS)    (CFS)      (Ac.Ft) .0         0.3      0.6      0.9      1.2 (Ft.)
     0     0.0      0.0       0.000  O         |        |        |        |     0.0
   100     0.0      0.0       0.000  O         |        |        |        |     0.0
   200     0.0      0.0       0.000  O         |        |        |        |     0.0
   300     0.0      0.0       0.000  O         |        |        |        |     0.0
   400     0.0      0.0       0.000  O         |        |        |        |     0.0
   500     0.0      0.0       0.000  O         |        |        |        |     0.0
   600     0.0      0.0       0.000  O         |        |        |        |     0.0
   700     0.0      0.0       0.000  O         |        |        |        |     0.0
   800     0.0      0.0       0.000  O         |        |        |        |     0.0
   900     0.0      0.0       0.000  O         |        |        |        |     0.0
  1000     0.0      0.0       0.000  O         |        |        |        |     0.0
  1050     0.0      0.0       0.000  O         |        |        |        |     0.0
  1100     0.0      0.0       0.000  O         |        |        |        |     0.0
  1110     0.1      0.0       0.001  O I       |        |        |        |     0.0
  1120     0.1      0.0       0.002  O I       |        |        |        |     0.0
  1130     0.1      0.0       0.003  O I       |        |        |        |     0.0
  1131     0.1      0.0       0.003  O I       |        |        |        |     0.0
  1132     0.1      0.0       0.004  O I       |        |        |        |     0.0
  1133     0.1      0.0       0.004  O I       |        |        |        |     0.0
  1134     0.1      0.0       0.004  O I       |        |        |        |     0.0
  1135     0.1      0.0       0.004  O I       |        |        |        |     0.0
  1136     0.1      0.0       0.004  O I       |        |        |        |     0.0
  1137     0.1      0.0       0.004  O I       |        |        |        |     0.0
  1138     0.1      0.0       0.004  O I       |        |        |        |     0.1
  1139     0.1      0.0       0.004  O I       |        |        |        |     0.1
  1140     0.1      0.0       0.005  O I       |        |        |        |     0.1
  1141     0.1      0.0       0.005  O I       |        |        |        |     0.1
  1142     0.2      0.0       0.005  O     I   |        |        |        |     0.1
  1143     0.2      0.0       0.005  O     I   |        |        |        |     0.1
  1144     0.2      0.0       0.005  O     I   |        |        |        |     0.1
  1145     0.2      0.0       0.006  O     I   |        |        |        |     0.1
  1146     0.2      0.0       0.006  O     I   |        |        |        |     0.1
  1147     0.3      0.0       0.006  O         I        |        |        |     0.1
  1148     0.3      0.0       0.007  O         I        |        |        |     0.1

                                                     Page 1
```



```
                                             4DAY50.out
1149     0.3     0.0      0.007  O       I       |       |       |      0.1
1150     0.3     0.0      0.008  O       I       |       |       |      0.1
1151     0.3     0.0      0.008  O       I       |       |       |      0.1
1152     0.3     0.0      0.008  O       I       |       |       |      0.1
1153     0.4     0.0      0.009  O       | I     |       |       |      0.1
1154     0.5     0.0      0.009  O       |    I  |       |       |      0.1
1155     0.6     0.0      0.010  O       |       I       |       |      0.1
1156     0.7     0.0      0.011  O       |       | I     |       |      0.1
1157     0.8     0.0      0.012  O       |       |    I  |       |      0.1
1158     0.9     0.0      0.013  |O      |       |       I       |      0.2
1159     1.0     0.0      0.015  |O      |       |       | I     |      0.2
1160     1.1     0.0      0.016  |O      |       |       |    I  |      0.2
1161     1.1     0.1      0.018  |O      |       |       |    I  |      0.2
1162     1.2     0.1      0.019  |O      |       |       |       I      0.2
1163     1.2     0.1      0.021  |O      |       |       |       I      0.2
1164     1.2     0.1      0.022  |O      |       |       |       I      0.3
1165     1.1     0.1      0.024  |O      |       |       |    I  |      0.3
1166     1.1     0.1      0.025  |O      |       |       |    I  |      0.3
1167     1.1     0.1      0.027  | O     |       |       |    I  |      0.3
1168     1.1     0.1      0.028  | O     |       |       |    I  |      0.3
1169     1.1     0.1      0.029  | O     |       |       |    I  |      0.3
1170     1.1     0.1      0.031  | O     |       |       |    I  |      0.4
1171     1.0     0.1      0.032  | O     |       |       | I     |      0.4
1172     1.0     0.1      0.033  | O     |       |       | I     |      0.4
1173     1.0     0.1      0.035  | O     |       |       | I     |      0.4
1174     0.9     0.1      0.036  | O     |       |       I       |      0.4
1175     0.9     0.1      0.037  | O     |       |       I       |      0.4
1176     0.9     0.1      0.038  | O     |       |       I       |      0.4
1177     0.9     0.1      0.039  | O     |       |       I       |      0.5
1178     0.8     0.1      0.040  |  O    |       |    I  |       |      0.5
1179     0.8     0.1      0.041  |  O    |       |    I  |       |      0.5
1180     0.8     0.1      0.042  |  O    |       |    I  |       |      0.5
1181     0.8     0.1      0.043  |  O    |       |    I  |       |      0.5
1182     0.8     0.1      0.044  |  O    |       |    I  |       |      0.5
1183     0.8     0.1      0.045  |  O    |       |    I  |       |      0.5
1184     0.8     0.1      0.045  |  O    |       |    I  |       |      0.5
1185     0.7     0.1      0.046  |  O    |       | I     |       |      0.5
1186     0.7     0.1      0.047  |  O    |       | I     |       |      0.6
1187     0.7     0.1      0.048  |  O    |       | I     |       |      0.6
1188     0.7     0.1      0.049  |  O    |       | I     |       |      0.6
1189     0.7     0.1      0.049  |  O    |       | I     |       |      0.6
1190     0.7     0.1      0.050  |  O    |       | I     |       |      0.6
1191     0.7     0.1      0.051  |  O    |       | I     |       |      0.6
1192     0.7     0.1      0.052  |  O    |       | I     |       |      0.6
1193     0.7     0.1      0.052  |  O    |       | I     |       |      0.6
1194     0.6     0.2      0.053  |   O   |       I       |       |      0.6
1195     0.6     0.2      0.054  |   O   |       I       |       |      0.6
1196     0.6     0.2      0.054  |   O   |       I       |       |      0.6
1197     0.6     0.2      0.055  |   O   |       I       |       |      0.6
1198     0.6     0.2      0.055  |   O   |       I       |       |      0.6
1199     0.6     0.2      0.056  |   O   |       I       |       |      0.7
1200     0.6     0.2      0.057  |   O   |       I       |       |      0.7
1201     0.5     0.2      0.057  |   O   |    I  |       |       |      0.7
1202     0.5     0.2      0.058  |   O   |    I  |       |       |      0.7
1203     0.5     0.2      0.058  |   O   |    I  |       |       |      0.7
1204     0.5     0.2      0.059  |   O   |    I  |       |       |      0.7
1205     0.5     0.2      0.059  |   O   |    I  |       |       |      0.7
1206     0.5     0.2      0.059  |   O   |    I  |       |       |      0.7
1207     0.5     0.2      0.060  |   O   |    I  |       |       |      0.7
1208     0.5     0.2      0.060  |   O   |    I  |       |       |      0.7
1209     0.5     0.2      0.061  |   O   |    I  |       |       |      0.7
1210     0.5     0.2      0.061  |   O   |    I  |       |       |      0.7
1211     0.5     0.2      0.062  |   O   |    I  |       |       |      0.7
1212     0.5     0.2      0.062  |   O   |    I  |       |       |      0.7
1213     0.5     0.2      0.063  |   O   |    I  |       |       |      0.7
1214     0.5     0.2      0.063  |   O   |    I  |       |       |      0.7
1215     0.5     0.2      0.063  |   O   |    I  |       |       |      0.7
1216     0.5     0.2      0.064  |   O   |    I  |       |       |      0.7
1217     0.5     0.2      0.064  |   O   |    I  |       |       |      0.8
1218     0.5     0.2      0.065  |   O   |    I  |       |       |      0.8
1219     0.5     0.2      0.065  |   O   |    I  |       |       |      0.8
1220     0.5     0.2      0.066  |    O  |    I  |       |       |      0.8
1221     0.5     0.2      0.066  |    O  |    I  |       |       |      0.8
1222     0.5     0.2      0.067  |    O  |    I  |       |       |      0.8
1223     0.5     0.2      0.067  |    O  |    I  |       |       |      0.8
1224     0.5     0.2      0.067  |    O  |    I  |       |       |      0.8
1225     0.5     0.2      0.068  |    O  |    I  |       |       |      0.8
1226     0.5     0.2      0.068  |    O  |    I  |       |       |      0.8
1227     0.5     0.2      0.069  |    O  |    I  |       |       |      0.8
                                               Page 2
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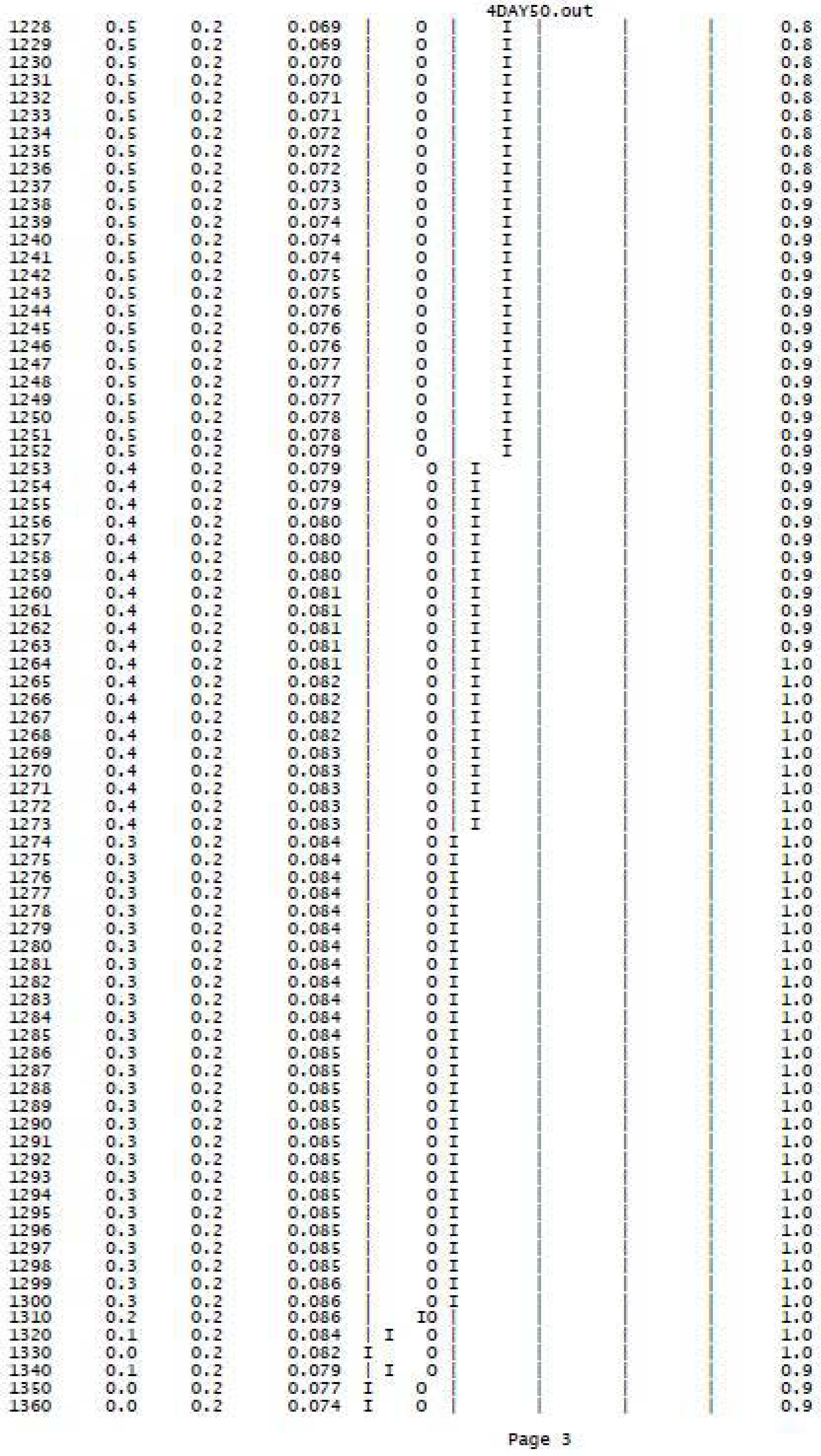

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                                             4DAY50.out
1228     0.5     0.2      0.069   |    O  |    I  |       |       |      0.8
1229     0.5     0.2      0.069   |    O  |    I  |       |       |      0.8
1230     0.5     0.2      0.070   |    O  |    I  |       |       |      0.8
1231     0.5     0.2      0.070   |    O  |    I  |       |       |      0.8
1232     0.5     0.2      0.071   |    O  |    I  |       |       |      0.8
1233     0.5     0.2      0.071   |    O  |    I  |       |       |      0.8
1234     0.5     0.2      0.072   |    O  |    I  |       |       |      0.8
1235     0.5     0.2      0.072   |    O  |    I  |       |       |      0.8
1236     0.5     0.2      0.072   |    O  |    I  |       |       |      0.8
1237     0.5     0.2      0.073   |    O  |    I  |       |       |      0.9
1238     0.5     0.2      0.073   |    O  |    I  |       |       |      0.9
1239     0.5     0.2      0.074   |    O  |    I  |       |       |      0.9
1240     0.5     0.2      0.074   |    O  |    I  |       |       |      0.9
1241     0.5     0.2      0.074   |    O  |    I  |       |       |      0.9
1242     0.5     0.2      0.075   |    O  |    I  |       |       |      0.9
1243     0.5     0.2      0.075   |    O  |    I  |       |       |      0.9
1244     0.5     0.2      0.076   |    O  |    I  |       |       |      0.9
1245     0.5     0.2      0.076   |    O  |    I  |       |       |      0.9
1246     0.5     0.2      0.076   |    O  |    I  |       |       |      0.9
1247     0.5     0.2      0.077   |    O  |    I  |       |       |      0.9
1248     0.5     0.2      0.077   |    O  |    I  |       |       |      0.9
1249     0.5     0.2      0.077   |    O  |    I  |       |       |      0.9
1250     0.5     0.2      0.078   |    O  |    I  |       |       |      0.9
1251     0.5     0.2      0.078   |    O  |    I  |       |       |      0.9
1252     0.5     0.2      0.079   |    O  |    I  |       |       |      0.9
1253     0.4     0.2      0.079   |     O | I     |       |       |      0.9
1254     0.4     0.2      0.079   |     O | I     |       |       |      0.9
1255     0.4     0.2      0.079   |     O | I     |       |       |      0.9
1256     0.4     0.2      0.080   |     O | I     |       |       |      0.9
1257     0.4     0.2      0.080   |     O | I     |       |       |      0.9
1258     0.4     0.2      0.080   |     O | I     |       |       |      0.9
1259     0.4     0.2      0.080   |     O | I     |       |       |      0.9
1260     0.4     0.2      0.081   |     O | I     |       |       |      0.9
1261     0.4     0.2      0.081   |     O | I     |       |       |      0.9
1262     0.4     0.2      0.081   |     O | I     |       |       |      0.9
1263     0.4     0.2      0.081   |     O | I     |       |       |      0.9
1264     0.4     0.2      0.081   |     O | I     |       |       |      1.0
1265     0.4     0.2      0.082   |     O | I     |       |       |      1.0
1266     0.4     0.2      0.082   |     O | I     |       |       |      1.0
1267     0.4     0.2      0.082   |     O | I     |       |       |      1.0
1268     0.4     0.2      0.082   |     O | I     |       |       |      1.0
1269     0.4     0.2      0.083   |     O | I     |       |       |      1.0
1270     0.4     0.2      0.083   |     O | I     |       |       |      1.0
1271     0.4     0.2      0.083   |     O | I     |       |       |      1.0
1272     0.4     0.2      0.083   |     O | I     |       |       |      1.0
1273     0.4     0.2      0.083   |     O | I     |       |       |      1.0
1274     0.3     0.2      0.084   |     O I       |       |       |      1.0
1275     0.3     0.2      0.084   |     O I       |       |       |      1.0
1276     0.3     0.2      0.084   |     O I       |       |       |      1.0
1277     0.3     0.2      0.084   |     O I       |       |       |      1.0
1278     0.3     0.2      0.084   |     O I       |       |       |      1.0
1279     0.3     0.2      0.084   |     O I       |       |       |      1.0
1280     0.3     0.2      0.084   |     O I       |       |       |      1.0
1281     0.3     0.2      0.084   |     O I       |       |       |      1.0
1282     0.3     0.2      0.084   |     O I       |       |       |      1.0
1283     0.3     0.2      0.084   |     O I       |       |       |      1.0
1284     0.3     0.2      0.084   |     O I       |       |       |      1.0
1285     0.3     0.2      0.084   |     O I       |       |       |      1.0
1286     0.3     0.2      0.085   |     O I       |       |       |      1.0
1287     0.3     0.2      0.085   |     O I       |       |       |      1.0
1288     0.3     0.2      0.085   |     O I       |       |       |      1.0
1289     0.3     0.2      0.085   |     O I       |       |       |      1.0
1290     0.3     0.2      0.085   |     O I       |       |       |      1.0
1291     0.3     0.2      0.085   |     O I       |       |       |      1.0
1292     0.3     0.2      0.085   |     O I       |       |       |      1.0
1293     0.3     0.2      0.085   |     O I       |       |       |      1.0
1294     0.3     0.2      0.085   |     O I       |       |       |      1.0
1295     0.3     0.2      0.085   |     O I       |       |       |      1.0
1296     0.3     0.2      0.085   |     O I       |       |       |      1.0
1297     0.3     0.2      0.085   |     O I       |       |       |      1.0
1298     0.3     0.2      0.085   |     O I       |       |       |      1.0
1299     0.3     0.2      0.086   |     O I       |       |       |      1.0
1300     0.3     0.2      0.086   |     O I       |       |       |      1.0
1310     0.2     0.2      0.086   |    IO |       |       |       |      1.0
1320     0.1     0.2      0.084   | I   O |       |       |       |      1.0
1330     0.0     0.2      0.082   I     O |       |       |       |      1.0
1340     0.1     0.2      0.079   | I   O |       |       |       |      0.9
1350     0.0     0.2      0.077   I    O  |       |       |       |      0.9
1360     0.0     0.2      0.074   I    O  |       |       |       |      0.9

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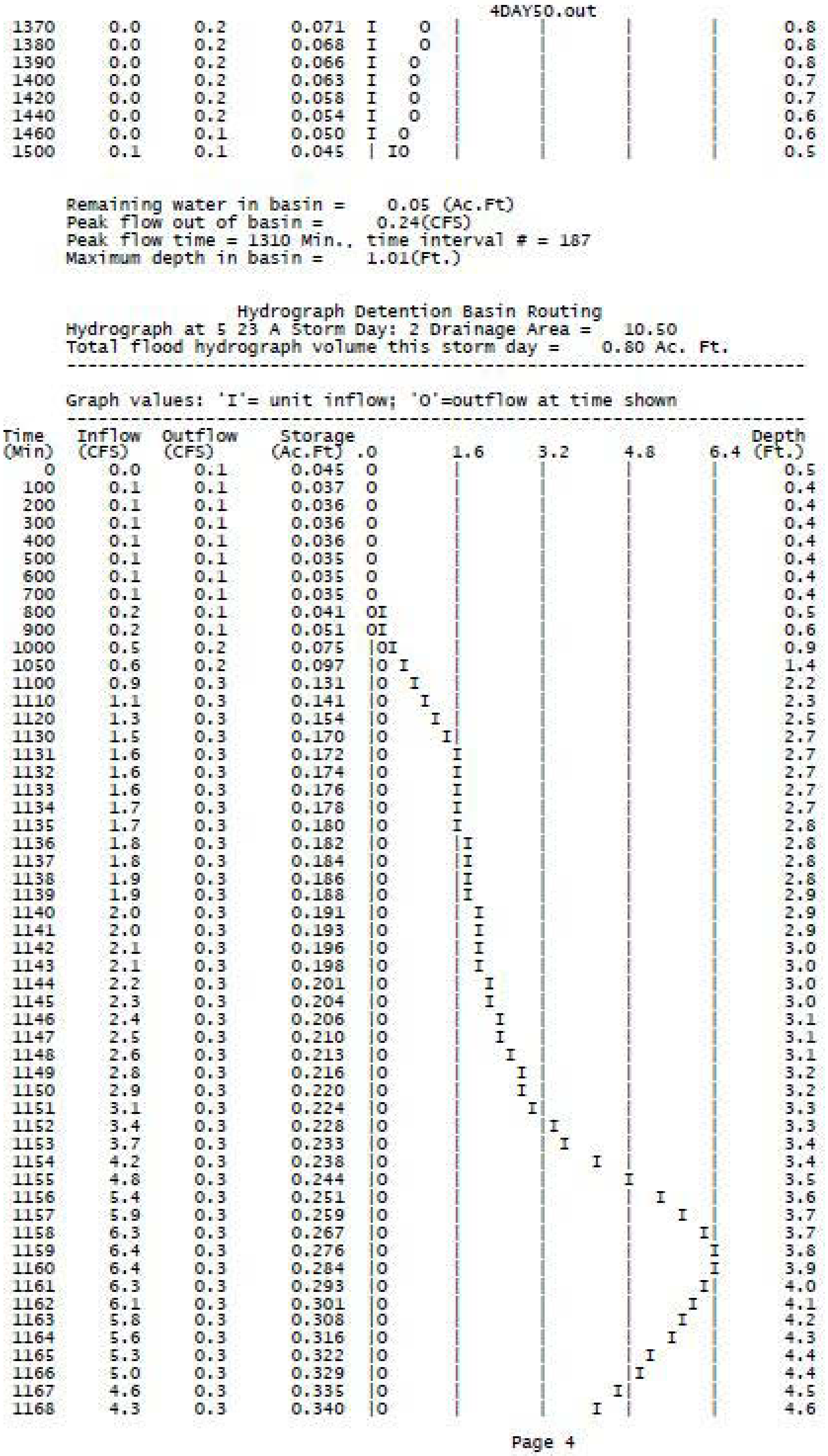

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                                              4DAY50.out
 1370     0.0     0.2      0.071  I    O  |       |       |       |      0.8
 1380     0.0     0.2      0.068  I    O  |       |       |       |      0.8
 1390     0.0     0.2      0.066  I   O   |       |       |       |      0.8
 1400     0.0     0.2      0.063  I   O   |       |       |       |      0.7
 1420     0.0     0.2      0.058  I   O   |       |       |       |      0.7
 1440     0.0     0.2      0.054  I   O   |       |       |       |      0.6
 1460     0.0     0.1      0.050  I  O    |       |       |       |      0.6
 1500     0.1     0.1      0.045  | IO    |       |       |       |      0.5

      Remaining water in basin =    0.05 (Ac.Ft)
      Peak flow out of basin =     0.24(CFS)
      Peak flow time = 1310 Min., time interval # = 187
      Maximum depth in basin =    1.01(Ft.)


                      Hydrograph Detention Basin Routing
      Hydrograph at 5 23 A Storm Day: 2 Drainage Area =    10.50
      Total flood hydrograph volume this storm day =    0.80 Ac. Ft.
      ---------------------------------------------------------------------

      Graph values: 'I'= unit inflow; 'O'=outflow at time shown
      ---------------------------------------------------------------------
Time   Inflow  Outflow    Storage                                     Depth
(Min)  (CFS)   (CFS)     (Ac.Ft) .0       1.6     3.2     4.8     6.4 (Ft.)
    0     0.0     0.1      0.045  O       |       |       |       |      0.5
  100     0.1     0.1      0.037  O       |       |       |       |      0.4
  200     0.1     0.1      0.036  O       |       |       |       |      0.4
  300     0.1     0.1      0.036  O       |       |       |       |      0.4
  400     0.1     0.1      0.036  O       |       |       |       |      0.4
  500     0.1     0.1      0.035  O       |       |       |       |      0.4
  600     0.1     0.1      0.035  O       |       |       |       |      0.4
  700     0.1     0.1      0.035  O       |       |       |       |      0.4
  800     0.2     0.1      0.041  OI      |       |       |       |      0.5
  900     0.2     0.1      0.051  OI      |       |       |       |      0.6
 1000     0.5     0.2      0.075  |OI     |       |       |       |      0.9
 1050     0.6     0.2      0.097  |O I    |       |       |       |      1.4
 1100     0.9     0.3      0.131  |O  I   |       |       |       |      2.2
 1110     1.1     0.3      0.141  |O   I  |       |       |       |      2.3
 1120     1.3     0.3      0.154  |O    I |       |       |       |      2.5
 1130     1.5     0.3      0.170  |O     I|       |       |       |      2.7
 1131     1.6     0.3      0.172  |O      I       |       |       |      2.7
 1132     1.6     0.3      0.174  |O      I       |       |       |      2.7
 1133     1.6     0.3      0.176  |O      I       |       |       |      2.7
 1134     1.7     0.3      0.178  |O      I       |       |       |      2.7
 1135     1.7     0.3      0.180  |O      I       |       |       |      2.8
 1136     1.8     0.3      0.182  |O      |I      |       |       |      2.8
 1137     1.8     0.3      0.184  |O      |I      |       |       |      2.8
 1138     1.9     0.3      0.186  |O      |I      |       |       |      2.8
 1139     1.9     0.3      0.188  |O      |I      |       |       |      2.9
 1140     2.0     0.3      0.191  |O      | I     |       |       |      2.9
 1141     2.0     0.3      0.193  |O      | I     |       |       |      2.9
 1142     2.1     0.3      0.196  |O      | I     |       |       |      3.0
 1143     2.1     0.3      0.198  |O      | I     |       |       |      3.0
 1144     2.2     0.3      0.201  |O      |  I    |       |       |      3.0
 1145     2.3     0.3      0.204  |O      |  I    |       |       |      3.0
 1146     2.4     0.3      0.206  |O      |   I   |       |       |      3.1
 1147     2.5     0.3      0.210  |O      |   I   |       |       |      3.1
 1148     2.6     0.3      0.213  |O      |    I  |       |       |      3.1
 1149     2.8     0.3      0.216  |O      |     I |       |       |      3.2
 1150     2.9     0.3      0.220  |O      |     I |       |       |      3.2
 1151     3.1     0.3      0.224  |O      |      I|       |       |      3.3
 1152     3.4     0.3      0.228  |O      |       |I      |       |      3.3
 1153     3.7     0.3      0.233  |O      |       | I     |       |      3.4
 1154     4.2     0.3      0.238  |O      |       |    I  |       |      3.4
 1155     4.8     0.3      0.244  |O      |       |       I       |      3.5
 1156     5.4     0.3      0.251  |O      |       |       |  I    |      3.6
 1157     5.9     0.3      0.259  |O      |       |       |    I  |      3.7
 1158     6.3     0.3      0.267  |O      |       |       |      I|      3.7
 1159     6.4     0.3      0.276  |O      |       |       |       I      3.8
 1160     6.4     0.3      0.284  |O      |       |       |       I      3.9
 1161     6.3     0.3      0.293  |O      |       |       |      I|      4.0
 1162     6.1     0.3      0.301  |O      |       |       |     I |      4.1
 1163     5.8     0.3      0.308  |O      |       |       |    I  |      4.2
 1164     5.6     0.3      0.316  |O      |       |       |   I   |      4.3
 1165     5.3     0.3      0.322  |O      |       |       | I     |      4.4
 1166     5.0     0.3      0.329  |O      |       |       |I      |      4.4
 1167     4.6     0.3      0.335  |O      |       |      I|       |      4.5
 1168     4.3     0.3      0.340  |O      |       |    I  |       |      4.6
                                                Page 4
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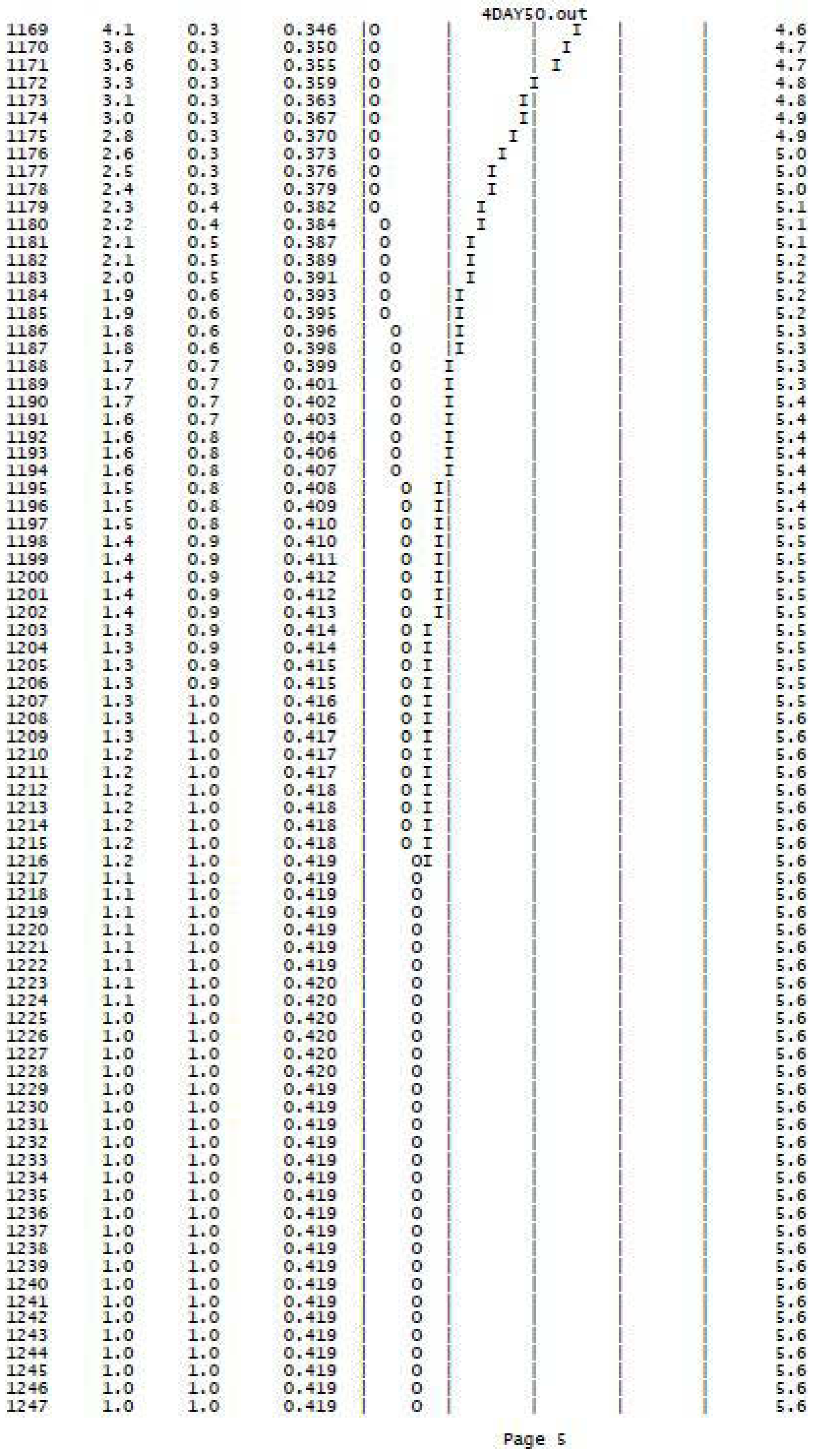

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                                             4DAY50.out
1169     4.1     0.3      0.346   |O      |       |   I   |       |      4.6
1170     3.8     0.3      0.350   |O      |       |  I    |       |      4.7
1171     3.6     0.3      0.355   |O      |       | I     |       |      4.7
1172     3.3     0.3      0.359   |O      |       I       |       |      4.8
1173     3.1     0.3      0.363   |O      |      I|       |       |      4.8
1174     3.0     0.3      0.367   |O      |      I|       |       |      4.9
1175     2.8     0.3      0.370   |O      |     I |       |       |      4.9
1176     2.6     0.3      0.373   |O      |    I  |       |       |      5.0
1177     2.5     0.3      0.376   |O      |   I   |       |       |      5.0
1178     2.4     0.3      0.379   |O      |   I   |       |       |      5.0
1179     2.3     0.4      0.382   |O      |  I    |       |       |      5.1
1180     2.2     0.4      0.384   | O     |  I    |       |       |      5.1
1181     2.1     0.5      0.387   | O     | I     |       |       |      5.1
1182     2.1     0.5      0.389   | O     | I     |       |       |      5.2
1183     2.0     0.5      0.391   | O     | I     |       |       |      5.2
1184     1.9     0.6      0.393   | O     |I      |       |       |      5.2
1185     1.9     0.6      0.395   | O     |I      |       |       |      5.2
1186     1.8     0.6      0.396   |  O    |I      |       |       |      5.3
1187     1.8     0.6      0.398   |  O    |I      |       |       |      5.3
1188     1.7     0.7      0.399   |  O    I       |       |       |      5.3
1189     1.7     0.7      0.401   |  O    I       |       |       |      5.3
1190     1.7     0.7      0.402   |  O    I       |       |       |      5.4
1191     1.6     0.7      0.403   |  O    I       |       |       |      5.4
1192     1.6     0.8      0.404   |  O    I       |       |       |      5.4
1193     1.6     0.8      0.406   |  O    I       |       |       |      5.4
1194     1.6     0.8      0.407   |  O    I       |       |       |      5.4
1195     1.5     0.8      0.408   |   O  I|       |       |       |      5.4
1196     1.5     0.8      0.409   |   O  I|       |       |       |      5.4
1197     1.5     0.8      0.410   |   O  I|       |       |       |      5.5
1198     1.4     0.9      0.410   |   O  I|       |       |       |      5.5
1199     1.4     0.9      0.411   |   O  I|       |       |       |      5.5
1200     1.4     0.9      0.412   |   O  I|       |       |       |      5.5
1201     1.4     0.9      0.412   |   O  I|       |       |       |      5.5
1202     1.4     0.9      0.413   |   O  I|       |       |       |      5.5
1203     1.3     0.9      0.414   |   O I |       |       |       |      5.5
1204     1.3     0.9      0.414   |   O I |       |       |       |      5.5
1205     1.3     0.9      0.415   |   O I |       |       |       |      5.5
1206     1.3     0.9      0.415   |   O I |       |       |       |      5.5
1207     1.3     1.0      0.416   |   O I |       |       |       |      5.5
1208     1.3     1.0      0.416   |   O I |       |       |       |      5.6
1209     1.3     1.0      0.417   |   O I |       |       |       |      5.6
1210     1.2     1.0      0.417   |   O I |       |       |       |      5.6
1211     1.2     1.0      0.417   |   O I |       |       |       |      5.6
1212     1.2     1.0      0.418   |   O I |       |       |       |      5.6
1213     1.2     1.0      0.418   |   O I |       |       |       |      5.6
1214     1.2     1.0      0.418   |   O I |       |       |       |      5.6
1215     1.2     1.0      0.418   |   O I |       |       |       |      5.6
1216     1.2     1.0      0.419   |    OI |       |       |       |      5.6
1217     1.1     1.0      0.419   |    O  |       |       |       |      5.6
1218     1.1     1.0      0.419   |    O  |       |       |       |      5.6
1219     1.1     1.0      0.419   |    O  |       |       |       |      5.6
1220     1.1     1.0      0.419   |    O  |       |       |       |      5.6
1221     1.1     1.0      0.419   |    O  |       |       |       |      5.6
1222     1.1     1.0      0.419   |    O  |       |       |       |      5.6
1223     1.1     1.0      0.420   |    O  |       |       |       |      5.6
1224     1.1     1.0      0.420   |    O  |       |       |       |      5.6
1225     1.0     1.0      0.420   |    O  |       |       |       |      5.6
1226     1.0     1.0      0.420   |    O  |       |       |       |      5.6
1227     1.0     1.0      0.420   |    O  |       |       |       |      5.6
1228     1.0     1.0      0.420   |    O  |       |       |       |      5.6
1229     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1230     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1231     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1232     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1233     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1234     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1235     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1236     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1237     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1238     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1239     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1240     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1241     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1242     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1243     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1244     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1245     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1246     1.0     1.0      0.419   |    O  |       |       |       |      5.6
1247     1.0     1.0      0.419   |    O  |       |       |       |      5.6

                                               Page 5
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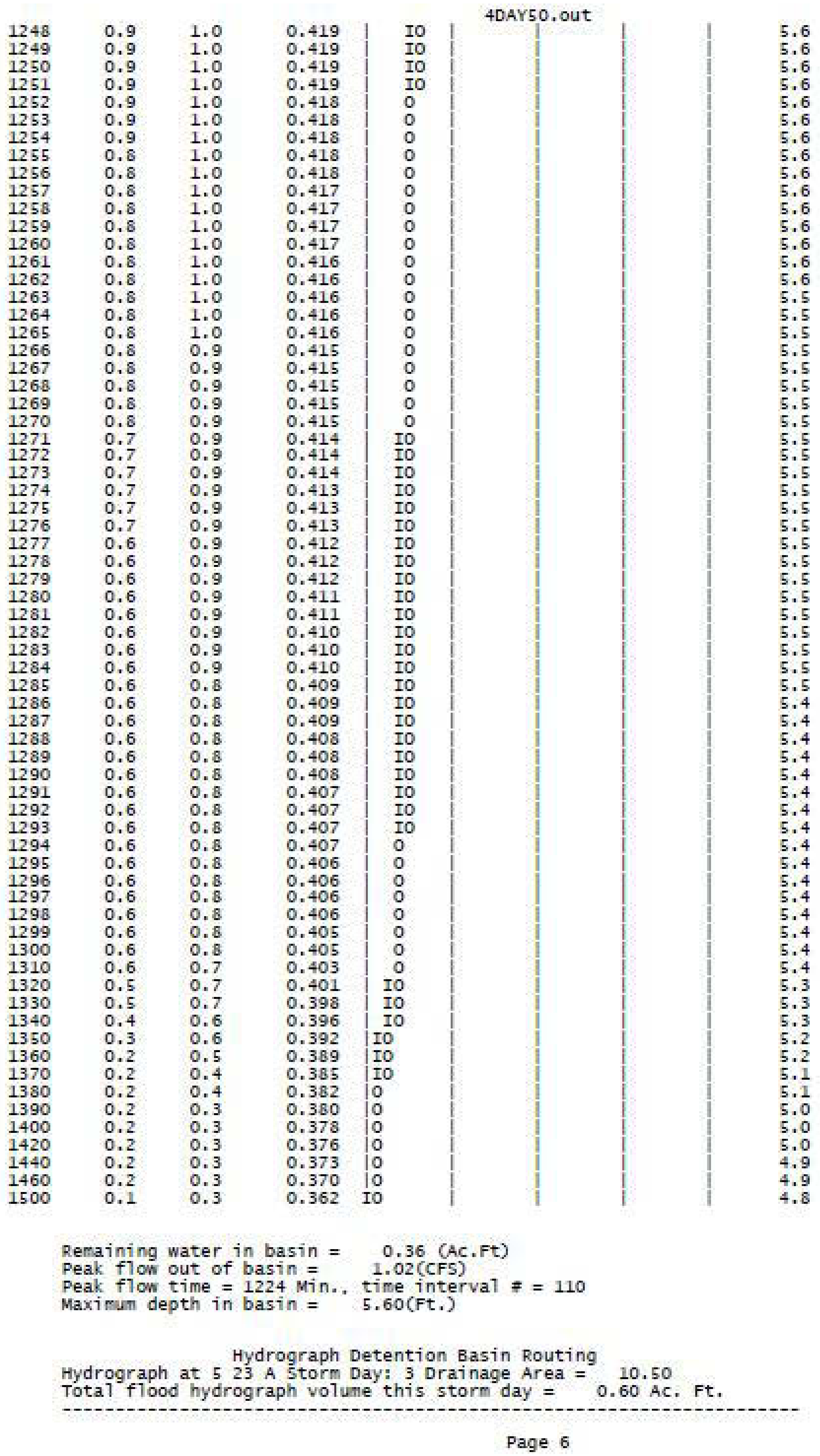

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                                                   4DAY50.out
 1248      0.9      1.0      0.419  |   IO  |         |         |         |        5.6
 1249      0.9      1.0      0.419  |   IO  |         |         |         |        5.6
 1250      0.9      1.0      0.419  |   IO  |         |         |         |        5.6
 1251      0.9      1.0      0.419  |   IO  |         |         |         |        5.6
 1252      0.9      1.0      0.418  |   O   |         |         |         |        5.6
 1253      0.9      1.0      0.418  |   O   |         |         |         |        5.6
 1254      0.9      1.0      0.418  |   O   |         |         |         |        5.6
 1255      0.8      1.0      0.418  |   O   |         |         |         |        5.6
 1256      0.8      1.0      0.418  |   O   |         |         |         |        5.6
 1257      0.8      1.0      0.417  |   O   |         |         |         |        5.6
 1258      0.8      1.0      0.417  |   O   |         |         |         |        5.6
 1259      0.8      1.0      0.417  |   O   |         |         |         |        5.6
 1260      0.8      1.0      0.417  |   O   |         |         |         |        5.6
 1261      0.8      1.0      0.416  |   O   |         |         |         |        5.6
 1262      0.8      1.0      0.416  |   O   |         |         |         |        5.6
 1263      0.8      1.0      0.416  |   O   |         |         |         |        5.5
 1264      0.8      1.0      0.416  |   O   |         |         |         |        5.5
 1265      0.8      1.0      0.416  |   O   |         |         |         |        5.5
 1266      0.8      0.9      0.415  |   O   |         |         |         |        5.5
 1267      0.8      0.9      0.415  |   O   |         |         |         |        5.5
 1268      0.8      0.9      0.415  |   O   |         |         |         |        5.5
 1269      0.8      0.9      0.415  |   O   |         |         |         |        5.5
 1270      0.8      0.9      0.415  |   O   |         |         |         |        5.5
 1271      0.7      0.9      0.414  |  IO   |         |         |         |        5.5
 1272      0.7      0.9      0.414  |  IO   |         |         |         |        5.5
 1273      0.7      0.9      0.414  |  IO   |         |         |         |        5.5
 1274      0.7      0.9      0.413  |  IO   |         |         |         |        5.5
 1275      0.7      0.9      0.413  |  IO   |         |         |         |        5.5
 1276      0.7      0.9      0.413  |  IO   |         |         |         |        5.5
 1277      0.6      0.9      0.412  |  IO   |         |         |         |        5.5
 1278      0.6      0.9      0.412  |  IO   |         |         |         |        5.5
 1279      0.6      0.9      0.412  |  IO   |         |         |         |        5.5
 1280      0.6      0.9      0.411  |  IO   |         |         |         |        5.5
 1281      0.6      0.9      0.411  |  IO   |         |         |         |        5.5
 1282      0.6      0.9      0.410  |  IO   |         |         |         |        5.5
 1283      0.6      0.9      0.410  |  IO   |         |         |         |        5.5
 1284      0.6      0.9      0.410  |  IO   |         |         |         |        5.5
 1285      0.6      0.8      0.409  |  IO   |         |         |         |        5.5
 1286      0.6      0.8      0.409  |  IO   |         |         |         |        5.4
 1287      0.6      0.8      0.409  |  IO   |         |         |         |        5.4
 1288      0.6      0.8      0.408  |  IO   |         |         |         |        5.4
 1289      0.6      0.8      0.408  |  IO   |         |         |         |        5.4
 1290      0.6      0.8      0.408  |  IO   |         |         |         |        5.4
 1291      0.6      0.8      0.407  |  IO   |         |         |         |        5.4
 1292      0.6      0.8      0.407  |  IO   |         |         |         |        5.4
 1293      0.6      0.8      0.407  |  IO   |         |         |         |        5.4
 1294      0.6      0.8      0.407  |  O    |         |         |         |        5.4
 1295      0.6      0.8      0.406  |  O    |         |         |         |        5.4
 1296      0.6      0.8      0.406  |  O    |         |         |         |        5.4
 1297      0.6      0.8      0.406  |  O    |         |         |         |        5.4
 1298      0.6      0.8      0.406  |  O    |         |         |         |        5.4
 1299      0.6      0.8      0.405  |  O    |         |         |         |        5.4
 1300      0.6      0.8      0.405  |  O    |         |         |         |        5.4
 1310      0.6      0.7      0.403  |  O    |         |         |         |        5.4
 1320      0.5      0.7      0.401  | IO    |         |         |         |        5.3
 1330      0.5      0.7      0.398  | IO    |         |         |         |        5.3
 1340      0.4      0.6      0.396  | IO    |         |         |         |        5.3
 1350      0.3      0.6      0.392  |IO     |         |         |         |        5.2
 1360      0.2      0.5      0.389  |IO     |         |         |         |        5.2
 1370      0.2      0.4      0.385  |IO     |         |         |         |        5.1
 1380      0.2      0.4      0.382  |O      |         |         |         |        5.1
 1390      0.2      0.3      0.380  |O      |         |         |         |        5.0
 1400      0.2      0.3      0.378  |O      |         |         |         |        5.0
 1420      0.2      0.3      0.376  |O      |         |         |         |        5.0
 1440      0.2      0.3      0.373  |O      |         |         |         |        4.9
 1460      0.2      0.3      0.370  |O      |         |         |         |        4.9
 1500      0.1      0.3      0.362  IO      |         |         |         |        4.8

        Remaining water in basin =     0.36 (Ac.Ft)
        Peak flow out of basin =     1.02(CFS)
        Peak flow time = 1224 Min., time interval # = 110
        Maximum depth in basin =    5.60(Ft.)

                        Hydrograph Detention Basin Routing
        Hydrograph at 5 23 A Storm Day: 3 Drainage Area =    10.50
        Total flood hydrograph volume this storm day =    0.60 Ac. Ft.
        ----------------------------------------------------------------------

                                            Page 6
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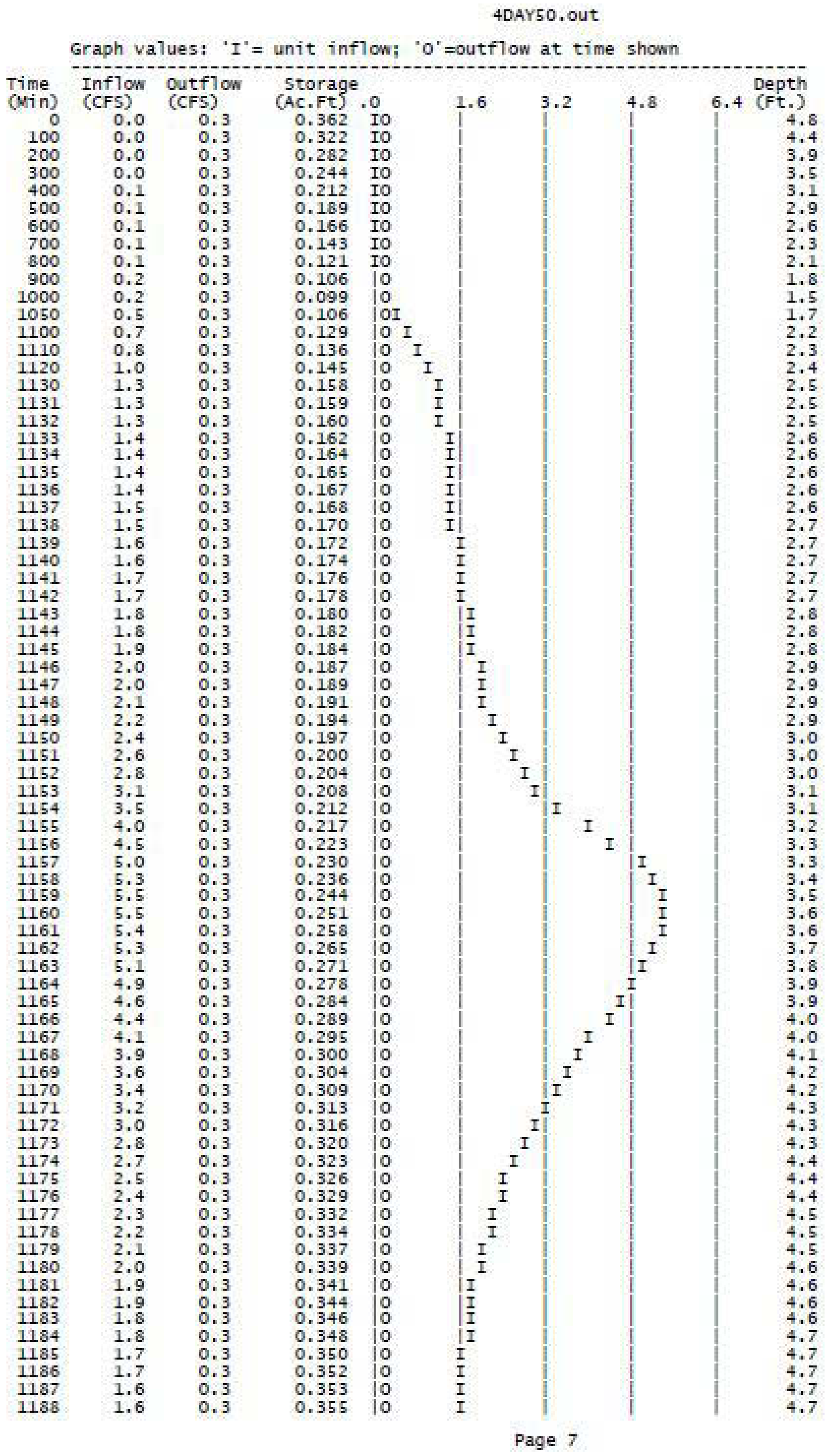

```
                                              4DAY50.out

      Graph values: 'I'= unit inflow; 'O'=outflow at time shown
      ----------------------------------------------------------------------
Time   Inflow  Outflow    Storage                                     Depth
(Min)  (CFS)   (CFS)     (Ac.Ft) .0       1.6     3.2     4.8     6.4 (Ft.)
    0     0.0     0.3      0.362  IO      |       |       |       |      4.8
  100     0.0     0.3      0.322  IO      |       |       |       |      4.4
  200     0.0     0.3      0.282  IO      |       |       |       |      3.9
  300     0.0     0.3      0.244  IO      |       |       |       |      3.5
  400     0.1     0.3      0.212  IO      |       |       |       |      3.1
  500     0.1     0.3      0.189  IO      |       |       |       |      2.9
  600     0.1     0.3      0.166  IO      |       |       |       |      2.6
  700     0.1     0.3      0.143  IO      |       |       |       |      2.3
  800     0.1     0.3      0.121  IO      |       |       |       |      2.1
  900     0.2     0.3      0.106  |O      |       |       |       |      1.8
 1000     0.2     0.3      0.099  |O      |       |       |       |      1.5
 1050     0.5     0.3      0.106  |OI     |       |       |       |      1.7
 1100     0.7     0.3      0.129  |O I    |       |       |       |      2.2
 1110     0.8     0.3      0.136  |O  I   |       |       |       |      2.3
 1120     1.0     0.3      0.145  |O   I  |       |       |       |      2.4
 1130     1.3     0.3      0.158  |O    I |       |       |       |      2.5
 1131     1.3     0.3      0.159  |O    I |       |       |       |      2.5
 1132     1.3     0.3      0.160  |O    I |       |       |       |      2.5
 1133     1.4     0.3      0.162  |O     I|       |       |       |      2.6
 1134     1.4     0.3      0.164  |O     I|       |       |       |      2.6
 1135     1.4     0.3      0.165  |O     I|       |       |       |      2.6
 1136     1.4     0.3      0.167  |O     I|       |       |       |      2.6
 1137     1.5     0.3      0.168  |O     I|       |       |       |      2.6
 1138     1.5     0.3      0.170  |O     I|       |       |       |      2.7
 1139     1.6     0.3      0.172  |O      I       |       |       |      2.7
 1140     1.6     0.3      0.174  |O      I       |       |       |      2.7
 1141     1.7     0.3      0.176  |O      I       |       |       |      2.7
 1142     1.7     0.3      0.178  |O      I       |       |       |      2.7
 1143     1.8     0.3      0.180  |O      |I      |       |       |      2.8
 1144     1.8     0.3      0.182  |O      |I      |       |       |      2.8
 1145     1.9     0.3      0.184  |O      |I      |       |       |      2.8
 1146     2.0     0.3      0.187  |O      | I     |       |       |      2.9
 1147     2.0     0.3      0.189  |O      | I     |       |       |      2.9
 1148     2.1     0.3      0.191  |O      | I     |       |       |      2.9
 1149     2.2     0.3      0.194  |O      |  I    |       |       |      2.9
 1150     2.4     0.3      0.197  |O      |   I   |       |       |      3.0
 1151     2.6     0.3      0.200  |O      |    I  |       |       |      3.0
 1152     2.8     0.3      0.204  |O      |     I |       |       |      3.0
 1153     3.1     0.3      0.208  |O      |      I|       |       |      3.1
 1154     3.5     0.3      0.212  |O      |       |I      |       |      3.1
 1155     4.0     0.3      0.217  |O      |       |   I   |       |      3.2
 1156     4.5     0.3      0.223  |O      |       |     I |       |      3.3
 1157     5.0     0.3      0.230  |O      |       |       |I      |      3.3
 1158     5.3     0.3      0.236  |O      |       |       | I     |      3.4
 1159     5.5     0.3      0.244  |O      |       |       |  I    |      3.5
 1160     5.5     0.3      0.251  |O      |       |       |  I    |      3.6
 1161     5.4     0.3      0.258  |O      |       |       |  I    |      3.6
 1162     5.3     0.3      0.265  |O      |       |       | I     |      3.7
 1163     5.1     0.3      0.271  |O      |       |       |I      |      3.8
 1164     4.9     0.3      0.278  |O      |       |       I       |      3.9
 1165     4.6     0.3      0.284  |O      |       |      I|       |      3.9
 1166     4.4     0.3      0.289  |O      |       |     I |       |      4.0
 1167     4.1     0.3      0.295  |O      |       |   I   |       |      4.0
 1168     3.9     0.3      0.300  |O      |       |  I    |       |      4.1
 1169     3.6     0.3      0.304  |O      |       | I     |       |      4.2
 1170     3.4     0.3      0.309  |O      |       |I      |       |      4.2
 1171     3.2     0.3      0.313  |O      |       I       |       |      4.3
 1172     3.0     0.3      0.316  |O      |      I|       |       |      4.3
 1173     2.8     0.3      0.320  |O      |     I |       |       |      4.3
 1174     2.7     0.3      0.323  |O      |    I  |       |       |      4.4
 1175     2.5     0.3      0.326  |O      |   I   |       |       |      4.4
 1176     2.4     0.3      0.329  |O      |   I   |       |       |      4.4
 1177     2.3     0.3      0.332  |O      |  I    |       |       |      4.5
 1178     2.2     0.3      0.334  |O      |  I    |       |       |      4.5
 1179     2.1     0.3      0.337  |O      | I     |       |       |      4.5
 1180     2.0     0.3      0.339  |O      | I     |       |       |      4.6
 1181     1.9     0.3      0.341  |O      |I      |       |       |      4.6
 1182     1.9     0.3      0.344  |O      |I      |       |       |      4.6
 1183     1.8     0.3      0.346  |O      |I      |       |       |      4.6
 1184     1.8     0.3      0.348  |O      |I      |       |       |      4.7
 1185     1.7     0.3      0.350  |O      I       |       |       |      4.7
 1186     1.7     0.3      0.352  |O      I       |       |       |      4.7
 1187     1.6     0.3      0.353  |O      I       |       |       |      4.7
 1188     1.6     0.3      0.355  |O      I       |       |       |      4.7
                                                Page 7
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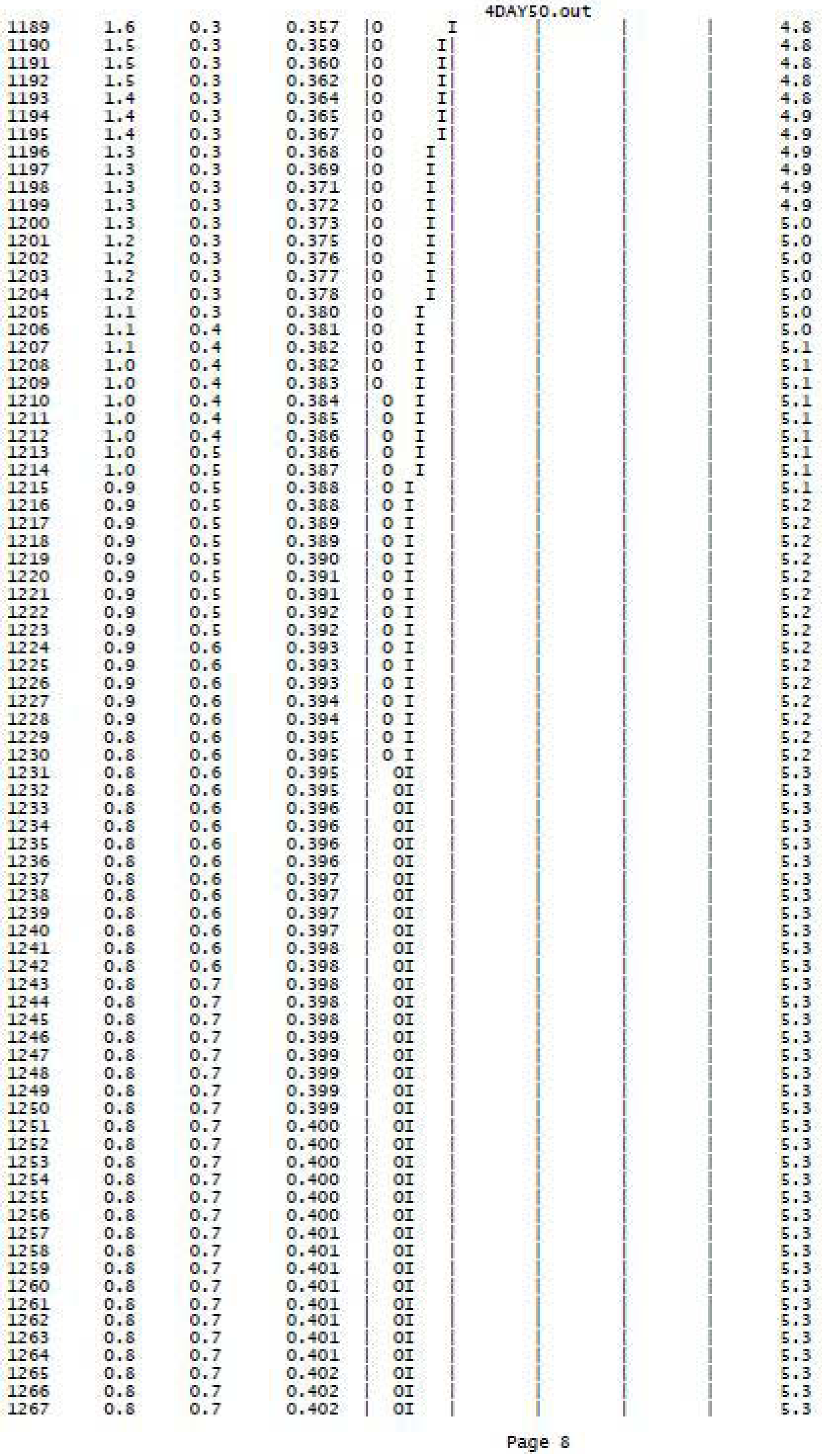

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                                            4DAY50.out
1189     1.6     0.3      0.357  |O      I       |       |       |      4.8
1190     1.5     0.3      0.359  |O     I|       |       |       |      4.8
1191     1.5     0.3      0.360  |O     I|       |       |       |      4.8
1192     1.5     0.3      0.362  |O     I|       |       |       |      4.8
1193     1.4     0.3      0.364  |O     I|       |       |       |      4.8
1194     1.4     0.3      0.365  |O     I|       |       |       |      4.9
1195     1.4     0.3      0.367  |O     I|       |       |       |      4.9
1196     1.3     0.3      0.368  |O    I |       |       |       |      4.9
1197     1.3     0.3      0.369  |O    I |       |       |       |      4.9
1198     1.3     0.3      0.371  |O    I |       |       |       |      4.9
1199     1.3     0.3      0.372  |O    I |       |       |       |      4.9
1200     1.3     0.3      0.373  |O    I |       |       |       |      5.0
1201     1.2     0.3      0.375  |O    I |       |       |       |      5.0
1202     1.2     0.3      0.376  |O    I |       |       |       |      5.0
1203     1.2     0.3      0.377  |O    I |       |       |       |      5.0
1204     1.2     0.3      0.378  |O    I |       |       |       |      5.0
1205     1.1     0.3      0.380  |O   I  |       |       |       |      5.0
1206     1.1     0.4      0.381  |O   I  |       |       |       |      5.0
1207     1.1     0.4      0.382  |O   I  |       |       |       |      5.1
1208     1.0     0.4      0.382  |O   I  |       |       |       |      5.1
1209     1.0     0.4      0.383  |O   I  |       |       |       |      5.1
1210     1.0     0.4      0.384  | O  I  |       |       |       |      5.1
1211     1.0     0.4      0.385  | O  I  |       |       |       |      5.1
1212     1.0     0.4      0.386  | O  I  |       |       |       |      5.1
1213     1.0     0.5      0.386  | O  I  |       |       |       |      5.1
1214     1.0     0.5      0.387  | O  I  |       |       |       |      5.1
1215     0.9     0.5      0.388  | O I   |       |       |       |      5.1
1216     0.9     0.5      0.388  | O I   |       |       |       |      5.2
1217     0.9     0.5      0.389  | O I   |       |       |       |      5.2
1218     0.9     0.5      0.389  | O I   |       |       |       |      5.2
1219     0.9     0.5      0.390  | O I   |       |       |       |      5.2
1220     0.9     0.5      0.391  | O I   |       |       |       |      5.2
1221     0.9     0.5      0.391  | O I   |       |       |       |      5.2
1222     0.9     0.5      0.392  | O I   |       |       |       |      5.2
1223     0.9     0.5      0.392  | O I   |       |       |       |      5.2
1224     0.9     0.6      0.393  | O I   |       |       |       |      5.2
1225     0.9     0.6      0.393  | O I   |       |       |       |      5.2
1226     0.9     0.6      0.393  | O I   |       |       |       |      5.2
1227     0.9     0.6      0.394  | O I   |       |       |       |      5.2
1228     0.9     0.6      0.394  | O I   |       |       |       |      5.2
1229     0.8     0.6      0.395  | O I   |       |       |       |      5.2
1230     0.8     0.6      0.395  | O I   |       |       |       |      5.2
1231     0.8     0.6      0.395  |  OI   |       |       |       |      5.3
1232     0.8     0.6      0.395  |  OI   |       |       |       |      5.3
1233     0.8     0.6      0.396  |  OI   |       |       |       |      5.3
1234     0.8     0.6      0.396  |  OI   |       |       |       |      5.3
1235     0.8     0.6      0.396  |  OI   |       |       |       |      5.3
1236     0.8     0.6      0.396  |  OI   |       |       |       |      5.3
1237     0.8     0.6      0.397  |  OI   |       |       |       |      5.3
1238     0.8     0.6      0.397  |  OI   |       |       |       |      5.3
1239     0.8     0.6      0.397  |  OI   |       |       |       |      5.3
1240     0.8     0.6      0.397  |  OI   |       |       |       |      5.3
1241     0.8     0.6      0.398  |  OI   |       |       |       |      5.3
1242     0.8     0.6      0.398  |  OI   |       |       |       |      5.3
1243     0.8     0.7      0.398  |  OI   |       |       |       |      5.3
1244     0.8     0.7      0.398  |  OI   |       |       |       |      5.3
1245     0.8     0.7      0.398  |  OI   |       |       |       |      5.3
1246     0.8     0.7      0.399  |  OI   |       |       |       |      5.3
1247     0.8     0.7      0.399  |  OI   |       |       |       |      5.3
1248     0.8     0.7      0.399  |  OI   |       |       |       |      5.3
1249     0.8     0.7      0.399  |  OI   |       |       |       |      5.3
1250     0.8     0.7      0.399  |  OI   |       |       |       |      5.3
1251     0.8     0.7      0.400  |  OI   |       |       |       |      5.3
1252     0.8     0.7      0.400  |  OI   |       |       |       |      5.3
1253     0.8     0.7      0.400  |  OI   |       |       |       |      5.3
1254     0.8     0.7      0.400  |  OI   |       |       |       |      5.3
1255     0.8     0.7      0.400  |  OI   |       |       |       |      5.3
1256     0.8     0.7      0.400  |  OI   |       |       |       |      5.3
1257     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1258     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1259     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1260     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1261     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1262     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1263     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1264     0.8     0.7      0.401  |  OI   |       |       |       |      5.3
1265     0.8     0.7      0.402  |  OI   |       |       |       |      5.3
1266     0.8     0.7      0.402  |  OI   |       |       |       |      5.3
1267     0.8     0.7      0.402  |  OI   |       |       |       |      5.3
                                              Page 8
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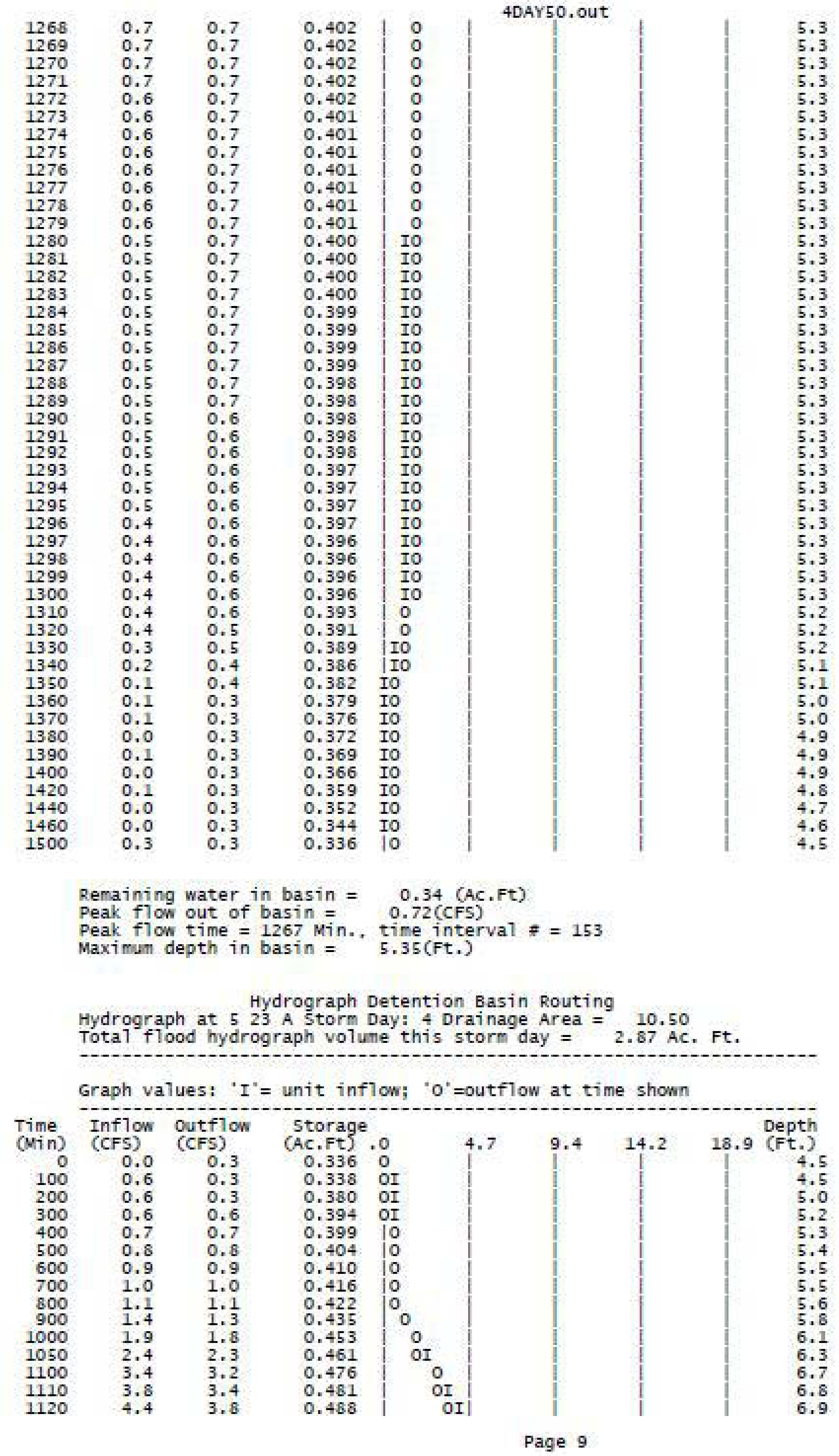

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                                             4DAY50.out
 1268     0.7     0.7      0.402  |  O    |       |       |       |      5.3
 1269     0.7     0.7      0.402  |  O    |       |       |       |      5.3
 1270     0.7     0.7      0.402  |  O    |       |       |       |      5.3
 1271     0.7     0.7      0.402  |  O    |       |       |       |      5.3
 1272     0.6     0.7      0.402  |  O    |       |       |       |      5.3
 1273     0.6     0.7      0.401  |  O    |       |       |       |      5.3
 1274     0.6     0.7      0.401  |  O    |       |       |       |      5.3
 1275     0.6     0.7      0.401  |  O    |       |       |       |      5.3
 1276     0.6     0.7      0.401  |  O    |       |       |       |      5.3
 1277     0.6     0.7      0.401  |  O    |       |       |       |      5.3
 1278     0.6     0.7      0.401  |  O    |       |       |       |      5.3
 1279     0.6     0.7      0.401  |  O    |       |       |       |      5.3
 1280     0.5     0.7      0.400  | IO    |       |       |       |      5.3
 1281     0.5     0.7      0.400  | IO    |       |       |       |      5.3
 1282     0.5     0.7      0.400  | IO    |       |       |       |      5.3
 1283     0.5     0.7      0.400  | IO    |       |       |       |      5.3
 1284     0.5     0.7      0.399  | IO    |       |       |       |      5.3
 1285     0.5     0.7      0.399  | IO    |       |       |       |      5.3
 1286     0.5     0.7      0.399  | IO    |       |       |       |      5.3
 1287     0.5     0.7      0.399  | IO    |       |       |       |      5.3
 1288     0.5     0.7      0.398  | IO    |       |       |       |      5.3
 1289     0.5     0.7      0.398  | IO    |       |       |       |      5.3
 1290     0.5     0.6      0.398  | IO    |       |       |       |      5.3
 1291     0.5     0.6      0.398  | IO    |       |       |       |      5.3
 1292     0.5     0.6      0.398  | IO    |       |       |       |      5.3
 1293     0.5     0.6      0.397  | IO    |       |       |       |      5.3
 1294     0.5     0.6      0.397  | IO    |       |       |       |      5.3
 1295     0.5     0.6      0.397  | IO    |       |       |       |      5.3
 1296     0.4     0.6      0.397  | IO    |       |       |       |      5.3
 1297     0.4     0.6      0.396  | IO    |       |       |       |      5.3
 1298     0.4     0.6      0.396  | IO    |       |       |       |      5.3
 1299     0.4     0.6      0.396  | IO    |       |       |       |      5.3
 1300     0.4     0.6      0.396  | IO    |       |       |       |      5.3
 1310     0.4     0.6      0.393  | O     |       |       |       |      5.2
 1320     0.4     0.5      0.391  | O     |       |       |       |      5.2
 1330     0.3     0.5      0.389  |IO     |       |       |       |      5.2
 1340     0.2     0.4      0.386  |IO     |       |       |       |      5.1
 1350     0.1     0.4      0.382  IO      |       |       |       |      5.1
 1360     0.1     0.3      0.379  IO      |       |       |       |      5.0
 1370     0.1     0.3      0.376  IO      |       |       |       |      5.0
 1380     0.0     0.3      0.372  IO      |       |       |       |      4.9
 1390     0.1     0.3      0.369  IO      |       |       |       |      4.9
 1400     0.0     0.3      0.366  IO      |       |       |       |      4.9
 1420     0.1     0.3      0.359  IO      |       |       |       |      4.8
 1440     0.0     0.3      0.352  IO      |       |       |       |      4.7
 1460     0.0     0.3      0.344  IO      |       |       |       |      4.6
 1500     0.3     0.3      0.336  |O      |       |       |       |      4.5

      Remaining water in basin =     0.34 (Ac.Ft)
      Peak flow out of basin =      0.72(CFS)
      Peak flow time = 1267 Min., time interval # = 153
      Maximum depth in basin =     5.35(Ft.)


                      Hydrograph Detention Basin Routing
      Hydrograph at 5 23 A Storm Day: 4 Drainage Area =    10.50
      Total flood hydrograph volume this storm day =     2.87 Ac. Ft.
      --------------------------------------------------------------------

      Graph values: 'I'= unit inflow; 'O'=outflow at time shown
      --------------------------------------------------------------------
Time   Inflow  Outflow    Storage                                     Depth
(Min)  (CFS)   (CFS)     (Ac.Ft) .0       4.7     9.4    14.2    18.9 (Ft.)
    0     0.0     0.3      0.336  O       |       |       |       |      4.5
  100     0.6     0.3      0.338  OI      |       |       |       |      4.5
  200     0.6     0.3      0.380  OI      |       |       |       |      5.0
  300     0.6     0.6      0.394  OI      |       |       |       |      5.2
  400     0.7     0.7      0.399  |O      |       |       |       |      5.3
  500     0.8     0.8      0.404  |O      |       |       |       |      5.4
  600     0.9     0.9      0.410  |O      |       |       |       |      5.5
  700     1.0     1.0      0.416  |O      |       |       |       |      5.5
  800     1.1     1.1      0.422  |O      |       |       |       |      5.6
  900     1.4     1.3      0.435  | O     |       |       |       |      5.8
 1000     1.9     1.8      0.453  |  O    |       |       |       |      6.1
 1050     2.4     2.3      0.461  |  OI   |       |       |       |      6.3
 1100     3.4     3.2      0.476  |    O  |       |       |       |      6.7
 1110     3.8     3.4      0.481  |    OI |       |       |       |      6.8
 1120     4.4     3.8      0.488  |     OI|       |       |       |      6.9

                                               Page 9
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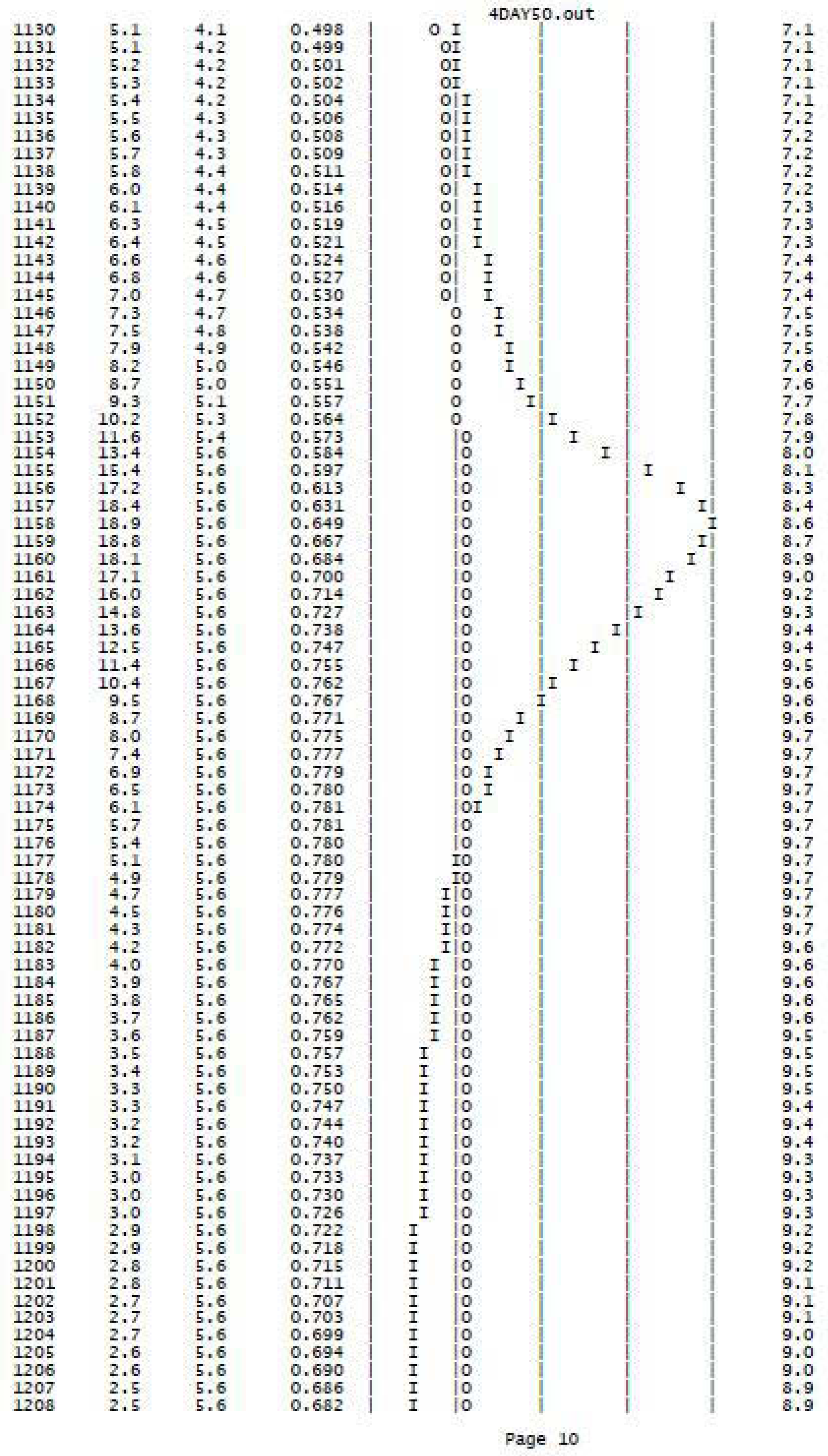

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                                            4DAY50.out
1130      5.1     4.1     0.498  |     O I       |       |       |      7.1
1131      5.1     4.2     0.499  |      OI       |       |       |      7.1
1132      5.2     4.2     0.501  |      OI       |       |       |      7.1
1133      5.3     4.2     0.502  |      OI       |       |       |      7.1
1134      5.4     4.2     0.504  |      O|I      |       |       |      7.1
1135      5.5     4.3     0.506  |      O|I      |       |       |      7.2
1136      5.6     4.3     0.508  |      O|I      |       |       |      7.2
1137      5.7     4.3     0.509  |      O|I      |       |       |      7.2
1138      5.8     4.4     0.511  |      O|I      |       |       |      7.2
1139      6.0     4.4     0.514  |      O| I     |       |       |      7.2
1140      6.1     4.4     0.516  |      O| I     |       |       |      7.3
1141      6.3     4.5     0.519  |      O| I     |       |       |      7.3
1142      6.4     4.5     0.521  |      O| I     |       |       |      7.3
1143      6.6     4.6     0.524  |      O|  I    |       |       |      7.4
1144      6.8     4.6     0.527  |      O|  I    |       |       |      7.4
1145      7.0     4.7     0.530  |      O|  I    |       |       |      7.4
1146      7.3     4.7     0.534  |       O   I   |       |       |      7.5
1147      7.5     4.8     0.538  |       O   I   |       |       |      7.5
1148      7.9     4.9     0.542  |       O    I  |       |       |      7.5
1149      8.2     5.0     0.546  |       O    I  |       |       |      7.6
1150      8.7     5.0     0.551  |       O     I |       |       |      7.6
1151      9.3     5.1     0.557  |       O      I|       |       |      7.7
1152     10.2     5.3     0.564  |       O       |I      |       |      7.8
1153     11.6     5.4     0.573  |       |O      |  I    |       |      7.9
1154     13.4     5.6     0.584  |       |O      |     I |       |      8.0
1155     15.4     5.6     0.597  |       |O      |       | I     |      8.1
1156     17.2     5.6     0.613  |       |O      |       |    I  |      8.3
1157     18.4     5.6     0.631  |       |O      |       |      I|      8.4
1158     18.9     5.6     0.649  |       |O      |       |       I      8.6
1159     18.8     5.6     0.667  |       |O      |       |      I|      8.7
1160     18.1     5.6     0.684  |       |O      |       |     I |      8.9
1161     17.1     5.6     0.700  |       |O      |       |   I   |      9.0
1162     16.0     5.6     0.714  |       |O      |       |  I    |      9.2
1163     14.8     5.6     0.727  |       |O      |       |I      |      9.3
1164     13.6     5.6     0.738  |       |O      |      I|       |      9.4
1165     12.5     5.6     0.747  |       |O      |    I  |       |      9.4
1166     11.4     5.6     0.755  |       |O      |  I    |       |      9.5
1167     10.4     5.6     0.762  |       |O      |I      |       |      9.6
1168      9.5     5.6     0.767  |       |O      I       |       |      9.6
1169      8.7     5.6     0.771  |       |O    I |       |       |      9.6
1170      8.0     5.6     0.775  |       |O   I  |       |       |      9.7
1171      7.4     5.6     0.777  |       |O  I   |       |       |      9.7
1172      6.9     5.6     0.779  |       |O I    |       |       |      9.7
1173      6.5     5.6     0.780  |       |O I    |       |       |      9.7
1174      6.1     5.6     0.781  |       |OI     |       |       |      9.7
1175      5.7     5.6     0.781  |       |O      |       |       |      9.7
1176      5.4     5.6     0.780  |       |O      |       |       |      9.7
1177      5.1     5.6     0.780  |       IO      |       |       |      9.7
1178      4.9     5.6     0.779  |       IO      |       |       |      9.7
1179      4.7     5.6     0.777  |      I|O      |       |       |      9.7
1180      4.5     5.6     0.776  |      I|O      |       |       |      9.7
1181      4.3     5.6     0.774  |      I|O      |       |       |      9.7
1182      4.2     5.6     0.772  |      I|O      |       |       |      9.6
1183      4.0     5.6     0.770  |     I |O      |       |       |      9.6
1184      3.9     5.6     0.767  |     I |O      |       |       |      9.6
1185      3.8     5.6     0.765  |     I |O      |       |       |      9.6
1186      3.7     5.6     0.762  |     I |O      |       |       |      9.6
1187      3.6     5.6     0.759  |     I |O      |       |       |      9.5
1188      3.5     5.6     0.757  |    I  |O      |       |       |      9.5
1189      3.4     5.6     0.753  |    I  |O      |       |       |      9.5
1190      3.3     5.6     0.750  |    I  |O      |       |       |      9.5
1191      3.3     5.6     0.747  |    I  |O      |       |       |      9.4
1192      3.2     5.6     0.744  |    I  |O      |       |       |      9.4
1193      3.2     5.6     0.740  |    I  |O      |       |       |      9.4
1194      3.1     5.6     0.737  |    I  |O      |       |       |      9.3
1195      3.0     5.6     0.733  |    I  |O      |       |       |      9.3
1196      3.0     5.6     0.730  |    I  |O      |       |       |      9.3
1197      3.0     5.6     0.726  |    I  |O      |       |       |      9.3
1198      2.9     5.6     0.722  |   I   |O      |       |       |      9.2
1199      2.9     5.6     0.718  |   I   |O      |       |       |      9.2
1200      2.8     5.6     0.715  |   I   |O      |       |       |      9.2
1201      2.8     5.6     0.711  |   I   |O      |       |       |      9.1
1202      2.7     5.6     0.707  |   I   |O      |       |       |      9.1
1203      2.7     5.6     0.703  |   I   |O      |       |       |      9.1
1204      2.7     5.6     0.699  |   I   |O      |       |       |      9.0
1205      2.6     5.6     0.694  |   I   |O      |       |       |      9.0
1206      2.6     5.6     0.690  |   I   |O      |       |       |      9.0
1207      2.5     5.6     0.686  |   I   |O      |       |       |      8.9
1208      2.5     5.6     0.682  |   I   |O      |       |       |      8.9
                                              Page 10
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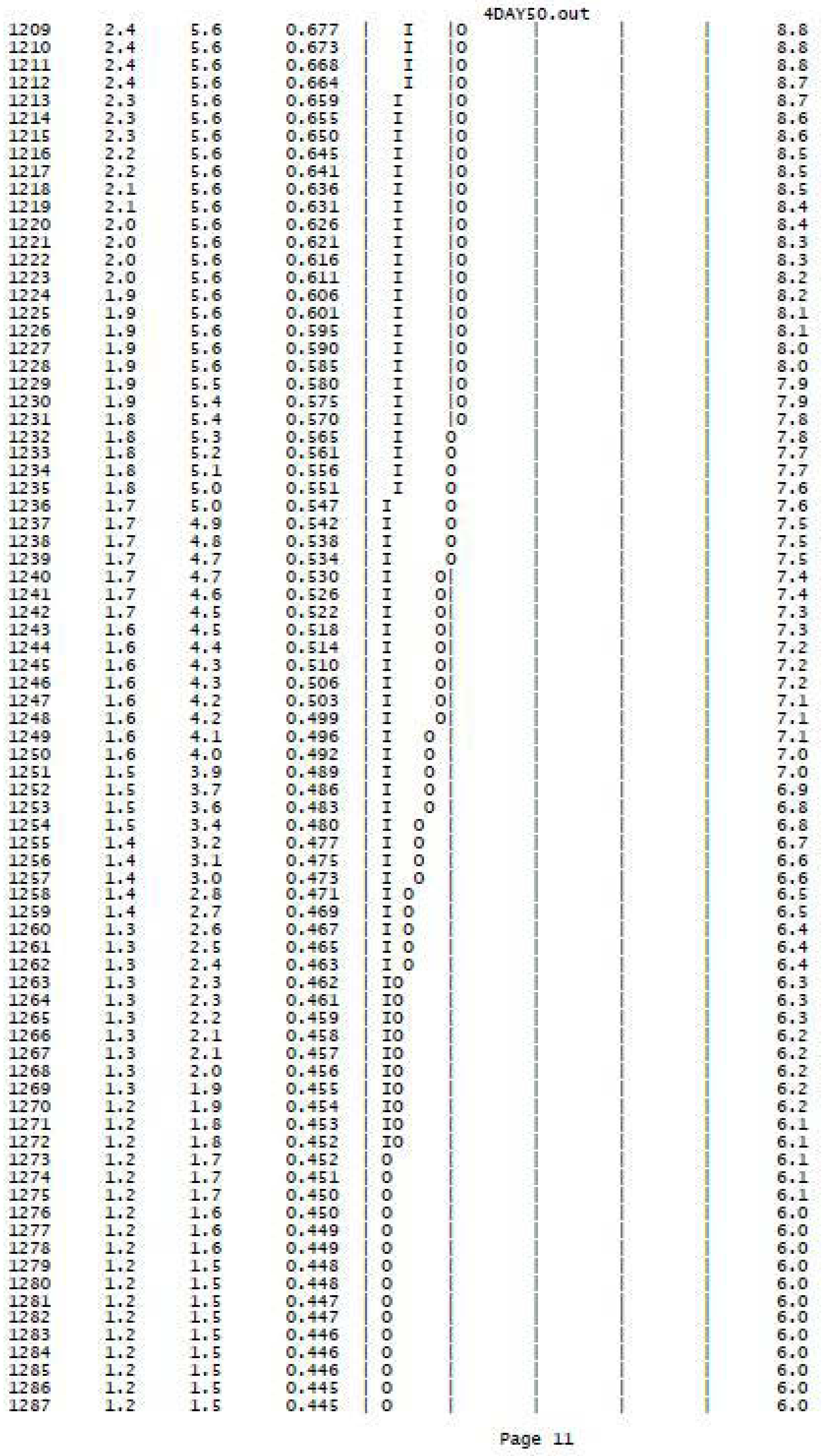

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                                             4DAY50.out
1209     2.4     5.6      0.677   |   I   |O      |       |       |      8.8
1210     2.4     5.6      0.673   |   I   |O      |       |       |      8.8
1211     2.4     5.6      0.668   |   I   |O      |       |       |      8.8
1212     2.4     5.6      0.664   |   I   |O      |       |       |      8.7
1213     2.3     5.6      0.659   |  I    |O      |       |       |      8.7
1214     2.3     5.6      0.655   |  I    |O      |       |       |      8.6
1215     2.3     5.6      0.650   |  I    |O      |       |       |      8.6
1216     2.2     5.6      0.645   |  I    |O      |       |       |      8.5
1217     2.2     5.6      0.641   |  I    |O      |       |       |      8.5
1218     2.1     5.6      0.636   |  I    |O      |       |       |      8.5
1219     2.1     5.6      0.631   |  I    |O      |       |       |      8.4
1220     2.0     5.6      0.626   |  I    |O      |       |       |      8.4
1221     2.0     5.6      0.621   |  I    |O      |       |       |      8.3
1222     2.0     5.6      0.616   |  I    |O      |       |       |      8.3
1223     2.0     5.6      0.611   |  I    |O      |       |       |      8.2
1224     1.9     5.6      0.606   |  I    |O      |       |       |      8.2
1225     1.9     5.6      0.601   |  I    |O      |       |       |      8.1
1226     1.9     5.6      0.595   |  I    |O      |       |       |      8.1
1227     1.9     5.6      0.590   |  I    |O      |       |       |      8.0
1228     1.9     5.6      0.585   |  I    |O      |       |       |      8.0
1229     1.9     5.5      0.580   |  I    |O      |       |       |      7.9
1230     1.9     5.4      0.575   |  I    |O      |       |       |      7.9
1231     1.8     5.4      0.570   |  I    |O      |       |       |      7.8
1232     1.8     5.3      0.565   |  I    O       |       |       |      7.8
1233     1.8     5.2      0.561   |  I    O       |       |       |      7.7
1234     1.8     5.1      0.556   |  I    O       |       |       |      7.7
1235     1.8     5.0      0.551   |  I    O       |       |       |      7.6
1236     1.7     5.0      0.547   | I     O       |       |       |      7.6
1237     1.7     4.9      0.542   | I     O       |       |       |      7.5
1238     1.7     4.8      0.538   | I     O       |       |       |      7.5
1239     1.7     4.7      0.534   | I     O       |       |       |      7.5
1240     1.7     4.7      0.530   | I    O|       |       |       |      7.4
1241     1.7     4.6      0.526   | I    O|       |       |       |      7.4
1242     1.7     4.5      0.522   | I    O|       |       |       |      7.3
1243     1.6     4.5      0.518   | I    O|       |       |       |      7.3
1244     1.6     4.4      0.514   | I    O|       |       |       |      7.2
1245     1.6     4.3      0.510   | I    O|       |       |       |      7.2
1246     1.6     4.3      0.506   | I    O|       |       |       |      7.2
1247     1.6     4.2      0.503   | I    O|       |       |       |      7.1
1248     1.6     4.2      0.499   | I    O|       |       |       |      7.1
1249     1.6     4.1      0.496   | I   O |       |       |       |      7.1
1250     1.6     4.0      0.492   | I   O |       |       |       |      7.0
1251     1.5     3.9      0.489   | I   O |       |       |       |      7.0
1252     1.5     3.7      0.486   | I   O |       |       |       |      6.9
1253     1.5     3.6      0.483   | I   O |       |       |       |      6.8
1254     1.5     3.4      0.480   | I  O  |       |       |       |      6.8
1255     1.4     3.2      0.477   | I  O  |       |       |       |      6.7
1256     1.4     3.1      0.475   | I  O  |       |       |       |      6.6
1257     1.4     3.0      0.473   | I  O  |       |       |       |      6.6
1258     1.4     2.8      0.471   | I O   |       |       |       |      6.5
1259     1.4     2.7      0.469   | I O   |       |       |       |      6.5
1260     1.3     2.6      0.467   | I O   |       |       |       |      6.4
1261     1.3     2.5      0.465   | I O   |       |       |       |      6.4
1262     1.3     2.4      0.463   | I O   |       |       |       |      6.4
1263     1.3     2.3      0.462   | IO    |       |       |       |      6.3
1264     1.3     2.3      0.461   | IO    |       |       |       |      6.3
1265     1.3     2.2      0.459   | IO    |       |       |       |      6.3
1266     1.3     2.1      0.458   | IO    |       |       |       |      6.2
1267     1.3     2.1      0.457   | IO    |       |       |       |      6.2
1268     1.3     2.0      0.456   | IO    |       |       |       |      6.2
1269     1.3     1.9      0.455   | IO    |       |       |       |      6.2
1270     1.2     1.9      0.454   | IO    |       |       |       |      6.2
1271     1.2     1.8      0.453   | IO    |       |       |       |      6.1
1272     1.2     1.8      0.452   | IO    |       |       |       |      6.1
1273     1.2     1.7      0.452   | O     |       |       |       |      6.1
1274     1.2     1.7      0.451   | O     |       |       |       |      6.1
1275     1.2     1.7      0.450   | O     |       |       |       |      6.1
1276     1.2     1.6      0.450   | O     |       |       |       |      6.0
1277     1.2     1.6      0.449   | O     |       |       |       |      6.0
1278     1.2     1.6      0.449   | O     |       |       |       |      6.0
1279     1.2     1.5      0.448   | O     |       |       |       |      6.0
1280     1.2     1.5      0.448   | O     |       |       |       |      6.0
1281     1.2     1.5      0.447   | O     |       |       |       |      6.0
1282     1.2     1.5      0.447   | O     |       |       |       |      6.0
1283     1.2     1.5      0.446   | O     |       |       |       |      6.0
1284     1.2     1.5      0.446   | O     |       |       |       |      6.0
1285     1.2     1.5      0.446   | O     |       |       |       |      6.0
1286     1.2     1.5      0.445   | O     |       |       |       |      6.0
1287     1.2     1.5      0.445   | O     |       |       |       |      6.0
                                              Page 11
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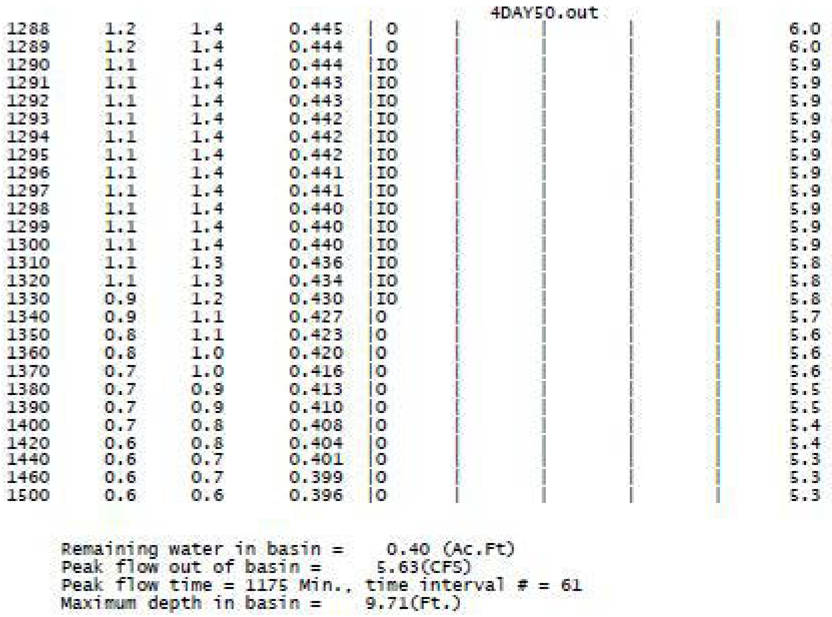

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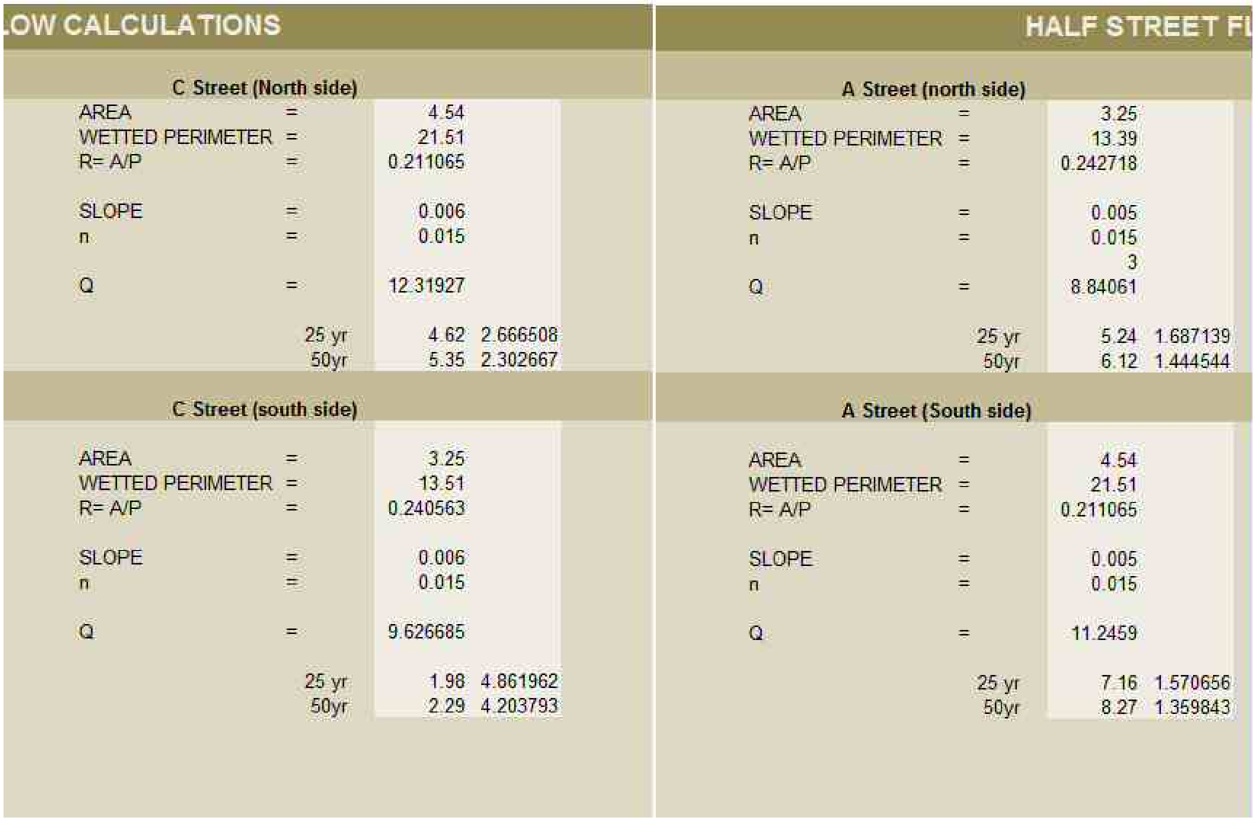
                                                 4DAY50.out
1288       1.2      1.4       0.445  | O      |       |       |       |        6.0
1289       1.2      1.4       0.444  | O      |       |       |       |        6.0
1290       1.1      1.4       0.444  |IO      |       |       |       |        5.9
1291       1.1      1.4       0.443  |IO      |       |       |       |        5.9
1292       1.1      1.4       0.443  |IO      |       |       |       |        5.9
1293       1.1      1.4       0.442  |IO      |       |       |       |        5.9
1294       1.1      1.4       0.442  |IO      |       |       |       |        5.9
1295       1.1      1.4       0.442  |IO      |       |       |       |        5.9
1296       1.1      1.4       0.441  |IO      |       |       |       |        5.9
1297       1.1      1.4       0.441  |IO      |       |       |       |        5.9
1298       1.1      1.4       0.440  |IO      |       |       |       |        5.9
1299       1.1      1.4       0.440  |IO      |       |       |       |        5.9
1300       1.1      1.4       0.440  |IO      |       |       |       |        5.9
1310       1.1      1.3       0.436  |IO      |       |       |       |        5.8
1320       1.1      1.3       0.434  |IO      |       |       |       |        5.8
1330       0.9      1.2       0.430  |IO      |       |       |       |        5.8
1340       0.9      1.1       0.427  |O       |       |       |       |        5.7
1350       0.8      1.1       0.423  |O       |       |       |       |        5.6
1360       0.8      1.0       0.420  |O       |       |       |       |        5.6
1370       0.7      1.0       0.416  |O       |       |       |       |        5.6
1380       0.7      0.9       0.413  |O       |       |       |       |        5.5
1390       0.7      0.9       0.410  |O       |       |       |       |        5.5
1400       0.7      0.8       0.408  |O       |       |       |       |        5.4
1420       0.6      0.8       0.404  |O       |       |       |       |        5.4
1440       0.6      0.7       0.401  |O       |       |       |       |        5.3
1460       0.6      0.7       0.399  |O       |       |       |       |        5.3
1500       0.6      0.6       0.396  |O       |       |       |       |        5.3

     Remaining water in basin =     0.40 (Ac.Ft)
     Peak flow out of basin =     5.63(CFS)
     Peak flow time = 1175 Min., time interval # = 61
     Maximum depth in basin =    9.71(Ft.)
```

Figure 10

Half Street Capacity Calculations



OW CALCULATIONS

HALF STREET F

C Street (North side)

AREA = 4.54
WETTED PERIMETER = 21.51
R= A/P = 0.211065

SLOPE = 0.006
n = 0.015

Q = 12.31927

25 yr 4.62 2.666508
50yr 5.35 2.302667

C Street (south side)

AREA = 3.25
WETTED PERIMETER = 13.51
R= A/P = 0.240563

SLOPE = 0.006
n = 0.015

Q = 9.626685

25 yr 1.98 4.861962
50yr 2.29 4.203793

A Street (north side)

AREA = 3.25
WETTED PERIMETER = 13.39
R= A/P = 0.242718

SLOPE = 0.005
n = 0.015
3
Q = 8.84061

25 yr 5.24 1.687139
50yr 6.12 1.444544

A Street (South side)

AREA = 4.54
WETTED PERIMETER = 21.51
R= A/P = 0.211065

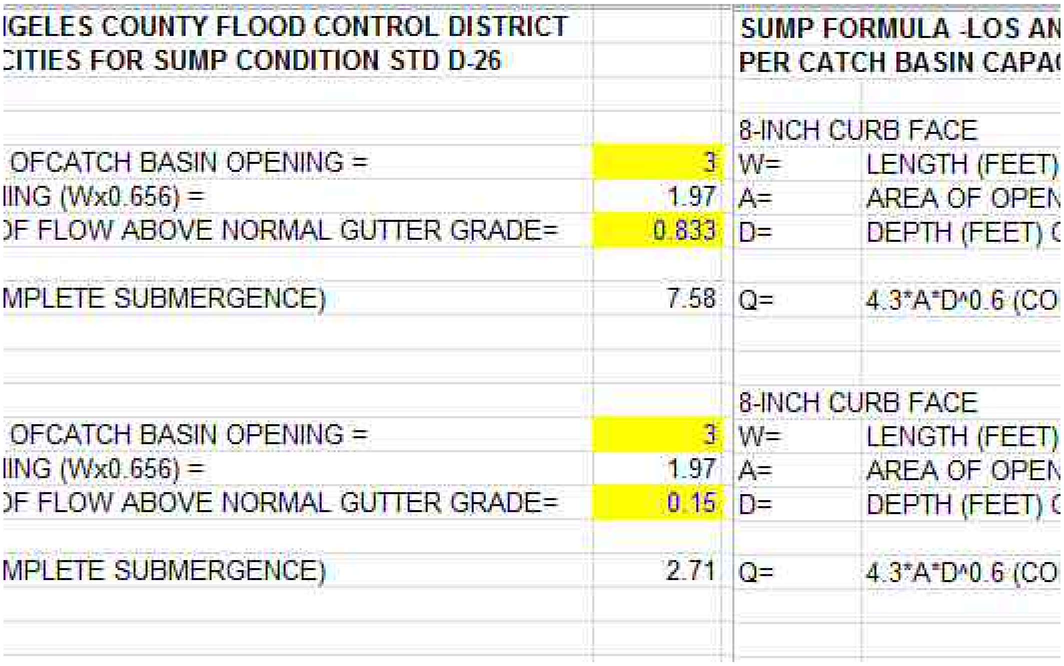
SLOPE = 0.005
n = 0.015

Q = 11.2459

25 yr 7.16 1.570656
50yr 8.27 1.359843

Figure 11

Catch Basin Inlet Calculations



IGELES COUNTY FLOOD CONTROL DISTRICT		SUMP FORMULA -LOS AN	
CITIES FOR SUMP CONDITION STD D-26		PER CATCH BASIN CAPA	
		8-INCH CURB FACE	
OFCATCH BASIN OPENING =	3	W=	LENGTH (FEET)
IING (Wx0.656) =	1.97	A=	AREA OF OPEN
OF FLOW ABOVE NORMAL GUTTER GRADE=	0.833	D=	DEPTH (FEET)
MPLETE SUBMERGENCE)	7.58	Q=	4.3*A*D^0.6 (CO
		8-INCH CURB FACE	
OFCATCH BASIN OPENING =	3	W=	LENGTH (FEET)
IING (Wx0.656) =	1.97	A=	AREA OF OPEN
OF FLOW ABOVE NORMAL GUTTER GRADE=	0.15	D=	DEPTH (FEET)
MPLETE SUBMERGENCE)	2.71	Q=	4.3*A*D^0.6 (CO

Appendix H

Noise Impact Study

RK engineering group, inc.

transportation planning • traffic engineering
acoustical engineering • parking studies

LETTER OF TRANSMITTAL

TO: THE LONG BEACH PROJECT OWNER, LLC.
3 San Joaquin Plaza, Suite 100
Newport Beach, CA 92660

ATTN: Mr. Spencer Oliver

DATE: October 15, 2013
JOB NO.: 2373-2013-01
SUBJECT: Riverwalk Residential Development
Noise Impact Study, City of Long Beach

WE ARE FORWARDING:

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SENT FOR YOUR		STATUS		PLEASE NOTE	
	Approval		Preliminary		Revisions
	Signature		Revised		Additions
X	Use		Approved		Omissions
	File		Released		Corrections

REMARKS:
Attached is the Riverwalk Residential Development Noise Impact Study, City of Long Beach.

Please call me at (949) 474-0809 extension 208, if you have any questions.

BY: Mike Dickerson

Mike Dickerson, INCE
Acoustical Engineer

COPIES TO:

RK10128TB.xls

4000 westerly place, suite 280
newport beach, california 92660
tel 949.474.0809 fax 949.474.0902
http://www.rkengineer.com

RIVERWALK RESIDENTIAL DEVELOPMENT
NOISE IMPACT STUDY
City of Long Beach, California

RK engineering group, inc.

RK engineering group, inc.

transportation planning • traffic engineering
acoustical engineering • parking studies

October 15, 2013

Mr. Spencer Oliver
THE LONG BEACH PROJECT OWNER, LLC.
3 San Joaquin Plaza, Suite 100
Newport Beach, CA 92660

Subject: Riverwalk Residential Development Noise Impact Study, Long Beach

Dear Mr. Oliver:

RK ENGINEERING GROUP, INC. (RK) has completed an acoustical analysis of the proposed Riverwalk Residential Development project. The project site is located at 4747 Daisy Avenue in the City of Long Beach, as indicated in Exhibit A. The proposed project's site plan is shown in Exhibit B. The acoustical parameters, including the City of Long Beach Noise Standards, are included in Appendix A.

The proposed project was assessed with respect to off-site noise impacts to and from the project site. The primary source of off-site generated noise would be traffic noise from the roadway network and railroad noise from the tracks directly south of the project site. The noise standards, defined by the City are indicated in Section 3.0 of the report. The project is expected to meet the required noise standards, as specified by the City of Long Beach with the recommendations of this report. The project will require a "windows closed" condition. A final noise study should be prepared prior to obtaining building permits for the project. The final noise study will review the architectural design from a noise perspective to ensure compliance to the noise isolation performance of party walls and ceiling/floor assemblies. In addition, it will confirm the precise interior noise levels.

RK ENGINEERING GROUP, INC. is pleased to provide THE LONG BEACH PROJECT OWNER with this acoustical analysis. If you have any questions regarding this study or need further review, please call us at (949) 474-0809.

Sincerely,
RK ENGINEERING GROUP, INC.

REGISTERED PROFESSIONAL ENGINEER
ROBERT KAHN
No. 20285
Exp. 09/30/17
CIVIL
STATE OF CALIFORNIA

Mike Dickerson

Mike Dickerson, INCE
Noise/Air Specialist

Robert Kahn, P.E.
Principal

Tiffany Giordano
Engineer I

Attachments

MD:TG:mn/RK10128.doc
JN:2373-2013-01

4000 westerly place, suite 280
newport beach, california 92660
tel 949.474.0809 fax 949.474.0902
http://www.rkengineer.com

RIVERWALK RESIDENTIAL DEVELOPMENT
NOISE IMPACT STUDY
City of Long Beach, California

Prepared for:

THE LONG BEACH PROJECT OWNER, LLC
3 San Joaquin Plaza, Suite 100
Newport Beach, CA 92660

Prepared by:

RK ENGINEERING GROUP, INC.
4000 Westerly Place, Suite 280
Newport Beach, CA 92660

Michael Dickerson
Robert Kahn, P.E.
Tiffany Giordano

ROBERT KAHN
No. 20285
Exp. 09/30/13

October 15, 2013

RIVERWALK RESIDENTIAL DEVELOPMENT
NOISE IMPACT STUDY
City of Long Beach, California

Prepared for:

THE LONG BEACH PROJECT OWNER, LLC
3 San Joaquin Plaza, Suite 100
Newport Beach, CA 92660

Prepared by:

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4000 Westerly Place, Suite 280
Newport Beach, CA 92660

Michael Dickerson
Robert Kahn, P.E.
Tiffany Giordano

ROBERT KAHN
No. 20285
Exp. 09/30/13

October 15, 2013

MD:TG:cm/RK10122.doc
JN:2273-2013-01

RIVERWALK RESIDENTIAL DEVELOPMENT
NOISE IMPACT STUDY
City of Long Beach, California

Prepared for:

THE LONG BEACH PROJECT OWNER, LLC
3 San Joaquin Plaza, Suite 100
Newport Beach, CA 92660

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Exp. 09/30/13

October 15, 2013

MD:TG:cm/RK10122.doc
JN:2273-2013-01

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List of Attachments

Exhibits

Tables

Appendices

1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this acoustical assessment is to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. This assessment was conducted and compared to the noise standards set forth by the Federal, State, and Local agencies. Consistent with the City's Municipal Code, a significant impact related to noise would occur if a proposed project is determined to result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local Municipal Code or noise ordinance, or applicable agencies.

The following is provided in this report:

- A description of the study area and proposed project.
- Information regarding the fundamentals of noise.
- A description of the local noise guidelines and standards.
- An exterior/interior analysis of traffic and railroad noise impacts to the project study area.
- An analysis of railroad vibration impacts to the project study area.

1.2 Site Location and Study Area

The project site is located at 4747 Daisy Avenue in the City of Long Beach. The project is bounded by railroad tracks to the south, Dominquez Gap Wetlands to the west, existing residential units to the north, and Daisy Avenue to the east. Land uses surrounding the project include existing residential to the north and east, as demonstrated in Exhibit A. Approximately 1,500 feet to the west is the existing State Route 710 freeway. The existing railroad line to the south is assumed to be the Union Pacific Rail Line. The southern border of the site has an uphill grade, with an approximate 10 foot wall at the top of the slope. The uphill grading and wall are continuous throughout the residential area bordering the railroad line. The remainder of the site is relatively flat and approximately 45 feet above sea level. The site is currently vacant.

1.3 Proposed Project Description

The project proposes to develop 120 single family residential dwelling units on approximately 10.58 acres (a maximum of 11.34 DU/AC). The site plan used for this analysis, provided by Integral Communities and Urban Arena, is illustrated in Exhibit B.

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2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines it loudness. The loudness of sound increases or decreases, as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels and abbreviated dB.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway), would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels. Following are the most commonly used noise descriptors along with brief definitions.

A-Weighted Sound Level

The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level

The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL)

The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB)

A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room

Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n)

The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise

Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area

Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter

An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL)

The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

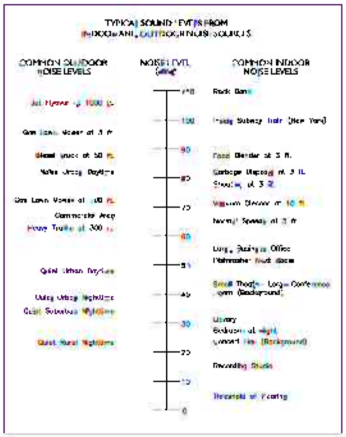
Noise levels associated with traffic depend on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2 – 6 wheels) and heavy truck percentage (3 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

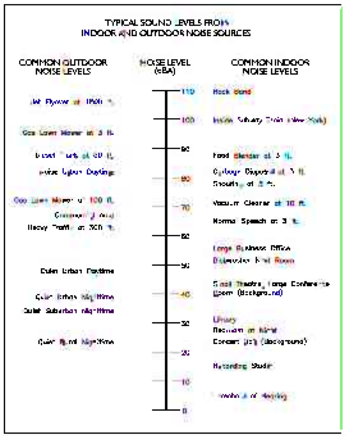
2.8 Sound Propagation

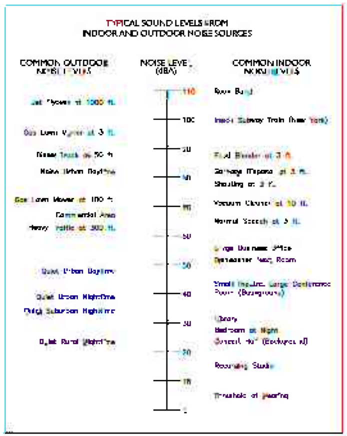
As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at an additional rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity and turbulence can further impact how far sound can travel.







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3.0 Regulatory Setting

The proposed project is located in the City of Long Beach and noise regulations are addressed through the various federal, state, and local government agencies. The agencies responsible for regulating noise are discussed below.

3.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three (3) purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was originally tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies; The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports; The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system; The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The Federal government and the State advocate that local jurisdiction use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the Federal government and the State have preempted the setting of standards for noise levels that can be emitted by the transportation source, the County is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

3.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable.

3.3 City of Long Beach Noise Regulations

The City of Long Beach outlines their noise regulations and standards within the City's Municipal Code (Section 8.80.130, Appendix A). For purposes of this analysis, the City of Long Beach's Acoustical Standards are used to evaluate the roadway noise impacts to the proposed project from the local roadway network.

Traffic Noise Regulation

The City of Long Beach's noise standards for residential development require that noise sensitive uses proposed to be located in areas with noise levels of 65 dBA LDN/CNEL or greater include the recommended mitigation measures or demonstrate the interior levels will not exceed an LDN/CNEL of 45 dBA.

Construction Noise Regulation

The City of Long Beach's Municipal Noise Code (Section 8.80.202) indicates that the project construction noise levels should be kept to a minimum by using acceptable practices where sensitive land uses are adjacent to construction zone. If construction activities fall outside the acceptable hours as outlined in the Code, the project must not exceed the maximum permitted noise levels for the underlying land use category.

The City's Code states that no person shall operate any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity which produce loud or unusual noise which annoys or disturbs a reasonable person of normal sensitivity between the following hours:

- Weekdays and Federal Holidays: Between 7:00 PM and 7:00 AM.
- Saturdays: Between 7:00 PM on Friday and 9:00 AM on Saturday, and after 6:00 PM on Saturday
- Sundays: Anytime, except when person has received a work permit from the Noise Control Officer. In that case, the person may work between 9:00 AM and 6:00 PM during the dates specified in the work permit.

Railroad Noise Regulation

The City's noise standards for residential development require that noise levels from railroad tracks do not exceed 65 dBA LDN/CNEL.

4.0 Study Method and Procedures

The following describes the noise modeling procedures and assumptions.

4.1 Traffic Noise Modeling

Traffic noise from vehicular traffic was projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the key input parameters. Long Beach Freeway (SR-710) traffic data, traffic volumes, and percentages were obtained through the 2011 Annual Average Daily Truck Traffic on the California State Highway System compiled by Traffic and Vehicle Data Systems. The referenced traffic data was applied to the model and is provided in Appendix B. Table 1 contains the roadway parameters and vehicle distribution.

The following outlines the key adjustments made to the computer model for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway).
- Average Daily Traffic (ADT) Volumes, Travel Speeds, and Percentages of automobiles, medium trucks, and heavy trucks.
- Roadway grade and angle of view.
- Site Conditions (e.g. soft vs. hard).
- Percentage of total ADT which flows each hour throughout a 24-hour period

The following outlines key adjustments to the computer model for the project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source).
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra.
- Topography.

RK projected the traffic noise levels to the nearest building facades of the project site (first row lots nearest SR-710). The noise model takes into account the 5-foot berm near the Dominquez Gap Wetlands. Traffic noise levels were projected to the first and second floor for all residential units. The building facade is approximately 1,500 feet from the centerline of Long Beach Freeway (SR-710). It is important to note that the existing berm along the western property line will serve as a berm barrier; therefore, lowering the noise levels. The project noise calculation worksheet outputs are provided in Appendix C.

4.2 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's façade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows closed". RK estimated the interior noise level by subtracting the building shell design from the estimated exterior noise level.

4.3 Railroad Noise Modeling

The railroad source noise analysis uses a version of Wyle Labs WCR73_5, together with several key site parameters, to project the expected impacts of Railroad operations to the proposed project site. Key inputs include train category identification, percent grade, length of train, speed of train, and distance to receiver. Similar performance equations, including relative source-barrier-receiver horizontal separations, relative source-barrier-receiver vertical separations, typical noise source spectra, and barrier transmission loss from the railroad noise model, were utilized to complete the stationary source model. It is important to note that there is an existing uphill grade on the site leading to the track, as well as an approximate 10 foot high wall. It is estimated that the wall is about 25 feet from the railroad tracks. Railroad noise calculations are included in Appendix F.

The railroad tracks are assumed to be Union Pacific Rail Line. Since the exact rail line is unknown, information about the railroad activity and frequency must be assumed for modeling purposes. Appendix D shows the City of Carson's General Plan, which lists the various rail lines near the project area. Per the City's Plan, the Dominguez Channel line runs parallel to the project site, and can have operations up to approximately 16 times per day. This line is assumed to be the same line which runs south of the project. RK utilized the Federal Railroad Administration (FRA) website to obtain the track operations based on the railroad crossing. The aerial in Appendix D is from the FRA and depicts the railroads closest to the project site. According to the FRA online railroad portal, the railroad crossing nearest the project site is 811215N and is listed in Appendix D. The combination of reports in Appendix D was used to scientifically estimate the railroad modeling.

4.4 Railroad Vibration Modeling

The City's Municipal Code does not discuss vibration standards. Therefore, the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment*, (Washington D.C., 2006) was utilized to assess potential vibration impact from the adjacent rail line. The FTA Manual provides recommended vibration thresholds, and reference data for assessing probable ground-borne vibration near railroad or other fixed guide-way transportation systems. Typical levels of ground-borne vibrations are shown in Exhibit C. A summary of the ground-borne vibration criteria is included in Exhibit D from the FTA report.

The FTA Manual recommends a residential vibration velocity standard in decibels (VdB) of 80 VdB (re. 0.000001 inches per second) where there are fewer than 70 vibration events per day. The projected future track utilization would be approximately 16 freight events. The manual suggests that a vibration impact zone of 200 feet may be present for train movements at 60-70 miles per hour (mph). For slower speed movement, the impact distance is much smaller.

Figure 10-1 of the FTA Manual (Appendix E) shows a reference vibration level of 90 VdB at 25 feet from the track centerline for a heavy locomotive traveling at 50 mph, as indicated below.

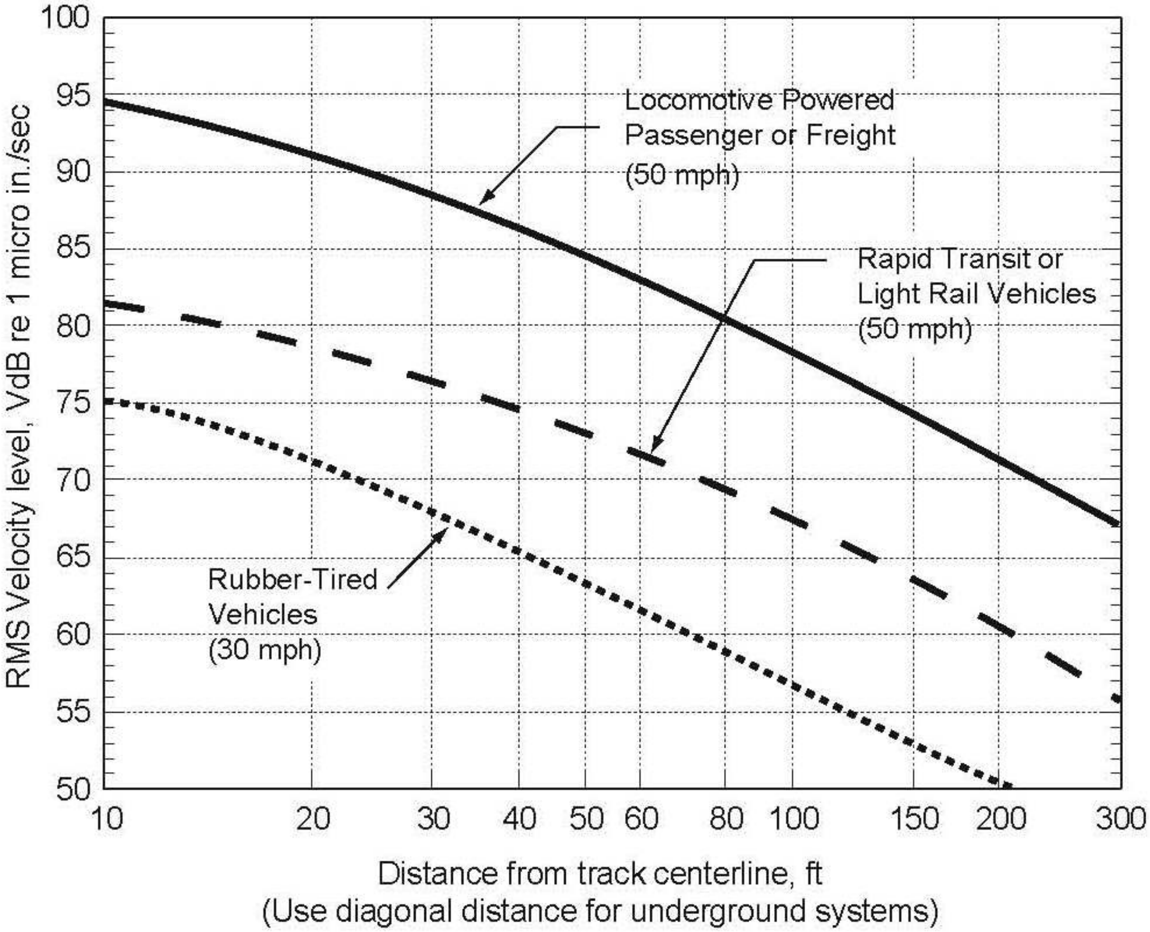

Figure 10-1. Generalized Ground Surface Vibration Curves

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5.0 Future Noise Environment Impacts and Mitigation

5.1 Future Exterior Noise

This assessment analyzes the traffic noise impacts from Long Beach Freeway (SR-710) and the rail line noise impacts from the adjacent railroad tracks to the proposed project site and compares the results to the City's Noise Standards. The analysis details the estimated vibration levels, exterior and interior noise levels, and mitigation measures.

5.1.1 Traffic Source Noise

Traffic noise along the Long Beach Freeway (SR-710) will be one of the main sources of noise impacting the project site and the surrounding area. Table 2 indicates the estimated future exterior noise levels for the first row of units facing the subject freeway at the project site. It is anticipated that the first row residential units facing the subject roadways will experience an exterior noise level of 48.9 dBA CNEL. This impact is considered less than significant.

5.1.2 Rail Line Source Noise

Railroad noise from the tracks south of the project site will be the other main source of noise impacting the southern portion of the project site and the surrounding area. Table 3 indicates the estimated future exterior noise levels for the units facing the railroad tracks at the project site. As previously discussed in Section 1.2 of the report, the southern border of the site has an uphill grade, with an approximate 10-foot wall at the top of the slope. It is anticipated that the first row residential units facing the subject rail line will experience an exterior noise level of 57.6 dBA CNEL at 100 feet from the railroad tracks. This impact is considered less than significant.

5.1.3 Train Vibration Analysis

The projected vibration impact for heavy locomotive operations is outlined in Table 4. The vibration impact will vary depending on the speed of the train and the respective distance to the sensitive receiver location. As demonstrated by the shaded area in Table 4 the vibration impact will range from 70-74 VdB. Exhibit D shows that the vibration standard set by the FTA is 80 VdB. It is estimated that at freight operations traveling at 20-30 mph (at 2 operations per day) will have a vibration impact of approximately 70 VdB at 100 feet. According to the FTA Manual, up to 30 events could occur per day without exceeding the vibration threshold. Therefore, the impact is considered less than significant.

5.2 Future Interior Noise

The future interior noise level was calculated for the sensitive receptor locations using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level. Tables 5 and 6 indicate the interior noise levels for the project site. The interior noise level will range from 36.9 to 52.3 dBA CNEL with the windows open and 28.9 to 44.3 with the windows closed.

To meet the City's interior 45 dBA CNEL standard, a "windows closed" condition is required for all lots facing the subject roadway and the rail line. Exhibit E indicates the required mitigation measures and which units require a "windows closed" condition.

5.3 Summary of Mitigation Measures

The recommended mitigation measures for the project are indicated in Exhibit E. In order to comply with the City of Long Beach's Noise Criteria the project must incorporate the following recommendations into the project design:

First Floor and Second Floor – First Row Residential Units Facing SR-710 Freeway

- All first floor and second floor windows and sliding glass doors facing the SR-710 Freeway should utilize a minimum STC rating of 28.

First Floor and Second Floor – First Row Residential Units Facing Union Pacific Railroad

- All first floor and second floor windows and sliding glass doors facing the adjacent rail line should utilize a minimum STC rating of 30.

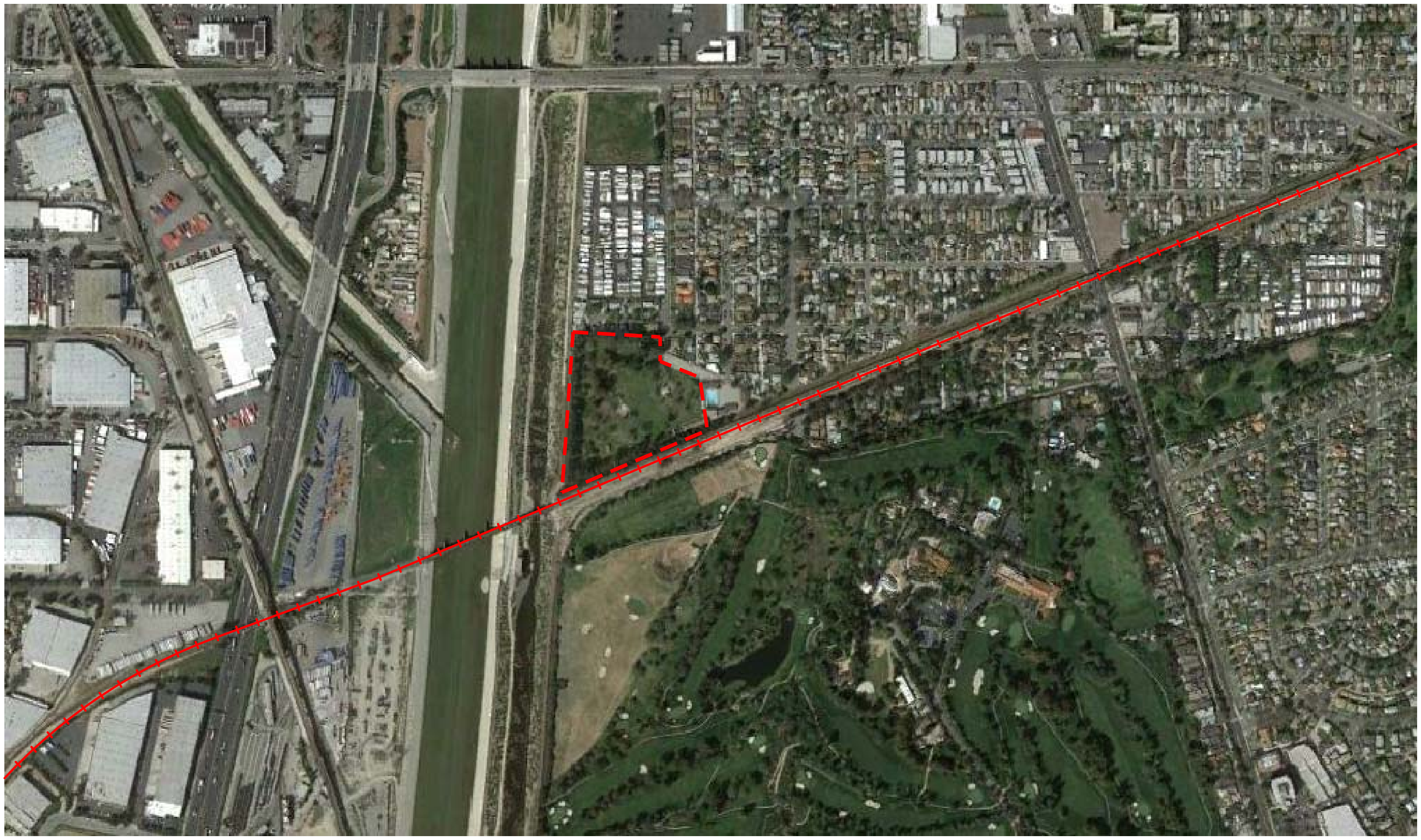
Remaining Residential Units – Second Row

- All other windows and sliding glass doors on project site should utilize a minimum STC rating of 25.

Exhibits

Exhibit A

Location Map



Legend:

- - - = Site Boundary

-+-+- = Union Pacific Rail Line

N

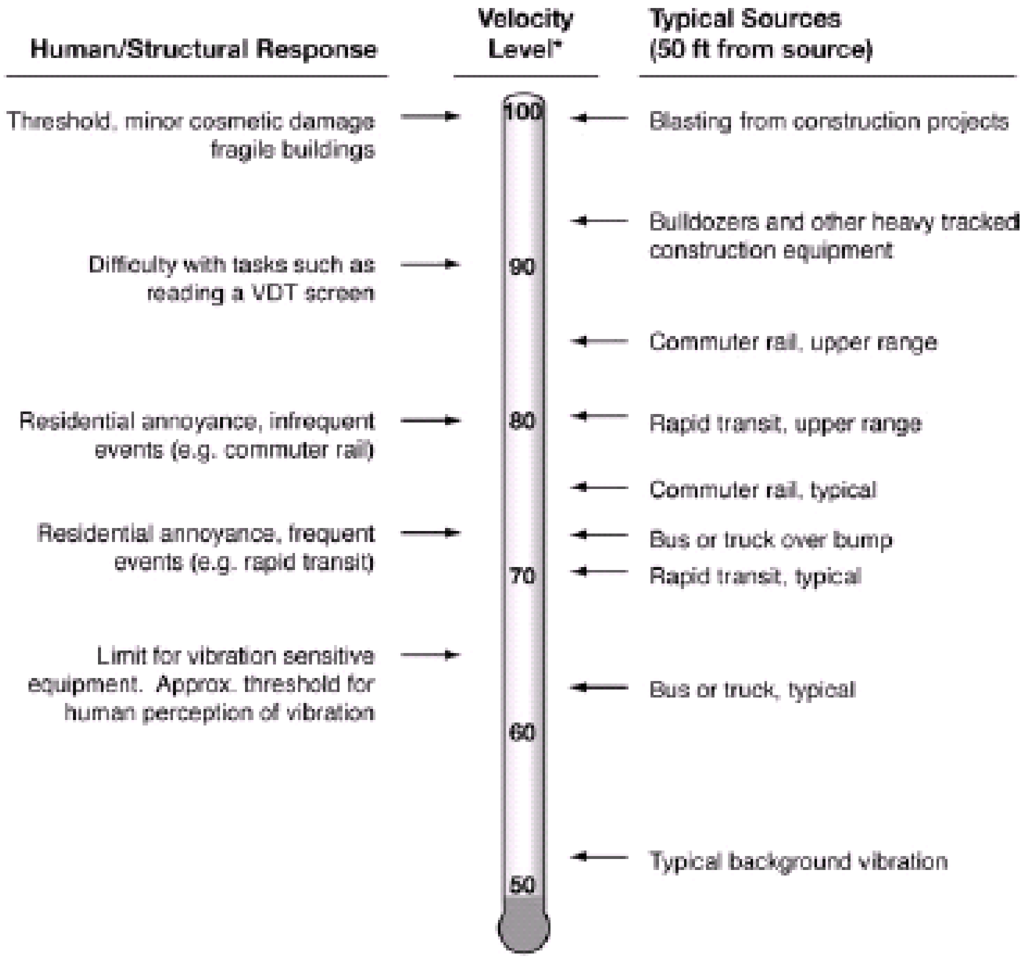
Exhibit B

Site Plan

N

Exhibit C

Typical Levels of Ground-Borne Vibration



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Figure 7-3. Typical Levels of Ground-Borne Vibration

N

Exhibit D

FTA Ground-Borne Vibration and Noise Criteria

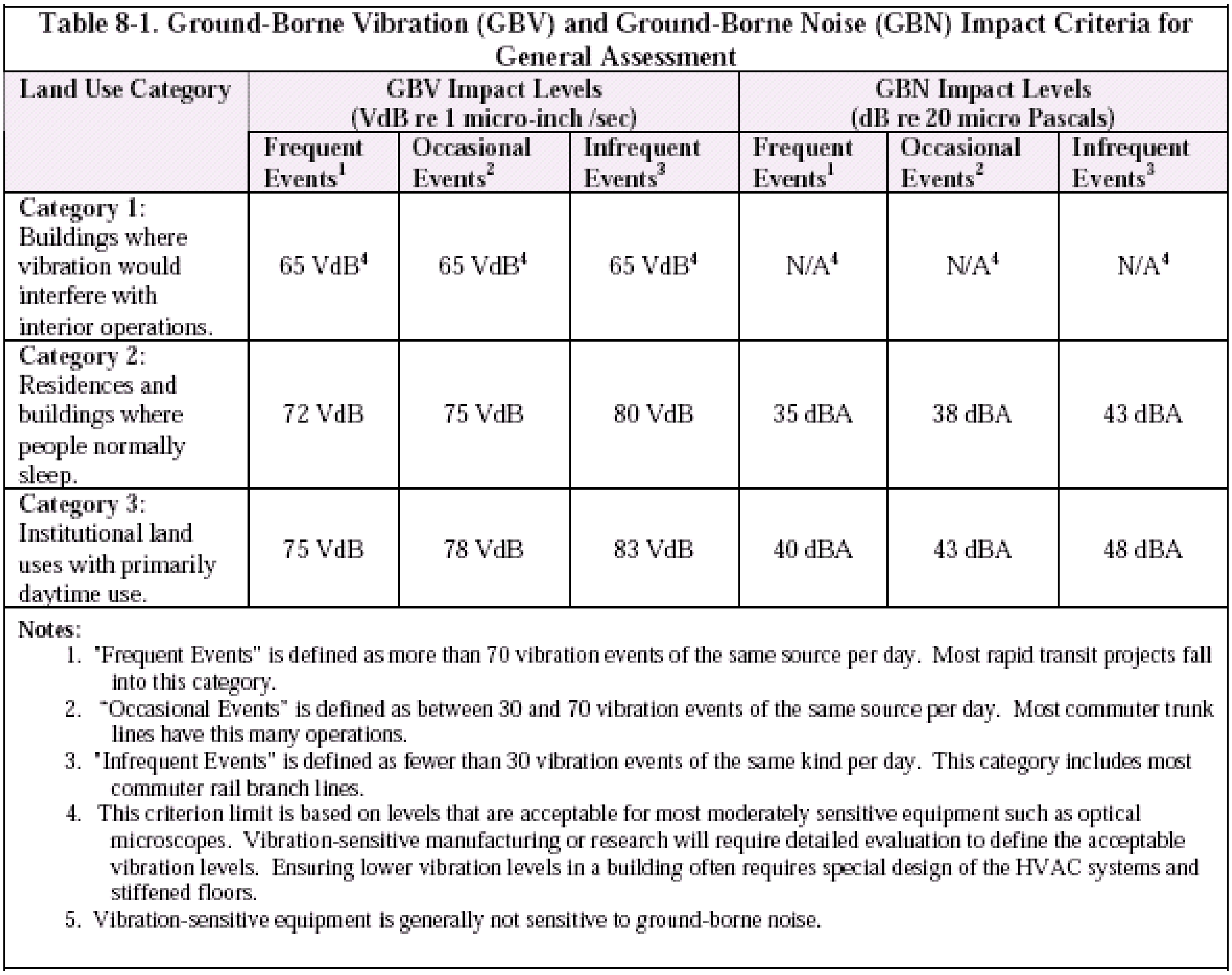


Table 8-1. Ground-Borne Vibration (GBV) and Ground-Borne Noise (GBN) Impact Criteria for General Assessment

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch /sec)			GBN Impact Levels (dB re 20 micro Pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

N

RK engineering group, inc.

Exhibit E

Recommendations

First and Second Floor -
First Row Residential Units Facing SR-710 Freeway:

All first floor and second floor windows and sliding glass doors facing the SR-710 freeway should utilize a minimum STC rating of 28. To meet the City's interior 45 dBA CNEL standard, a "windows closed" condition is required.

First and Second Floor -
First Row Residential Units Facing Union Pacific Railroad:

All first floor and second floor windows and sliding glass doors facing the adjacent rail line should utilize a minimum STC rating of 30. To meet the City's interior 45 dBA CNEL standard, a "windows closed" condition is required.

Remaining Residential Units - Second Row:

All other windows and slide glass doors on project site should utilize a minimum STC rating of 25.

Tables

TABLE 1

Roadway Parameters and Vehicle Distribution

Interstate 710 Roadway Parameters

Roadway	Classification	Lanes	Buildout (ADT)[1]	Speed (MPH)	Site Conditions
State Route 710 Freeway	Freeway	8	179,000	65	Soft

Interstate 710 Vehicle Distribution (Truck Mix)[2]

Motor-Vehicle Type	Daytime % (7 AM to 7 PM)	Evening % (7 PM to 10 PM)	Night % (10 PM to 7 AM)	Total % of Traffic Flow
Automobiles	70.5	19.3	10.2	85.74
Medium Trucks	75.0	6.3	18.7	4.96
Heavy Trucks	75.0	6.5	18.5	9.30

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[1] Source: Caltrans 2011 AADT Volumes obtained from Caltrans Website (see Appendix B).

[2] SR-710 vehicle mix is based on Caltrans 2011 Annual Average Daily Traffic Volumes (Appendix B).

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TABLE 2

Future Exterior Noise Levels (dBA CNEL)[1]

Exterior (Ground Level) Study Locations	Unmitigated Exterior Noise Impacts From State Route 710 Freeway	Noise Barrier Height (in feet)[2]	Final Projected Exterior Noise Level
First Row Units Facing 710 Freeway	48.9	- -	48.9

---

[1] Exterior noise levels calculated to backyard.

[2] "- -" indicates noise levels from adjacent roadways are below City standard and therefore no mitigation is required

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TABLE 3

Projected Exterior Noise Levels Along Rail Line (dBA CNEL)[1]

Rail Line	Operations per Day	CNEL at Observer Location (dBA)[2]	Noise Level at Specified Distance (dBA CNEL)[3]			
	Freight		100 (ft)	200 (ft)	400 (ft)	800 (ft)
Union Pacific Rail Line	16	62.3	57.6	54.1	50.1	45.6

---

[1] Scenario assumes existing wall is to remain to shield residential units from rail line noise. Existing wall is located approximately 25 feet from the rail line, and is approximately 10 feet high.

[2] Noise levels calculated at 5 feet above ground level.

[3] Noise level is projected approximately 100 feet from centerline of track. Refer to Appendix F for projected noise level calculations.

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TABLE 4

Projected Vibration for Heavy Locomotive Operation[1]

Speed[2]	Vibration @ 25 ft (FTA Manual)	Speed Correction Factor	Vibration Level (VdB) Distance from Centerline of Track (ft)[3]					
			12.5	25	37.5	50	75	100
10	76	-14	82	76	73	70	67	64
20	82	-8	88	82	79	76	73	70
30	86	-4	92	86	83	80	77	74
40	88	-2	94	88	85	82	79	76
50	90	0	96	90	87	84	81	78
60	92	2	98	92	89	86	83	80

---

[1] Table is based on reference vibration level of 90 VdB at 25 feet from track centerline as indicated in FTA Manual (Appendix E).

[2] Referenced vibration level: Speed 50 mph, 90 VdB at a distance of 25 feet from track centerline.

[3] Shaded area corresponds to the vibration impact range based on speed and distance.

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TABLE 5

Future First Floor Interior Noise Levels (dBA CNEL)

Receiver Location	Noise Impacts at First Floor Building Façade	Interior Noise Reduction Required to Meet Interior Noise Standard of 45 dBA CNEL	First Floor Interior Noise Level w/ Standard Windows (STC $\geq$ 25)	
			Windows Open[1]	Windows Closed[2]
First Row Units Facing 710 Freeway	48.9	3.9	36.9	28.9

---

[1] A minimum of 12 dBA noise reduction is assumed with a "windows open" condition.

[2] A minimum of 20 dBA noise reduction is assumed with a "windows closed" condition.

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TABLE 6

Future Second Floor Interior Noise Levels (dBA CNEL)

Receiver Location	Noise Impacts at Second Floor Building Façade	Interior Noise Reduction Required to Meet Interior Noise Standard of 45 dBA CNEL	Second Floor Interior Noise Level w/ Standard Windows (STC $\geq$ 25)	
			Windows Open[1]	Windows Closed[2]
First Row Units Facing 710 Freeway	64.3	19.3	52.3	44.3

---

[1] A minimum of 12 dBA noise reduction is assumed with a "windows open" condition.

[2] A minimum of 20 dBA noise reduction is assumed with a "windows closed" condition.

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Appendices

Appendix A

City of Long Beach
Municipal Code Noise Section

8.80.130 Disturbing noises prohibited.

A. Notwithstanding any other provision of this Chapter, and in addition thereto, it is unlawful for any person to willfully make or continue, or cause to be made or continued, a loud, unnecessary or unusual noise which disturbs the peace and quiet of any neighborhood or which causes any discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

B. The standards which shall be considered in determining whether a violation of the provisions of this Section exist shall include, but not be limited to the following:

1. The sound level of the objectionable noise;
2. The sound level of the ambient noise;
3. The proximity of the noise to residential sleeping facilities;
4. The nature and zoning of the area within which the noise emanates;
5. The density of the inhabitation of the area within which the noise emanates;
6. The time of day or night the noise occurs;
7. The duration of the noise and its tonal, informational or musical content;
8. Whether the noise is continuous, recurrent, or intermittent;
9. Whether the noise is produced by a commercial or noncommercial activity.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.4)

8.80.140 Noise measurement procedure.

The measurement procedure presented in this Section assumes that personnel performing the noise measurements have been trained in the use of the instruments and in interpretation of measured data. Upon receipt of a complaint from a citizen, the Noise Control Officer, or his agent, equipped with sound level measurement equipment satisfying the requirements specified in Section 8.80.020, shall investigate the complaint. The investigation shall consist of a measurement and the gathering of data to adequately define the noise problem as specified in the California Office of Noise Control Model Enforcement Manual, and shall include the following:

A. Nonacoustic Data.

1. Type of noise source;
2. Location of noise source relative to complainant's property;
3. Time period during which noise source is considered by complainant to be intrusive;
4. Total duration of noise produced by noise source;
5. Date and time of noise measurement survey.

B. Procedure. Utilizing the A weighting scale of the sound level meter and the slow meter response, the noise level shall be measured at a position or positions along the complainant's property line closest to the noise source or at the location along the boundary line where the noise level is at a maximum. In general, the microphone shall be located five feet (5') above the ground; ten feet (10') or more from the nearest reflective surface, where possible. However, in those cases where another elevation is deemed appropriate, the latter shall be utilized. If the noise complaint is related to interior noise levels, interior noise measurements shall be made at a point at least four feet (4') from the wall, ceiling or floor nearest the noise source with windows in the normal seasonal configuration. Calibration of the instrument being used shall be performed immediately prior to and following the recording of any noise data utilizing the acoustic calibrator.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.5)

8.80.150 Exterior noise limits—Sound levels by receiving land use district.

A. The noise standards for the various land use districts identified by the noise control office as presented in Table A in Section 8.80.160 shall, unless otherwise specifically indicated, apply to all such property within a designated district.

B. No person shall operate or cause to be operated any source of sound at any location within the incorporated limits of the City or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured from any other property, either incorporated or unincorporated, to exceed:

1. The noise standard for that land use district as specified in Table A in Section 8.80.160 for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard plus five (5) decibels for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard plus ten (10) decibels for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard plus fifteen (15) decibels for a cumulative period of more than one (1) minute in any hour; or
5. The noise standard plus twenty (20) decibels or the maximum measured ambient, for any period of time.

C. If the measured ambient level exceeds that permissible within any of the first four (4) noise limit categories in Subsection B of this Section, the allowable noise exposure standard shall be increased in five (5) decibels increments in each category as appropriate to encompass or reflect the ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category in Subsection B of this Section, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

D. If the measurement location is on a boundary between two (2) different districts, the noise level limit applicable shall be the arithmetic mean of the two (2) districts.

E. If possible, the ambient noise shall be measured at the same location along the property line utilized in Subsection B of this Section, with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, then the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance such that the offending noise from the source is inaudible. If the difference between the noise levels with noise source operating and not operating is six (6) decibels or greater, then the noise measurement of the alleged source can be considered valid with a small correction applied to account for the contribution of the ambient noise. The correction is to be applied in accordance with data shown in Table B in Section 8.80.160

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.6 (a))

8.80.160 Exterior noise limits—Correction for character of sound.

In the event that alleged offensive noise contains a steady audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting or contains music or speech conveying informational content, the standard limits set forth in Table A shall be reduced by five (5) decibels.

Table A

EXTERIOR NOISE LIMITS

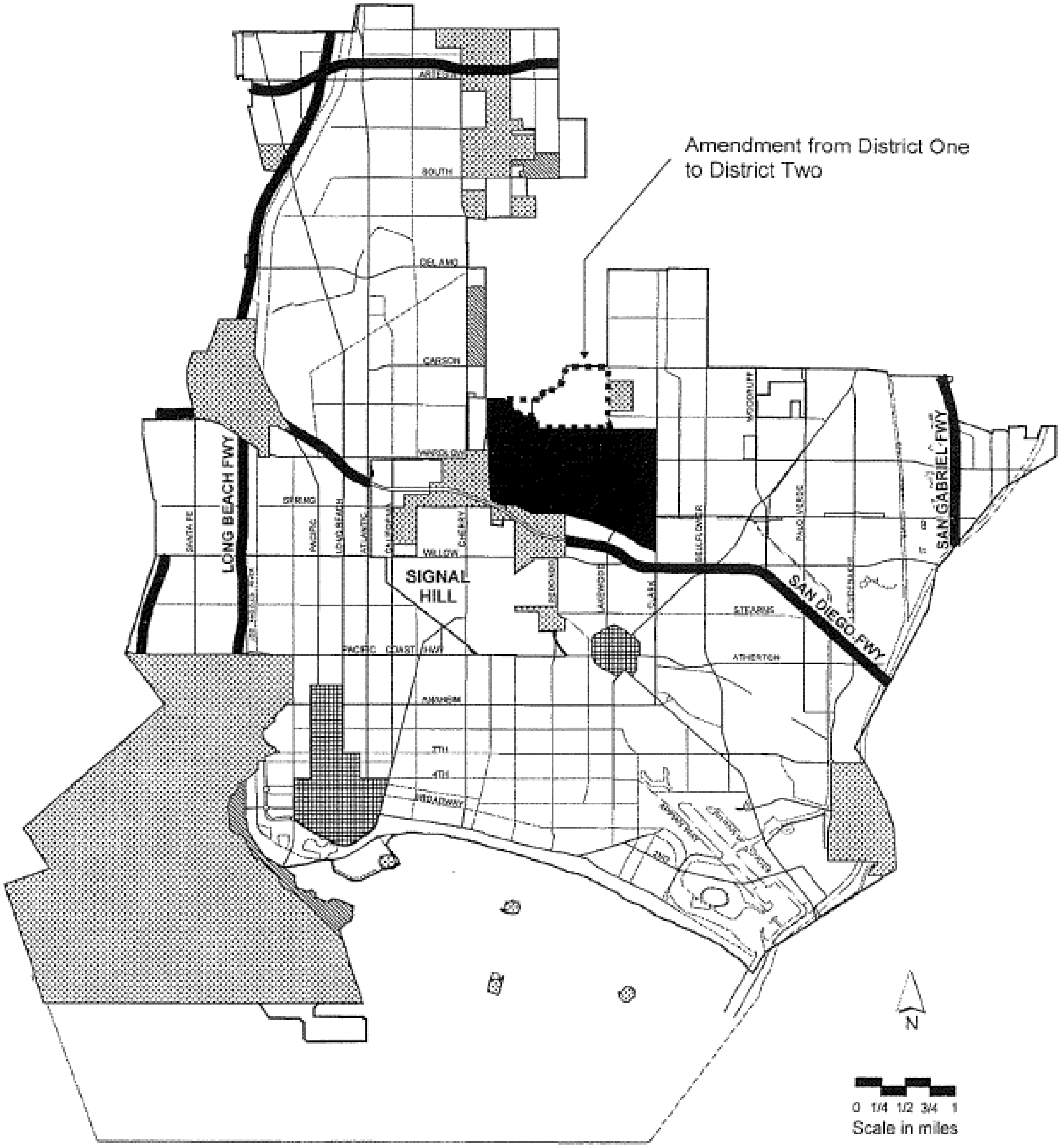
Receiving Land Use District*	Time Period	Noise Level** (dBA)
District One	Night:	
	10:00 p.m.—7:00 a.m.	45
	Day:	
	7:00 a.m.—10:00 p.m.	50
District Two	Night:	
	10:00 p.m.—7:00 a.m.	55
	Day:	
	7:00 a.m.—10:00 p.m.	60
District Three	Any time	65
District Four	Any time	70
District Five	Regulated by other agencies and laws	
*District One:	Predominantly residential with other land use types also present	
District Two:	Predominantly commercial with other land use types also present	
Districts Three and Four:	Predominantly industrial with other land types use also present	
District Five:	Airport, freeways and waterways regulated by other agencies	

** Districts Three and Four limits are intended primarily for use at their boundaries rather than for noise control within those districts.

Table B
BACKGROUND NOISE CORRECTION

Difference between total noise and background noise alone (decibels)	Amount to be subtracted from
6—8	1
9—10	.5

NOISE DISTRICT MAP



Amendment from District One to District Two

* Noise at Long Beach Airport is regulated by State & Federal Laws. It is the responsibility of the Noise Control Officer to address complaints filed against aircraft noise, report all violations to proper enforcing agencies and the Long Beach City Council.

District 1 - Remainder of the City ☐
District 2 ▦
District 3 ▨
District 4 ░
District 5 - Preempted by other Agencies* ■

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(ORD-09-0030, § 1(exh. A), 2009; Ord. C-7959 § 1 (exh. A), 2004; Ord. C-5371 § 1 (part), 1977: prior code § 4430.6(b))

8.80.170 Interior noise limits—Maximum sound levels.

A. The interior noise standards for various land use districts as presented in Table C shall apply, unless otherwise specifically indicated, within structures located in designated zones with windows in their normal seasonal configuration.

TABLE C

Receiving Land Use District	Type of Land Use	Time Interval	Allowable Interior Noise Level (dBA)
All	Residential	10:00 p.m.—7:00 a.m. 7:00 a.m.—10:00 p.m.	35 45
All	School	7:00 a.m.—10:00 p.m. (While school is in session)	45
Hospital, designated quiet zones and noise sensitive zones		Any time	40

B. No person shall operate, or cause to be operated, any source of sound indoors at any location within the incorporated limits of the City or allow the creation of any indoor noise which causes the noise level when measured inside the receiving dwelling unit to exceed:

1. The noise standard for that land use district as specified in Table C for a cumulative period of more than five (5) minutes in any hour; or
2. The noise standard plus five decibels (5 dB) for a cumulative period of more than one (1) minute in any hour; or
3. The noise standard plus ten decibels (10 dB) or the maximum measured ambient, for any period of time.

C. If the measured indoor ambient level exceeds that permissible within any of the first two (2) noise limit categories in this Section, the allowable noise exposure standard shall be increased in five decibel (5 dB) increments in each category as appropriate to reflect the indoor ambient noise level. In the event the indoor ambient noise level exceeds the third noise limit category, the maximum allowable indoor noise level under said category shall be increased to reflect the maximum indoor ambient noise level.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.7(a))

8.80.180 Interior noise limits—Correction for character of sound.

In the event the alleged offensive noise contains a steady audible tone such as a whine, screech or hum, or is a repetitive noise such as hammering or riveting, or contains music or speech conveying information content, the standard limits set forth in Table C in Section 8.80.170 shall be reduced by five decibels (5 dB).

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.7(b))

8.80.190 Noise disturbances—Prohibited.

No person shall unnecessarily make, continue or cause to be made or continued, any noise disturbance.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.8(a))

8.80.200 Noise disturbances—Acts specified.

The following acts, and the causing or permitting thereof, are declared to be in violation of this Chapter:

A. Radios, television sets, musical instruments and similar devices. Operating, playing or permitting the operation or playing of any radio, television set, phonograph, drum, musical instrument, or similar device which produces or reproduces sound:
   1. Between the hours of ten p.m. and seven a.m. the following day in such a manner as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of Sections 8.80.150 or 8.80.170 except for activities for which a variance has been issued by the noise control office,
   2. In such a manner as to exceed the levels set forth in Table A in Section 8.80.160, measured at a distance of at least fifty feet (50') (fifteen (15) meters) from such device operating on a public right-of-way or public space;

B. Loudspeakers (amplified sound). Using or operating for any purpose any loudspeaker, loudspeaker system, or similar device between the hours of ten p.m. and seven a.m. the following day, such that the sound therefrom creates a noise disturbance across a residential real property line, or at any time violates the provisions of Sections 8.80.150 or 8.80.170, except for any noncommercial public speaking, public assembly or other activity for which a variance has been issued by the noise control office;

C. Street sales. Offering for sale, selling anything or advertising by shouting or outcry within any residential or commercial area or noise sensitive zone of the City except by variance issued by the noise control office. The provisions of this subsection shall not be construed to prohibit the selling by outcry of merchandise, food and beverages at licensed sporting events, parades, fairs, circuses or other similar licensed public entertainment events;

D. Animals and birds. Owning, possessing or harboring any animal or bird which frequently or for continued duration howls, barks, meows, squawks, or makes other sounds which create a noise disturbance across a residential or commercial real property line or within a noise sensitive zone. This provision shall not apply to public zoos;

E. Loading and unloading. Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of ten p.m. and seven a.m. the following day in such a manner as to cause a noise disturbance across a residential real property line or at any time to violate the provisions of Sections 8.80.150 and 8.80.170

F. Repealed;

G. Vibration. Operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') (forty-six (46) meters) from the source if on a public space or public right-of-way. For the purposes of this subsection, "vibration perception threshold" means the minimum ground or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration by such directed means as, but not limited to, sensation by touch or visual observation of moving objects. The perception threshold shall be presumed to be .001 g's in the frequency range 0—30 hertz and .003 g's in the frequency range between thirty and one hundred hertz;

H. Explosives, firearms and similar devices. Using or firing explosives, firearms, firecrackers or similar devices such that the sound therefrom creates a noise disturbance across a real property line, or within a noise sensitive zone, public space or public right-of-way, without first obtaining a variance issued by the noise control office or other appropriate regulatory agency;

I. Powered model vehicles. Operating or permitting the operation of powered model vehicles:

    1. Between the hours of seven p.m. and seven a.m. the following day so as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of Sections 8.80.150 or 8.80.170

    2. In such a manner as to exceed the levels set forth in Table A in Section 8.80.160 measured at a distance not less than one hundred feet (100') (thirty (30) meters) from any point on the path of a vehicle operating on public space or public right-of-way;

J. Stationary nonemergency signaling devices.

    1. Sounding or permitting the sounding of any electronically amplified signal from any stationary bell, chime, siren, whistle, or similar device, intended primarily for nonemergency purposes, from any place, for more than ten (10) seconds in any hourly period,

    2. Houses of religious worship and chimes in the civic center shall be exempt from the operation of this provision,

    3. Sound sources covered by this provision and not exempted under Subsection 8.80.200.J.2 of this Section may be exempted by a variance issued by the noise control office;

K. Emergency signaling devices.

    1. The intentional sounding or permitting the sounding outdoors of any fire, burglar or civil defense alarm, siren, whistle or similar stationary emergency signaling device, except for emergency purposes or for testing, as provided in Subsection 8.80.200.K.2 of this Section,

    2. a. Testing of a stationary emergency signaling device shall not occur before seven a.m. or after seven p.m. Any such testing shall only use the minimum cycle test time. In no case shall such test time exceed ten (10) seconds,

        b. Testing of the complete emergency signaling system, including the functioning of the signaling device and the personnel response to the signaling device shall not occur more than once in each calendar month. Such testing shall not occur before seven a.m. or after ten p.m. The time limit specified in Subsection 8.80.200.K.2.a of this Section shall not apply to such complete system testing,

    3. Sounding or permitting the sounding of any exterior burglar or fire alarm unless such alarm is automatically terminated within fifteen (15) minutes of activation;

L. Noise sensitive zones.

    1. Creating or causing the creation of any sound within any noise sensitive zone, so as to exceed the specified land use noise standards set forth in Sections 8.80.150 and 8.80.170, or

    2. Creating or causing the creation of any sound within or adjacent to any noise sensitive zone containing a hospital, nursing home, school, court or other designated use so as to interfere with the functions of such activity or annoy the patients or participants of such activity;

M.

Domestic power tools.

1. Operating or permitting the operation of any mechanically powered saw, sander, drill, grinder, lawn or garden tool, or similar tool between ten p.m. and seven a.m. the following day so as to create a noise disturbance across a residential or commercial real property line,
2. Any motor, machinery, pump, etc., shall be sufficiently enclosed or muffled and maintained so as not to create a noise disturbance,
3. Operating leaf blowers, consisting of portable power equipment used in any landscape maintenance, construction, property repair or property maintenance for the purpose of blowing, dispersing or redistributing dust, dirt, leaves, grass clippings, cuttings, or trimmings from plants, trees or other debris is unlawful if operated within any residential area or in any nonresidential area within four hundred feet (400') of any residential area in the City between the hours after eight p.m. and before eight a.m. Monday through Friday, after five p.m. and before nine a.m. on Saturdays, and after five p.m. and before eleven a.m. on Sundays and legal holidays. Notwithstanding the provisions of Section 8.80.380, violations of this Subsection 8.80.200.M.3 shall be infractions except as specifically provided in this Section. The first violation in any one (1) year period shall be subject to a fine of fifty dollars ($50.00); a second violation in any one (1) year period shall be subject to a fine of seventy-five dollars ($75.00); a third violation in any one (1) year period shall be subject to a fine of one hundred dollars ($100.00). A fourth or subsequent violation of this Subsection in any one (1) year period may be filed as a misdemeanor. Notwithstanding the provisions of any other Section in this Chapter, the provisions of this subsection may be enforced by a Police Officer;

N. Air-conditioning or air refrigerating equipment. Operating or permitting the operation of any air-conditioning or air refrigerating equipment in such a manner as to exceed any of the following sound levels measured as specified in the American Society of Heating, Refrigeration and Air Conditioning Engineers Code of Recommended Practices:

Measurement Location	Units Installed Before 1-1-80 dB (A)	Units Installed On Or After 1-1-80 dB (A)
Any point on neighboring property line, five feet above grade level, no closer than three feet from any wall	60	55
Center of neighboring patio five feet above grade level, no closer than three feet from any wall	55	50
Outside the neighboring living area window nearest the equipment location, not more than three feet from the window opening, but at least three feet from any other surface	55	50

In case of conflict, the interior noise standards as specified in Section 8.80.170 shall nonetheless apply;

O. Places of public entertainment. Operating or permitting to be operated any loudspeaker or other source of sound in any place of public entertainment that exceeds the levels shown in Table D at any point normally occupied by a customer, without a conspicuous and legible sign stating

"WARNING, SOUND LEVELS WITHIN MAY CAUSE PERMANENT HEARING

IMPAIRMENT."

Table D
MAXIMUM LEVELS ALLOWED IN PLACES
OF PUBLIC ENTERTAINMENT

Duration Per Day Continuous Hours	Noise Level dB (A)
8	85
6	86
4	88
3	89
2	91
1 ½	92
1	94
½	97
¼ or less	100

P. Tampering. The following acts or the causing thereof are prohibited:

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any noise control device or element of design or noise label of any product identified under Subsection 8.80.040.G and Subsection 8.80.050.C. The Noise Control Officer may, by regulation, list those acts which constitute violation of this provision,
2. The use of a product, identified under Subsection 8.80.040.G and Subsection 8.80.050.C, which has had a noise control device or element of design or noise label removed or rendered inoperative with knowledge that such action has occurred.

(Ord. C-7745 § 1, 2001; Ord. C-7175 § 1, 1994; Ord. C-6474 § 2, 1988; Ord. C-6036 § 1, 1984; Ord. C-5371 § 1 (part), 1977: prior code § 4430.8(b))

8.80.202 Construction activity—Noise regulations.

The following regulations shall apply only to construction activities where a building or other related permit is required or was issued by the Building Official and shall not apply to any construction activities within the Long Beach harbor district as established pursuant to Section 201 of the City Charter.

A. Weekdays and federal holidays. No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity which produce loud or unusual noise which annoys or disturbs a reasonable person of normal sensitivity between the hours of seven p.m. and seven am. the following day on weekdays, except for emergency work authorized by the Building Official. For purposes of this Section, a federal holiday shall be considered a weekday.

B. Saturdays. No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity which produce loud or unusual noise which annoys or disturbs a reasonable person of normal sensitivity between the hours of seven p.m. on Friday and nine a.m. on Saturday and after six p.m. on Saturday, except for emergency work authorized by the Building Official.

C. Sundays. No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity at any time on Sunday, except for emergency work authorized by the Building Official or except for work authorized by permit issued by the Noise Control Officer.

D. Owner's/employer's responsibility. It is unlawful for the landowner, construction company owner, contractor, subcontractor or employer of persons working, laboring, building, or assisting in construction to permit construction activities in violation of provisions in this Section.

E. Sunday work permits. Any person who wants to do construction work on a Sunday must apply for a work permit from the Noise Control Officer. The Noise Control Officer may issue a Sunday work permit if there is good cause shown; and in issuing such a permit, consideration will be given to the nature of the work and its proximity to residential areas. The permit may allow work on Sundays, only between nine a.m. and six p.m., and it shall designate the specific dates when it is allowed.

F. Enforcement. Notwithstanding the provisions of Sections 8.80.370 and 8.80.380, this Section may be enforced by a Police Officer.

Any person who violates any provision of this Section is guilty of a misdemeanor and shall be fined in an amount not to exceed five hundred dollars ($500.00), or be imprisoned for a period not to exceed one hundred eighty (180) days, or by both such fine and imprisonment. Each day that a violation occurs shall constitute a separate offense and shall be punishable as such.

Whenever an employee is prosecuted for a violation of this noise control ordinance, the court shall, at the request of the employee, take appropriate action to make the landowner, construction company owner, contractor, subcontractor or employer a codefendant.

(Ord. C-6488 § 1, 1988; Ord. C-6474 § 1, 1988)

8.80.290 Exemption—From exterior noise standards.

The provisions of Section 8.80.150 shall not apply to activities covered by the following Sections:

A. Section 8.80.200 C, street sales;
B. Section 8.80.200 D, animals and birds;
C. Section 8.80.200 J, stationary nonemergency signaling devices;
D. Section 8.80.200 K, emergency signaling devices;
E. Section 8.80.200 M, domestic power tools;
F. Section 8.80.200 N, air conditioning or air refrigerating equipment; and
G. Section 8.80.210, refuse collection vehicles.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10 (e))

Appendix B

2011 Annual Average Daily Truck Traffic on California State Highway System

2011 ADT

RTE	DIST	CNTY	POST MILE	LEG	DESCRIPTION	VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOT VEH	TRUCK AADT TOTAL By Axle				% TRUCK AADT By Axle				EAL 2-WAY -1000	YEAR VER/ EST
									2	3	4	5+	2	3	4	5+		
680	4	CC	21.191	B	JCT. RTE. 4	126000	3402	2.7	1764	507	120	1011	51.84	14.91	3.53	29.72	475	00V
680	4	CC	21.191	A	JCT. RTE. 4	117000	7968	6.81	4132	920	241	2675	51.86	11.54	3.03	33.57	1188	00V
680	4	SOL	R2.819	B	LAKE HERMAN ROAD	58000	3091	5.33	1032	223	127	1710	33.38	7.22	4.1	55.3	665	00V
680	4	SOL	R2.819	A	LAKE HERMAN ROAD	59000	3162	5.36	1136	272	115	1639	35.93	8.6	3.64	51.83	647	00V
680	4	SOL	13.126	B	CORDELIA WYE, JCT. RTE. 80	63000	3282	5.21	1152	286	271	1573	35.1	8.72	8.25	47.93	649	00V
710	7	LA	4.96	A	LONG BEACH, BEGIN ROUTE 710, LONG BEACH FREEWAY	57000	15954	27.99	1039	2728	78	12109	6.51	17.1	0.49	75.9	4476	11E
710	7	LA	6.881	B	LONG BEACH, JCT. RTE. 1, PACIFIC COAST HIGHWAY INTERCHANGE	129000	18937	14.68	2488	3202	286	12960	13.14	16.91	1.51	68.44	4895	11E
710	7	LA	6.881	A	LONG BEACH, JCT. RTE. 1, PACIFIC COAST HIGHWAY INTERCHANGE	149000	21873	14.68	2874	3699	330	14970	13.14	16.91	1.51	68.44	5654	11V
710	7	LA	9.41	B	LONG BEACH, JCT. RTE. 405, SAN DIEGO FREEWAY INTERCHANGE	164000	22419	13.67	2946	3791	339	15344	13.14	16.91	1.51	68.44	5795	11E
710	7	LA	9.41	A	LONG BEACH, JCT. RTE. 405, SAN DIEGO FREEWAY INTERCHANGE	176000	25010	14.21	5085	3326	350	16249	20.33	13.3	1.4	64.97	6141	11E
710	7	LA	10.823	A	LONG BEACH, DEL AMO BOULEVARD INTERCHANGE	179000	25525	14.26	5189	3395	357	16584	20.33	13.3	1.4	64.97	6268	11V

AUTOS: 85.74%
MED TKS: 4.996%
HVY TKS: 9.264%

Appendix C

Long Beach Freeway (SR-710) Roadway Calculations

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: RIVERWALK
ROADWAY: STATE ROUTE 710 FREEWAY
LOCATION: 1ST ROW UNITS FACING 710 FREEWAY (1ST FLOOR)

JOB #: 2373-2013-01
DATE: 9-Oct-13
ENGINEER: M. Dickerson

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT = 179,000
SPEED = 65
PK HR % = 10
NEAR LANE/FAR LANE DIST 105
ROAD ELEVATION = 50.0
GRADE = 0.5 %
PK HR VOL = 17,900

RECEIVER INPUT DATA

RECEIVER DISTANCE = 1,510
DIST C/L TO WALL = 1,500
RECEIVER HEIGHT = 5.0
WALL DISTANCE FROM RECEIVER = 10
PAD ELEVATION = 45.0
ROADWAY VIEW: LF ANGLE= -90
RT ANGLE= 90
DF ANGLE= 180

SITE CONDITIONS

AUTOMOBILES = 15
MEDIUM TRUCKS = 15
HEAVY TRUCKS = 15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL= 5.0
AMBIENT= 0.0
BARRIER = 1 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.705	0.193	0.102	0.8574
MEDIUM TRUCKS	0.750	0.063	0.187	0.0496
HEAVY TRUCKS	0.750	0.065	0.185	0.0930

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	52.0	1509.08	- -
MEDIUM TRUCKS	54.0	1509.09	- -
HEAVY TRUCKS	58.0	1509.10	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	60.5	58.2	58.6	51.0	59.5	60.3
MEDIUM TRUCKS	54.3	52.2	47.5	47.4	54.7	55.0
HEAVY TRUCKS	60.5	58.4	53.8	53.6	60.9	61.2
NOISE LEVELS (dBA)	64.0	61.8	60.1	56.1	63.9	64.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	45.0	42.7	43.1	35.5	44.0	44.8
MEDIUM TRUCKS	38.9	36.8	32.1	32.0	39.3	39.6
HEAVY TRUCKS	45.1	43.0	38.4	38.2	45.5	45.8
NOISE LEVELS (dBA)	48.5	46.4	44.6	40.7	48.4	48.9

NOISE CONTOUR (FT)

NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	632	1361	2931	6315
LDN	588	1267	2730	5881

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: RIVERWALK
ROADWAY: STATE ROUTE 710 FREEWAY
LOCATION: 1ST ROW UNITS FACING 710 FREEWAY (2ND FLOOR)

JOB #: 2373-2013-01
DATE: 9-Oct-13
ENGINEER: M. Dickerson

NOISE INPUT DATA

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SPEED = 65
PK HR % = 10
NEAR LANE/FAR LANE DIST 105
ROAD ELEVATION = 50.0
GRADE = 0.5 %
PK HR VOL = 17,900

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DIST C/L TO WALL = 1,500
RECEIVER HEIGHT = 15.0
WALL DISTANCE FROM RECEIVER = 10
PAD ELEVATION = 45.0
ROADWAY VIEW: LF ANGLE= -90
RT ANGLE= 90
DF ANGLE= 180

SITE CONDITIONS

AUTOMOBILES = 15
MEDIUM TRUCKS = 15
HEAVY TRUCKS = 15
(10 = HARD SITE, 15 = SOFT SITE)

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MEDIUM TRUCKS	0.750	0.063	0.187	0.0496
HEAVY TRUCKS	0.750	0.065	0.185	0.0930

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	52.0	1509.11	- -
MEDIUM TRUCKS	54.0	1509.10	- -
HEAVY TRUCKS	58.0	1509.09	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	60.5	58.2	58.6	51.0	59.5	60.3
MEDIUM TRUCKS	54.3	52.2	47.5	47.4	54.7	55.0
HEAVY TRUCKS	60.5	58.4	53.8	53.6	60.9	61.2
NOISE LEVELS (dBA)	64.0	61.8	60.1	56.1	63.9	64.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	60.5	58.2	58.6	51.0	59.5	60.3
MEDIUM TRUCKS	54.3	52.2	47.5	47.4	54.7	55.0
HEAVY TRUCKS	60.5	58.4	53.8	53.6	60.9	61.2
NOISE LEVELS (dBA)	64.0	61.8	60.1	56.1	63.9	64.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	632	1361	2931	6315
LDN	588	1267	2730	5881

Appendix D

City of Carson General Plan and
Federal Railroad Administration (FRA) Report

sporting events and horns. These noise sources have the potential to temporarily disrupt the quietness of an area. Effective control of these noise sources cannot be accomplished through decibel standards, but instead may be accomplished through provisions in the Noise Ordinance.

3.3.4 RAIL LINE NOISE

The City of Carson is served by three railroads: Union Pacific Railroad (UPRR), Burlington Northern Santa Fe (BNSF) Railroad and the Metro Blue line. The UPRR runs two lines (San Pedro and Wilmington) along the extreme western portion of the City, as it converges on the Los Angeles City container transfer facility, which borders the west side of Long Beach. Several UPRR spur lines extend westward from the San Pedro and Wilmington lines into the central portion of Carson providing rail service to many of the major petroleum production companies. A UPRR line also runs within the right-of-way of the Dominguez Channel. A BNSF rail line traverses the southern portion of the City from the Alameda Street Corridor to the Harbor Freeway (I-110). The Metro Blue line crosses the extreme eastern section of the City, running north to downtown Los Angeles and south through Long Beach; no Blue Line stations are in the City.

Three UPRR lines run within the City of Carson: San Pedro line, Wilmington line, and Dominguez Channel line. The San Pedro line carries five trains each day. The Wilmington line, which runs parallel to the Alameda Corridor line and is the preferred route out of the harbor, operates 15 trains each day. The train(s) run approximately every three hours on the Wilmington line. In approximately three years, the San Pedro line will be the only UPRR line in operation. However, the Wilmington line will remain in place and serve as an auxiliary line. The Dominguez Channel line carries five (5) trains per day in each direction. However, when the trains are used for shipping coal, the line is utilized 10 to 15 times per day each direction.[1]

According to the *Alameda Corridor Environmental Impact Report*, dated January 1993, residents located immediately adjacent to the Alameda and Wilmington lines between Dominguez Street and 223rd Street are experiencing noise levels of 68 dBA CNEL, which exceeds the City exterior noise standard of 65 dBA CNEL by 3 dBA. However, this noise level includes vehicular-generated noise associated with Alameda Street.

The BNSF line is located in the southern portion of Carson and runs from Alameda Street west through light industrial and residential areas to the Harbor Freeway.[2] There are approximately 38 trains that utilize the BNSF rail line within the City of Carson each day. No acoustical data or additional operational information was provided by BNSF, regarding operations within the City of Carson.

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[1] Mr. Mike Irvine, General Superintendent of Transportation, Union Pacific Railroad, April 7, 1999.

[2] Train operation data associated with the BNSF Railroad line were provided by Mr. Don Cleveland, staff with BNSF, April 14, 1999.

U.S. DOT - CROSSING INVENTORY INFORMATION
AS OF 10/7/2013

Crossing No.:	811215N	Update Reason:	Changed Crossing	Effective Begin-Date of Record:	01/01/11
Railroad:	UP Union Pacific RR Co. [UP]			End-Date of Record:	
Initiating Agency	Railroad	Type and Positiion:	Public At Grade		

Part I Location and Classification of Crossing

Division:	WESTERN	State:	CA
Subdivision:	CALIFORNIA	County:	LOS ANGELES
Branch or Line Name:	SAN PEDRO	City:	In LONG BEACH
Railroad Milepost:	0018.05	Street or Road Name:	CARSON ST
RailRoad I.D. No.:	3A 18.05	Highway Type & No.:	NON FA
Nearest RR Timetable Stn:	CARSON	HSR Corridor ID:	
Parent Railroad:		County Map Ref. No.:	13V53
Crossing Owner:		Latitude:	33.8317586
ENS Sign Installed:		Longitude:	-118.2145250
Passenger Service:		Lat/Long Source:	Actual
Avg Passenger Train Count:	0	Quiet Zone:	No
Adjacent Crossing with Separate Number:			

Private Crossing Information:

Category:		Public Access:	Unknown
Specify Signs:		Specify Signals:	

	ST/RR A	ST/RR B	ST/RR C	ST/RR D
Railroad Use:				
State Use:				

Narrative:

Emergency Contact:	(800)848-8715	Railroad Contact:		State Contact:	(415)703-3722

Part II Railroad Information

Number of Daily Train Movements:				Less Than One Movement Per Day:	No
Total Trains:	6	Total Switching:	2	Day Thru:	4
Typical Speed Range Over Crossing: From	20 to 30 mph			Maximum Time Table Speed:	30
Type and Number of Tracks:	Main: 1	Other	0	Specify:	

Does Another RR Operate a Separate Track at Crossing?	No
Does Another RR Operate Over Your Track at Crossing?	No

U.S. DOT - CROSSING INVENTORY INFORMATION
Continued

Crossing 811215N

Effective Begin-Date of Record: 01/01/11

End-Date of Record:

Part III: Traffic Control Device Information

Signs:

Crossbucks:	0	Highway Stop Signs:	0		
Advanced Warning:	No	Hump Crossing Sign:			
Pavement Markings:	No Markings	Other Signs:	0	Specify:	
			0		

Train Activated Devices:

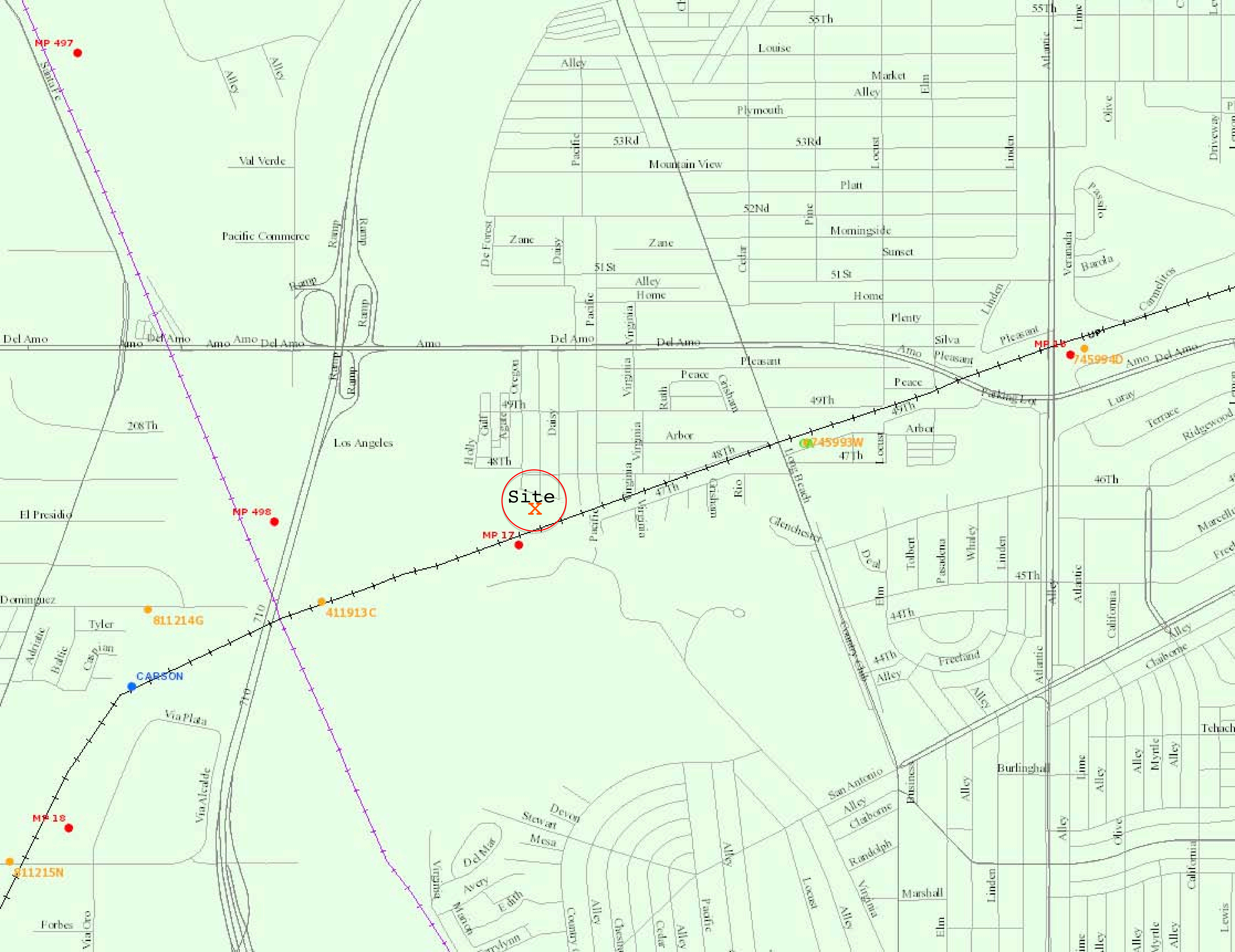
Gates:	4	4 Quad or Full Barrier:			
Mast Mounted FL:	0	Total Number FL Pairs:	0		
Cantilevered FL (Over):	0	Cantilevered FL (Not over):	0		
Other Flashing Lights:	0	Specify Other Flashing Lights:			
Highway Traffic Signals:	0	Wigwags:	0	Bells:	4
Other Train Activated Warning Devices:		Special Warning Devices Not Train Activated:			
Channelization:		Type of Train Detection:	Constant Warning Time		
Track Equipped with Train Signals?	No	Traffic Light Interconnection/Preemption:			

Part IV: Physical Characteristics

Type of Development:	Open Space	Smallest Crossing Angle:	60 to 90 Degrees
Number of Traffic Lanes Crossing Railroad:	2	Are Truck Pullout Lanes Present?	No
Is Highway Paved?	Yes		
Crossing Surface:	Rubber	If Other:	
Nearby Intersecting Highway?	N/A	Is it Signalized?	
Does Track Run Down a Street?	No	Is Crossing Illuminated?	
Is Commercial Power Available?	Yes		

Part V: Highway Information

Highway System:	Non-Federal-aid	Functional Classification of Road at Crossing:	Urban Local
Is Crossing on State Highway System:	No		
Annual Average Daily Traffic (AADT):	025000	AADT Year:	1986
Estimated Percent Trucks:	18	Avg. No of School Buses per Day:	0
Posted Highway Speed:	0		


Site
X
MP 497
MP 498
MP 17
MP 18
MP 18
MP 16
CARSON
UP
745994D
745993W
811214G
411913C
811215N
Santa Fe
710
710
Del Amo
Amo
Pacific Commerce
Val Verde
Los Angeles
Ramp
208Th
El Presidio
Dominguez
Tyler
Adriatic
Baltic
Caspian
Via Plata
Via Alcalde
Forbes
Via Oro
Alley
De Forest
Zane
Daisy
Pacific
53Rd
Mountain View
Louise
55Th
Market
Plymouth
Elm
Locust
Linden
Atlantic
Lime
Olive
Driveway
Platt
52Nd
Pine
Morningside
Sunset
Cedar
51 St
Home
Plenty
Virginia
Silva
Pleasant
Peace
Ruth
Grisham
Oregon
49Th
Arbor
47Th
48Th
Holly
Gulf
Agate
46Th
Rio
Long Beach
Glenchester
Deal
Tolbert
Pasadena
Whitley
45Th
44Th
Freeland
California
Claiborne
San Antonio
Business
Burlinghall
Myrtle
Tehachapi
Marshall
Randolph
Country Club
Devon
Stewart
Mesa
Del Mar
Avery
Edith
Marion
Veranada
Barcola
Pasado
Camellitos
Luray
Terrace
Ridgewood
Marcella
Parking Lot
Lewis

Appendix E

Federal Transit Administration (FTA)
General Vibration Assessment

10. GENERAL VIBRATION ASSESSMENT

This chapter outlines procedures that can be used to develop generalized predictions of ground-borne vibration and noise. This manual includes three different levels of detail for projecting ground-borne vibration:

- **Screening:** The screening procedure is discussed in Chapter 9. A standard table of impact distances is used to determine if ground-borne vibration from the project may affect sensitive land uses. More detailed analysis is required if any sensitive land uses are within the screening distances. The screening procedure does not require any specific knowledge about the vibration characteristics of the system or the geology of the area. If different propagation conditions are known to be present, a simple adjustment is provided.

- **General Assessment:** The general level of assessment, as described in this chapter, is an extension of the screening procedure. It uses generalized data to develop a curve of vibration level as a function of distance from the track. The vibration levels at specific buildings are estimated by reading values from the curve and applying adjustments to account for factors such as track support system, vehicle speed, type of building, and track and wheel condition. The general level deals only with the overall vibration velocity level and the A-weighted sound level. It does not consider the frequency spectrum of the vibration or noise.

- **Detailed Analysis:** Discussed in Chapter 11, the Detailed Analysis involves applying all of the available tools for accurately projecting the vibration impact at specific sites. The procedure outlined in this manual includes a test of the vehicle (or similar vehicle) to define the forces generated by the vibration source and tests at the site in question to define how the local geology affects vibration propagation. It is considerably more complex to develop detailed projections of ground-borne vibration than it is to develop detailed projections of airborne noise. Accurate projections of ground-borne vibration require professionals with experience in performing and interpreting vibration propagation tests. As such, detailed vibration predictions are usually performed during the final design phase of a project when there is sufficient reason to suspect adverse vibration impact from the project. The procedure for Detailed Vibration Analysis presented in Chapter 11 is based on measurements to characterize vibration propagation at specific sites.

There is not always a clear distinction between general and detailed predictions. For example, it is often appropriate to use several representative measurements of vibration propagation along the planned alignment in developing generalized propagation curves. Other times, generalized prediction curves may be sufficient for the majority of the alignment, but with Detailed Analysis applied to particularly sensitive buildings such as a concert hall. The methods for analyzing transit vibration in this manual are consistent with those described in recognized handbooks and international standards.(1, 2)

The purpose of the General Assessment is to provide a relatively simple method of developing estimates of the overall levels of ground-borne vibration and noise that can be compared to the acceptability criteria given in Chapter 8. For many projects, particularly when comparing alternatives, this level of detail will be sufficient for the environmental impact assessment. Where there are potential problems, the Detailed Analysis is then undertaken during final design of the selected alternative to accurately define the level of impact and design mitigation measures. A Detailed Analysis usually will be required when designing special track-support systems such as floating slabs or ballast mats. Detailed Analysis is not usually required if, as is often the case, the mitigation measure consists of relocating a crossover or turnout. Usually, the General Assessment is adequate to determine whether a crossover needs to be relocated.

The basic approach for the General Assessment is to define a curve, or set of curves, that predicts the overall ground-surface vibration as a function of distance from the source, then apply adjustments to these curves to account for factors such as vehicle speed, building type, and receiver location within the building. Section 10.1 includes curves of vibration level as a function of distance from the source for the common types of vibration sources such as rapid transit trains and buses. When the vehicle type is not covered by the curves included in this section, it will be necessary to define an appropriate curve either by extrapolating from existing information or performing measurements at an existing facility.

10.1 SELECTION OF BASE CURVE FOR GROUND SURFACE VIBRATION LEVEL

The base curves for three standard transportation systems are defined in Figure 10-1. This figure shows typical ground-surface vibration levels assuming equipment in good condition and speeds of 50 mph for the rail systems and 30 mph for buses. The levels must be adjusted to account for factors such as different speeds and different geologic conditions than assumed. The adjustment factors are discussed in Section 10.2.

The curves in Figure 10-1 are based on measurements of ground-borne vibration at representative North American transit systems. The top curve applies to trains that are powered by diesel or electric locomotives. It includes intercity passenger trains and commuter rail trains. The curve for rapid transit rail cars covers both heavy and light-rail vehicles on at-grade and subway track. It is somewhat surprising that subway and at-grade track can be represented by the same curve since ground-borne vibration created by a train operating in a subway has very different characteristics than vibration from at-grade track. However, in spite of these differences, the overall vibration velocity levels are comparable. Subways tend to have more vibration problems than at-grade track. This is probably due to two factors: (1) subways are usually located in more densely developed areas, and (2) the airborne noise is usually a more serious problem for at-grade systems than the ground-borne vibration. Another difference between subway and at-grade track is that the ground-borne vibration from subways tends to be higher frequency than the vibration from at-grade track, which makes the ground-borne noise more noticeable.

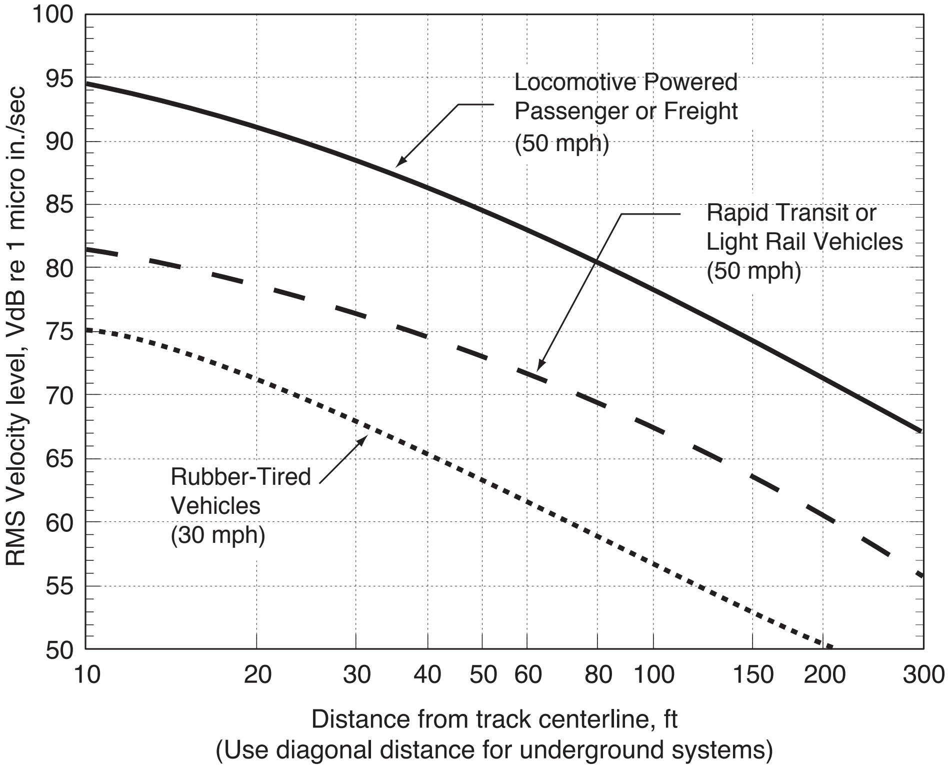


Figure 10-1. Generalized Ground Surface Vibration Curves

The curves in Figure 10-1 were developed from many measurements of ground-borne vibration. Experience with ground-borne vibration data is that, for any specific type of transit mode, a significant variation in vibration levels under apparently similar conditions is not uncommon. The curves in Figure

10-1 represent the upper range of the measurement data from well-maintained systems. Although actual levels fluctuate widely, it is rare that ground-borne vibration will exceed the curves in Figure 10-1 by more than one or two decibels unless there are extenuating circumstances, such as wheel- or running-surface defects.

One approach to dealing with the normal fluctuation is to show projections as a range. For example, the projected level from Figure 10-1 for an LRT system with train speeds of 50 mph is about 72 VdB at a distance of 60 feet from the track centerline, just at the threshold for acceptable ground-borne vibration for residential land uses. To help illustrate the normal fluctuation, the projected level of ground-borne vibration might be given as 67 to 72 VdB. This approach is not recommended since it tends to confuse the interpretation of whether or not the projected vibration levels exceed the impact threshold. However, because actual levels of ground-borne vibration will sometimes differ substantially from the projections, some care must be taken when interpreting projections. Some guidelines are given below:

1. Projected vibration is below the impact threshold. Vibration impact is unlikely in this case.
2. Projected ground-borne vibration is 0 to 5 decibels greater than the impact threshold. In this range there is still a significant chance that actual ground-borne vibration levels will be below the impact threshold. In this case, the impact would be reported in the environmental document as exceeding the applicable threshold and a commitment would be made to conduct more detailed studies to refine the vibration impact analysis during final design and determine appropriate mitigation, if necessary. A site-specific Detailed Analysis may show that vibration control measures are not needed.
3. Projected ground-borne vibration is 5 decibels or more greater than the impact threshold. Vibration impact is probable and Detailed Analysis will be needed during final design to help determine appropriate vibration control measures.

The two most important factors that must be accounted for in a General Assessment are the type of vibration source (the mode of transit) and the vibration propagation characteristics. It is well known that there are situations where ground-borne vibration propagates much more efficiently than normal. The result is unacceptable vibration levels at distances two to three times the normal distance. Unfortunately, the geologic conditions that promote efficient propagation have not been well documented and are not fully understood. Shallow bedrock or stiff clay soil often are involved. One possibility is that shallow bedrock acts to keep the vibration energy near the surface. Much of the energy that would normally radiate down is directed back towards the surface by the rock layer with the result that the ground surface vibration is higher than normal.

The selection of a base curve depends on the mode of rail transit under consideration. Appropriate correction factors are then added to account for any unusual propagation characteristics. For less common modes such as magnetically-levitated vehicles (maglev), monorail, or automated guideway transit (AGT), it is necessary to either make a judgment about which curve and adjustment factors best fit the mode or to develop new estimates of vibration level as a function of distance from the track. For example, the vibration from a rubber-tire monorail that will be operating on aerial guideway can be approximated using the bus/rubber tire systems with the appropriate adjustment for the aerial structure. Another example is a magnetic levitation system. Most of the data available on the noise and vibration characteristics of maglev vehicles comes from high-speed systems intended for inter-city service. Even though there is no direct contact between the vehicle and the guideway, the dynamic loads on the guideway can generate ground-borne vibration. Measurements on a German high-speed maglev resulted in ground-borne vibrations at 75 mph comparable to the base curve for rubber-tired vehicles at 30 mph.(3) Considerations for selecting a base curve are discussed below:

- **Intercity Passenger Trains:** Although intercity passenger trains can be an important source of environmental vibration, it is rare that they are significant for FTA-funded projects unless a new transit mode will use an existing rail alignment. When a new transit line will use an existing rail alignment, the changes in the intercity passenger traffic can result in either positive or negative impacts. Unless there are specific data available on the ground-borne vibration created by the train operations, the upper curve in Figure 10-1 should be used for intercity passenger trains.
- **Locomotive-Powered Commuter Rail:** The locomotive curve from Figure 10-1 should be used for any commuter rail system powered by either diesel or electric locomotives. The locomotives often create vibration levels that are 3 to 8 decibels higher than those created by the passenger cars. Self-powered electric commuter rail trains can be considered to be similar to rapid transit vehicles. Although they are relatively rare in the U.S., self-powered diesel multiple units (DMU's) create vibration levels somewhere between rapid transit vehicles and locomotive-powered passenger trains. When the axle loads and suspension parameters of a particular DMU are comparable to typical rapid transit vehicles, the rapid transit curve in Figure 10-1 can be used for that mode.
- **Subway Heavy Rail:** Complaints about ground-borne vibration are more common near subways than near at-grade track. This is not because subways create higher vibration levels than at-grade systems - rather it is because subways are usually located in high-density areas in close proximity to building foundations. When applied to subways, the rapid transit curve in Figure 10-1 assumes a relatively lightweight bored concrete tunnel in soil. The vibration levels will be lower for heavier subway structures such as cut-and-cover box structures and stations.
- **At-Grade Heavy Rail or LRT:** The available data show that heavy rail and light rail transit vehicles create similar levels of ground-borne vibration. This is not surprising since the vehicles have similar suspension systems and axle loads. Light-rail systems tend to have fewer problems with ground-borne vibration because of the lower operating speeds. Similar to the subway case, an adjustment factor must be used if the transit vehicle has a primary suspension that is stiff in the vertical direction.
- **Intermediate Capacity Transit:** The vibration levels created by an intermediate capacity transit system or an AGT system will depend on whether the vehicles have steel wheels or rubber wheels. If they have steel wheels, the transit car curve in Figure 10-1 should be used with appropriate adjustments for operating speed. The bus/rubber tire curve should be used for rubber-tired ICT systems.

- **Bus/Rubber Tire:** Rubber-tire vehicles rarely create ground-borne vibration problems unless there is a discontinuity or bump in the road that causes the vibration. The curve in Figure 10-1 shows the vibration level for a typical bus operating on smooth roadway.

10.2 ADJUSTMENTS

Once the base curve has been selected, the adjustments in Table 10-1 can be used to develop vibration projections for specific receiver positions inside buildings. All of the adjustments are given as single numbers to be added to, or subtracted from, the base level. The adjustment parameters are speed, wheel and rail type and condition, type of track support system, type of building foundation, and number of floors above the basement level. It should be recognized that many of these adjustments are strongly dependent on the frequency spectrum of the vibration source and the frequency dependence of the vibration propagation. The single number values are suitable for generalized evaluation of the vibration impact and vibration mitigation measures since they are based on typical vibration spectra. However, the single number adjustments are not adequate for detailed evaluations of impact of sensitive buildings or for detailed specification of mitigation measures. Detailed Analysis requires consideration of the relative importance of different frequency components.

Table 10-1. Adjustment Factors for Generalized Predictions of Ground-Borne Vibration and Noise

Factors Affecting Vibration Source

Source Factor	**Adjustment to Propagation Curve**			**Comment**
		Reference Speed		
Speed	Vehicle Speed	50 mph	30 mph	Vibration level is approximately proportional to 20*log(speed/speed$_{\text{ref}}$). Sometimes the variation with speed has been observed to be as low as 10 to 15 log(speed/speed$_{\text{ref}}$).
	60 mph	+1.6 dB	+6.0 dB	
	50 mph	0.0 dB	+4.4 dB	
	40 mph	-1.9 dB	+2.5 dB	
	30 mph	-4.4 dB	0.0 dB	
	20 mph	-8.0 dB	-3.5 dB	
Vehicle Parameters (not additive, apply greatest value only)				
Vehicle with stiff primary suspension	+8 dB			Transit vehicles with stiff primary suspensions have been shown to create high vibration levels. Include this adjustment when the primary suspension has a vertical resonance frequency greater than 15 Hz.
Resilient Wheels	0 dB			Resilient wheels do not generally affect ground-borne vibration except at frequencies greater than about 80 Hz.
Worn Wheels or Wheels with Flats	+10 dB			Wheel flats or wheels that are unevenly worn can cause high vibration levels. This can be prevented with wheel truing and slip-slide detectors to prevent the wheels from sliding on the track.
Track Conditions (not additive, apply greatest value only)				
Worn or Corrugated Track	+10 dB			If both the wheels and the track are worn, only one adjustment should be used. Corrugated track is a common problem. Mill scale on new rail can cause higher vibration levels until the rail has been in use for some time.
Special Trackwork	+10 dB			Wheel impacts at special trackwork will significantly increase vibration levels. The increase will be less at greater distances from the track.
Jointed Track or Uneven Road Surfaces	+5 dB			Jointed track can cause higher vibration levels than welded track. Rough roads or expansion joints are sources of increased vibration for rubber-tire transit.
Track Treatments (not additive, apply greatest value only)				
Floating Slab Trackbed	-15 dB			The reduction achieved with a floating slab trackbed is strongly dependent on the frequency characteristics of the vibration.
Ballast Mats	-10 dB			Actual reduction is strongly dependent on frequency of vibration.
High-Resilience Fasteners	-5 dB			Slab track with track fasteners that are very compliant in the vertical direction can reduce vibration at frequencies greater than 40 Hz.

Table 10-1. Adjustment Factors for Generalized Predictions of Ground-Borne Vibration and Noise (Continued)

Factors Affecting Vibration Path

Path Factor	**Adjustment to Propagation Curve**	**Comment**
Resiliently Supported Ties	-10 dB	Resiliently supported tie systems have been found to provide very effective control of low-frequency vibration.
Track Configuration (not additive, apply greatest value only)		
Type of Transit Structure	Relative to at-grade tie & ballast: Elevated structure -10 dB Open cut 0 dB	The general rule is the heavier the structure, the lower the vibration levels. Putting the track in cut may reduce the vibration levels slightly. Rock-based subways generate higher-frequency vibration.
	Relative to bored subway tunnel in soil: Station -5 dB Cut and cover -3 dB Rock-based - 15 dB	
Ground-borne Propagation Effects		
Geologic conditions that promote efficient vibration propagation	Efficient propagation in soil +10 dB	Refer to the text for guidance on identifying areas where efficient propagation is possible.
	Propagation in rock layer **Dist.** **Adjust.** 50 ft +2 dB 100 ft +4 dB 150 ft +6 dB 200 ft +9 dB	The positive adjustment accounts for the lower attenuation of vibration in rock compared to soil. It is generally more difficult to excite vibrations in rock than in soil at the source.
Coupling to building foundation	Wood Frame Houses -5 dB 1-2 Story Masonry -7 dB 3-4 Story Masonry -10 dB Large Masonry on Piles -10 dB Large Masonry on Spread Footings -13 dB Foundation in Rock 0 dB	The general rule is the heavier the building construction, the greater the coupling loss.

Factors Affecting Vibration Receiver

Receiver Factor	**Adjustment to Propagation Curve**	**Comment**
Floor-to-floor attenuation	1 to 5 floors above grade: -2 dB/floor 5 to 10 floors above grade: -1 dB/floor	This factor accounts for dispersion and attenuation of the vibration energy as it propagates through a building.
Amplification due to resonances of floors, walls, and ceilings	+6 dB	The actual amplification will vary greatly depending on the type of construction. The amplification is lower near the wall/floor and wall/ceiling intersections.
Conversion to Ground-borne Noise		
Noise Level in dBA	Peak frequency of ground vibration: Low frequency (<30 Hz): -50 dB Typical (peak 30 to 60 Hz): -35 dB High frequency (>60 Hz): -20 dB	Use these adjustments to estimate the A-weighted sound level given the average vibration velocity level of the room surfaces. See text for guidelines for selecting low, typical or high frequency characteristics. Use the high-frequency adjustment for subway tunnels in rock or if the dominant frequencies of the vibration spectrum are known to be 60 Hz or greater.

Without careful consideration of the shape of the actual vibration spectra, an inappropriate vibration control measure may be selected that could actually cause an increase in the vibration levels.

The following guidelines are used to select the appropriate adjustment factors. Note that the adjustments for wheel and rail condition are not cumulative. The general rule-of-thumb to use when more than one adjustment may apply is to apply only the largest adjustment. For example: the adjustment for jointed track is 5 decibels and the adjustment for wheel flats is 10 decibels. In an area where there is jointed track and many vehicles have wheel flats, the projected vibration levels should be increased by 10 decibels, not 15 decibels.

- **Train Speed:** The levels of ground-borne vibration and noise vary approximately as 20 times the logarithm of speed. This means that doubling train speed will increase the vibration levels approximately 6 decibels and halving train speed will reduce the levels by 6 decibels. Table 10-1 tabulates the adjustments for reference vehicle speeds of 30 mph for rubber-tired vehicles and 50 mph for steel-wheel vehicles. The following relationship should be used to calculate the adjustments for other speeds.

$$adjustment(dB) = 20 \times \log\left(\frac{speed}{speed_{ref}}\right)$$

- **Vehicle:** The most important factors for the vehicles are the suspension system, wheel condition, and wheel type. Most new heavy rail and light rail vehicles have relatively soft primary suspensions. However, experience in Atlanta, New York, and other cities has demonstrated that a stiff primary suspension (vertical resonance frequency greater than 15 Hz) can result in higher than normal levels of ground-borne vibration. Vehicles for which the primary suspension consists of a rubber or neoprene "donut" around the axle bearing usually have a very stiff primary suspension with a vertical resonance frequency greater than 40 Hz.

  Deteriorated wheel condition is another factor that will increase vibration levels. It can be assumed that a new system will have vehicles with wheels in good condition. However, when older vehicles will be used on new track, it may be appropriate to include an adjustment for wheel condition. The reference curves account for wheels without defects, but wheels with flats or corrugations can cause vibration levels that are 10 VdB higher than normal. Resilient wheels will reduce vibration levels at frequencies greater than the effective resonance frequency of the wheel. Because this resonance frequency is relatively high, often greater than 80 Hz, resilient wheels usually have only a marginal effect on ground-borne vibration.

  It is important to use only one of the adjustments in this category, the greatest one that applies.

- **Track System and Support:** This category includes the type of rail (welded, jointed or special trackwork), the track support system, and the condition of the rail. The base curves all assume good-condition welded rail. Jointed rail causes higher vibration levels than welded rail; the amount higher depends on the condition of the joints. The wheel impacts at special trackwork, such as frogs at crossovers, create much higher vibration forces than normal. Because of the higher vibration levels at special trackwork, crossovers often end up being the principal areas of vibration impact on new systems. Modifying the track support system is one method of mitigating the vibration impact. Special track support systems such as ballast mats, high-resilience track fasteners, resiliently supported ties, and floating slabs have all been shown to be effective in reducing vibration levels.

  The condition of the running surface of the rails can strongly affect vibration levels. Factors such as corrugations, general wear, or mill scale on new track can cause vibration levels that are 5 to 15 decibels higher than normal. Mill scale will usually wear off after some time in service; however, the track must be ground to remove corrugations or to reduce the roughness from wear.

  Again, apply only one of the adjustments.

  Roadway surfaces in the case of rubber-tired systems are assumed to be smooth. Rough washboard surfaces, bumps or uneven expansion joints are the types of running surface defects that cause increased vibration levels over the smooth road condition.

- **Transit Structure:** The weight and size of a transit structure affects the vibration radiated by that structure. The general rule-of-thumb is that vibration levels will be lower for heavier transit structures. Hence, the vibration levels from a cut-and-cover concrete double-box subway can be assumed to be lower than the vibration from a lightweight concrete-lined bored tunnel. The vibration from elevated structures is lower than from at-grade track because of the mass and damping of the structure and the extra distance that the vibration must travel before it reaches the receiver. Elevated structures in automated guideway transit applications sometimes are designed to bear on building elements. These are a special case and may require detailed design considerations.

- **Propagation Characteristics:** In the General Assessment it is necessary to make a selection among the general propagation characteristics. For a subway, the selection is a fairly straightforward choice of whether or not the subway will be founded in bedrock. Bedrock is considered to be hard rock. It is usually appropriate to consider soft siltstone and sandstone to be more similar to soil than hard rock. As seen in Table 10-1, whether the subway is founded in soil or rock can be a 15 VdB difference in the vibration levels.

  When considering at-grade vibration sources, the selection is between "normal" vibration propagation and "efficient" vibration propagation. Efficient vibration propagation results in approximately 10 decibels higher vibration levels. This more than doubles the potential impact zone for ground-borne vibration. One of the problems with identifying the cause of efficient propagation is the difficulty in determining whether higher than normal vibration levels are due to geologic conditions or due to special source conditions (e.g. rail corrugations or wheel flats).

  Although it is known that geologic conditions have a significant effect on the vibration levels, it is rarely possible to develop more than a broad-brush understanding of the vibration propagation characteristics for a General Assessment. The conservative approach would be to use the 10-decibel adjustment for efficient propagation to evaluate all potential vibration impact. The problem with this approach is that it tends to greatly overstate the potential for vibration impact. Hence, it is best to review available geological data and any complaint history from existing transit lines and major construction sites near the transit corridor to identify areas where efficient propagation is possible. If there is any reason to suspect efficient propagation conditions, then a Detailed Analysis during final design would include vibration propagation tests at the areas identified as potentially efficient propagation sites.

Some geologic conditions are repeatedly associated with efficient propagation. Shallow bedrock, less than 30 feet below the surface, is likely to have efficient propagation. Other factors that can be important are soil type and stiffness. In particular, stiff clayey soils have sometimes been associated with efficient vibration propagation. Investigation of soil boring records can be used to estimate depth to bedrock and the presence of problem soil conditions.

A factor that can be particularly complex to address is the effect of vibration propagation through rock. There are three factors from Table 10-1 that need to be included when a subway structure will be founded in rock. First is the -15 decibel adjustment in the "Type of Transit Structure" category. Second is the adjustment based on the propagation distance in the "Geologic Conditions" category. This positive adjustment is applied to the distances shown in Figure 10-1; the adjustment increases with distance because vibration attenuates more slowly in rock than in the soil used as a basis for the reference curve. The third factor is in the "Coupling to Building" category. When a building foundation is directly on the rock layer, there is no "coupling loss" due to the weight and stiffness of the building. Use the standard coupling factors if there is at least a 10-foot layer of soil between the building foundation and the rock layer.

- **Type of Building and Receiver Location in Building:** Since annoyance from ground-borne vibration and noise is an indoor phenomenon, the effects of the building structure on the vibration must be considered. Wood frame buildings, such as the typical residential structure, are more easily excited by ground vibration than heavier buildings. In contrast, large masonry buildings with spread footings have a low response to ground vibration.

  Vibration generally reduces in level as it propagates through a building. As indicated in Table 10-1, a 1- to 2-decibel attenuation per floor is usually assumed. Counteracting this, resonances of the building structure, particularly the floors, will cause some amplification of the vibration. Consequently, for a wood-frame structure, the building-related adjustments nearly cancel out. The adjustments for the first floor assuming a basement are: -5 decibels for the coupling loss; -2 decibels for the propagation from the basement to the first floor; and +6 decibels for the floor amplification. The total adjustment in this case is -1 decibel.

- **Vibration to Ground-Borne Noise Adjustment**: It is possible to estimate the levels of radiated noise given the average vibration amplitude of the room surfaces (floors, walls and ceiling), and the total acoustical absorption in the room. The unweighted sound pressure level is approximately equal to the vibration velocity level when the velocity level is referenced to $1x10^{-6}$ inches/second.

However, to estimate the A-weighted sound level from the velocity level, it is necessary to have some information about the frequency spectrum. The A-weighting adjustment drops rapidly at low frequencies, reflecting the relative insensitivity of human hearing to low frequencies. For example, A-weighting is -16 dB at 125 Hz, -26 dB at 60 Hz and -40 dB at 30 Hz. Table 10-1 provides adjustments for vibration depending on whether it has low-frequency, typical or high-frequency characteristics. Some general guidelines for classifying the frequency characteristics are:

- Low Frequency: Low-frequency vibration characteristics can be assumed for subways surrounded by cohesiveless sandy soil or whenever a vibration isolation track support system will be used. Low-frequency characteristics can be assumed for most surface track.
- Typical: The typical vibration characteristic is the default assumption for subways. It should be assumed for subways until there is information indicating that one of the other assumptions is appropriate. It should be used for surface track when the soil is very stiff with a high clay content.
- High Frequency: High-frequency characteristics should be assumed for subways whenever the transit structure is founded in rock or when there is very stiff clayey soil.

10.3 INVENTORY OF VIBRATION-IMPACTED LOCATIONS

This chapter includes generalized curves for surface vibration for different transit modes along with adjustments to apply for specific operating conditions and buildings. The projected levels are then compared with the criteria in Chapter 8 to determine whether vibration impact is likely. The results of the General Assessment are expressed in terms of an inventory of all sensitive land uses where either ground-borne vibration or ground-borne noise from the project may exceed the impact thresholds. The General Assessment may include a discussion of mitigation measures which would likely be needed to reduce vibration to acceptable levels.

The purpose of the procedure is to develop a reasonably complete inventory of the buildings that may experience ground-borne vibration or noise that exceed the impact criteria. At this point, it is preferable to make a conservative assessment of the impact. That is, it is better to include some buildings where ground-borne vibration may be below the impact threshold than to exclude buildings where it may exceed the impact threshold. The inventory should be organized according to the categories described in Chapter 8. For each building where the projected ground-borne vibration or noise exceeds the applicable impact threshold, one or more of the vibration control options from Section 11.5 should be considered for applicability. See Section 11.4 for a more complete description of how the General Vibration Assessment fits into the overall procedure.

REFERENCES

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2. International Organization for Standardization, “Mechanical vibration – Ground-borne noise and vibration arising from rail systems,” ISO/FDIS 14837-1:2005.

3. U.S. Department of Transportation, Volpe National Transportation Systems Center, “Vibration Characteristics of the Transrapid TR08 Maglev System,” Report No. DOT-VNTSC-FRA-02-06, March 2002.

Appendix F

WYLE-LABS WCR73_5
Railroad Noise Calculations

WYLE LABS WCR73_5

Assessment of Noise Environments Around Railroad Operations

Scenario: **FUTURE RAIL CONDITIONS**

Input Data:			**Results:**	
Wall Distance From Track (25,50, 100, or 150 feet)	**25**	57.6	CNEL at	100
		54.1	CNEL at	200
		50.1	CNEL at	400
Wall Height (in feet)	**10**	45.6	CNEL at	800
Observer Distance From Track	**40**	**62.3**	CNEL at	40

FUTURE RAIL CONDITIONS
CNEL WORKSHEET FOR LINE OPERATIONS

Train Category Identification	L, feet (train length)	V, mph (train speed)	% grade	Barrier (if existing)	Distance to tract, feet	(1) Pass-by Duration, sec t=L/V	(2) C_2 ('$10\log_{10}t$)	(3) Car SPL at 100' dB C_1	(4) Car distance attenuation α	(5) $\alpha_{bc:}$ Car barrier correction	(6) Car Noise Adjustment: C_3	(7) SENEL (cars), dB $C_1+C_2+C_3-\alpha-\alpha_{bc}$	(8) Loco. SENEL at 100' C_4, dB	(9) Loco. distance attenuation: α	(10) α_{be} Loco. Barrier correction	(11) Helper engine adjustment C_5	(12) SENEL (loco.), dB $C4+C5-\alpha-\alpha_{be}$	(13) SENEL (Train) dB	(14) N equiv. no. of daily operations	(15) CNEL contribution	COMPOSITE CNEL AT DISTANCE INDICATED				
																					(16) 100'	(17) 200'	(18) 400'	(19) 800'	(20)
1	2000	30	0.0%	0	100'	45.3	16.6	70	0	16.75	0	69.8	100	0.0	5	0	95.0	95.0	16	57.6	57.6				
FREIGHT					200'				4	16.75	0	65.8		3.5	5		91.5	91.5		54.1		54.1			
					400'				10	16.75	0	59.8		7.5	5		87.5	87.5		50.1			50.1		
					800'				16.5	16.75	0	53.3		12.0	5		83.0	83.0		45.6				45.6	

5500 = User Inputs
45.3 = Calculated Values
84 = From Charts

WYLE LABS WCR73_5
Assessment of Noise Environments Around Railroad Operations

Scenario: FUTURE RAIL CONDITIONS

Input Data:		**Results:**	
Wall Distance From Track	25	57.6	CNEL at 100'
(25,50, 100, or 150 feet)		54.1	CNEL at 200'
		50.1	CNEL at 400'
Wall Height (in feet)	10	45.6	CNEL at 800'
Observer Distance From Track	**40**	**62.3**	CNEL at **40**

Appendix I

Noise Data and Calculations

Noise Measurement Data

Long Beach Riverwalk Project Interval Data

Peak	Uwpk																	
Meas	Excd	Excd	Over															
Site	Location	Number	Date	Time	Duration	Leq	SEL	Lmax	Lmin	Peak	Uwpk	L(10)	L(33)	L(50)	L(90)	Count	Count	loads
----	--------------------	------	----------	--------	--------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
0		0	24Sep 14	17:05:12	900	72.8	102.4	88.5	57.7	102.9	112.6	76.3	72.7	70.2	63.6	37	255	0
0		0	03Nov 14	16:33:56	900	58.8	88.3	75.1	50.4	88.1	0	61.3	55.6	54	52.1	212	0	0
0		0	03Nov 14	16:52:19	900	55.1	84.7	74.9	46.8	90.9	98	58.1	52.8	50.9	48.4	255	2	0
0		0	03Nov 14	17:11:34	900	60.6	90.2	78	47.2	91.8	105.4	62.1	55.6	53.7	50.1	255	18	0
0		0	03Nov 14	17:29:56	900	53.4	83	77.1	46.1	92.4	107.6	54.2	50.2	49.4	47.6	72	10	0

Long Beach Riverwalk Project Event Data

Peak Meas Site	Time of Location	Excd Number	Over Date	Time	Lmax	Duration	Leq	SEL	Lmax	Peak	Uwpk	Sym	Decay	Type	Count	loads
0		0	24Sep 14	17:05:12	17:05:13	7.9	61.9	70.8	62.9	79.5	98	13.3	0	0	0	0
0		0	24Sep 14	17:05:20	17:06:00	104.4	71.7	91.9	82.4	92.9	104	38.7	0	0	0	0
0		0	24Sep 14	17:07:12	17:15:42	583.5	72.9	100.6	87.2	98.9	112	87.5	0	0	0	0
0		0	24Sep 14	17:17:16	17:17:47	176.5	73.9	96.3	88.5	102.9	112.6	18	0	0	0	0
0		0	03Nov 14	16:34:29	16:34:33	7.6	63.4	72.2	66.4	77.2	0	53.9	0	0	0	0
0		0	03Nov 14	16:38:50	16:38:56	9.6	64.7	74.5	67.1	78	0	64.1	0	0	0	0
0		0	03Nov 14	16:40:06	16:40:13	20	69.9	82.9	75.1	88.1	0	38.3	0	0	0	0
0		0	03Nov 14	16:40:53	16:41:01	12.8	65.1	76.2	68.3	81.5	0	66	0	0	0	0
0		0	03Nov 14	16:41:07	16:41:13	10.3	68.3	78.4	72.5	84.6	0	63.3	0	0	0	0
0		0	03Nov 14	16:45:37	16:45:40	6.6	65	73.3	67	79.9	0	46.9	0	0	0	0
0		0	03Nov 14	17:04:49	17:04:51	6.6	63.5	71.7	66	77.7	0	42.2	0	0	0	0
0		0	03Nov 14	17:13:50	17:13:56	22.1	72.6	86.1	78	89.5	98	30.9	0	0	0	0

Long Beach Riverwalk Project   Time History Data
Sample Period (sec):   10.000

		Meas					
Site	Location	Number	Date	Time	Level	Lmax	SEL
----"--------------------"------"----------"--------"-----"-----"-----							
Run	Key						
0		0	24Sep 14	17:05:12	61.7	62.9	71.7
0		0	24Sep 14	17:05:22	68.3	73.8	78.3
0		0	24Sep 14	17:05:32	72.2	75.9	82.2
0		0	24Sep 14	17:05:42	76	79.7	86
0		0	24Sep 14	17:05:52	75.1	82.4	85.1
0		0	24Sep 14	17:06:02	70.3	75.3	80.3
0		0	24Sep 14	17:06:12	72.3	76.3	82.3
0		0	24Sep 14	17:06:22	72.5	79.4	82.5
0		0	24Sep 14	17:06:32	65.6	68.2	75.6
0		0	24Sep 14	17:06:42	67.4	72.8	77.4
0		0	24Sep 14	17:06:52	63.5	70.2	73.5
0		0	24Sep 14	17:07:02	60.8	62.3	70.8
0		0	24Sep 14	17:07:12	69.7	75.2	79.7
0		0	24Sep 14	17:07:22	76.4	81.3	86.4
0		0	24Sep 14	17:07:32	74.7	77.3	84.7
0		0	24Sep 14	17:07:42	68	71.6	78
0		0	24Sep 14	17:07:52	66.3	67.8	76.3
0		0	24Sep 14	17:08:02	67.9	72.7	77.9
0		0	24Sep 14	17:08:12	75.3	81.9	85.3
0		0	24Sep 14	17:08:22	65.7	69.7	75.7
0		0	24Sep 14	17:08:32	65.9	72.4	75.9
0		0	24Sep 14	17:08:42	71	75.9	81
0		0	24Sep 14	17:08:52	72.6	78.4	82.6
0		0	24Sep 14	17:09:02	77	80.7	87
0		0	24Sep 14	17:09:12	75.7	79.3	85.7
0		0	24Sep 14	17:09:22	69.8	73.6	79.8
0		0	24Sep 14	17:09:32	72.9	76	82.9
0		0	24Sep 14	17:09:42	71.6	77.2	81.6
0		0	24Sep 14	17:09:52	72.1	76.3	82.1
0		0	24Sep 14	17:10:02	70.1	74.9	80.1
0		0	24Sep 14	17:10:12	73.4	78	83.4
0		0	24Sep 14	17:10:22	72.9	76.9	82.9
0		0	24Sep 14	17:10:32	73.3	77.3	83.3
0		0	24Sep 14	17:10:42	68.7	74.3	78.7
0		0	24Sep 14	17:10:52	72.5	79.5	82.5
0		0	24Sep 14	17:11:02	74	79.3	84
0		0	24Sep 14	17:11:12	75.1	77.4	85.1
0		0	24Sep 14	17:11:22	73.3	78.5	83.3
0		0	24Sep 14	17:11:32	71.5	77.9	81.5
0		0	24Sep 14	17:11:42	70.1	77.5	80.1

0	0	24Sep 14	17:11:52	69.9	75.1	79.9
0	0	24Sep 14	17:12:02	75.5	81	85.5
0	0	24Sep 14	17:12:12	70.5	73.6	80.5
0	0	24Sep 14	17:12:22	71.4	76.7	81.4
0	0	24Sep 14	17:12:32	69.7	74.5	79.7
0	0	24Sep 14	17:12:42	75	80.5	85
0	0	24Sep 14	17:12:52	70.9	76	80.9
0	0	24Sep 14	17:13:02	77	80.5	87
0	0	24Sep 14	17:13:12	75.7	80.1	85.7
0	0	24Sep 14	17:13:22	69.5	78.5	79.5
0	0	24Sep 14	17:13:32	74.4	79.9	84.4
0	0	24Sep 14	17:13:42	74.9	78.7	84.9
0	0	24Sep 14	17:13:52	67.6	76	77.6
0	0	24Sep 14	17:14:02	66.3	70	76.3
0	0	24Sep 14	17:14:12	70.9	74.9	80.9
0	0	24Sep 14	17:14:22	71.2	78.9	81.2
0	0	24Sep 14	17:14:32	67.9	70.7	77.9
0	0	24Sep 14	17:14:42	70.1	73.2	80.1
0	0	24Sep 14	17:14:52	72.4	79.2	82.4
0	0	24Sep 14	17:15:02	68.3	70.5	78.3
0	0	24Sep 14	17:15:12	68.4	73.5	78.4
0	0	24Sep 14	17:15:22	75.9	80.6	85.9
0	0	24Sep 14	17:15:32	77.3	82.8	87.3
0	0	24Sep 14	17:15:42	79.2	87.2	89.2
0	0	24Sep 14	17:15:52	72.6	78.1	82.6
0	0	24Sep 14	17:16:02	72.3	78.5	82.3
0	0	24Sep 14	17:16:12	72.9	79	82.9
0	0	24Sep 14	17:16:22	69.8	72.6	79.8
0	0	24Sep 14	17:16:32	67	70	77
0	0	24Sep 14	17:16:42	62.1	64.5	72.1
0	0	24Sep 14	17:16:52	62.5	69.7	72.5
0	0	24Sep 14	17:17:02	64.9	72.7	74.9
0	0	24Sep 14	17:17:12	64.4	70.9	74.4
0	0	24Sep 14	17:17:22	75.1	76.8	85.1
0	0	24Sep 14	17:17:32	75.2	76.8	85.2
0	0	24Sep 14	17:17:42	81.5	88.5	91.5
0	0	24Sep 14	17:17:52	72.4	77.6	82.4
0	0	24Sep 14	17:18:02	73.4	77.1	83.4
0	0	24Sep 14	17:18:12	72.6	76.6	82.6
0	0	24Sep 14	17:18:22	71.2	75.7	81.2
0	0	24Sep 14	17:18:32	68.6	75	78.6
0	0	24Sep 14	17:18:42	71.5	74.2	81.5
0	0	24Sep 14	17:18:52	73.2	78	83.2
0	0	24Sep 14	17:19:02	75.5	79.1	85.5
0	0	24Sep 14	17:19:12	75.2	78.5	85.2
0	0	24Sep 14	17:19:22	70.8	76.8	80.8
0	0	24Sep 14	17:19:32	67.4	75.6	77.4

0	0	24Sep 14	17:19:42	64.7	69.2	74.7
0	0	24Sep 14	17:19:52	71.6	77.1	81.6
0	0	24Sep 14	17:20:02	67.1	74.7	77.1
0	0	24Sep 14	17:20:12	65.7	65.7	75.7
Stop	Intv					
Run	Key					
0	0	03Nov 14	16:33:56	58.3	61	68.3
0	0	03Nov 14	16:34:06	56.5	59.3	66.5
0	0	03Nov 14	16:34:16	57	59.4	67
0	0	03Nov 14	16:34:26	62.4	66.4	72.4
0	0	03Nov 14	16:34:36	56	63.5	66
0	0	03Nov 14	16:34:46	53.2	54.5	63.2
0	0	03Nov 14	16:34:56	53.1	53.8	63.1
0	0	03Nov 14	16:35:06	52.7	53.6	62.7
0	0	03Nov 14	16:35:16	52.7	53.6	62.7
0	0	03Nov 14	16:35:26	53	54.6	63
0	0	03Nov 14	16:35:36	55.9	58.9	65.9
0	0	03Nov 14	16:35:46	59.5	62.1	69.5
0	0	03Nov 14	16:35:56	59.6	62.5	69.6
0	0	03Nov 14	16:36:06	53.7	54.8	63.7
0	0	03Nov 14	16:36:16	56.6	59	66.6
0	0	03Nov 14	16:36:26	53.6	55	63.6
0	0	03Nov 14	16:36:36	52.7	54	62.7
0	0	03Nov 14	16:36:46	52	53	62
0	0	03Nov 14	16:36:56	51.9	53	61.9
0	0	03Nov 14	16:37:06	51.9	53.3	61.9
0	0	03Nov 14	16:37:16	52.1	53.3	62.1
0	0	03Nov 14	16:37:26	52.7	54.8	62.7
0	0	03Nov 14	16:37:36	52	53.3	62
0	0	03Nov 14	16:37:46	53.2	54.5	63.2
0	0	03Nov 14	16:37:56	51.8	52.9	61.8
0	0	03Nov 14	16:38:06	51.4	52.6	61.4
0	0	03Nov 14	16:38:16	55.7	60.1	65.7
0	0	03Nov 14	16:38:26	53.6	55.3	63.6
0	0	03Nov 14	16:38:36	56.2	59.1	66.2
0	0	03Nov 14	16:38:46	62.1	65.9	72.1
0	0	03Nov 14	16:38:56	61.8	67.1	71.8
0	0	03Nov 14	16:39:06	55.4	59.1	65.4
0	0	03Nov 14	16:39:16	54.2	56.3	64.2
0	0	03Nov 14	16:39:26	52.9	54.4	62.9
0	0	03Nov 14	16:39:36	52.2	52.9	62.2
0	0	03Nov 14	16:39:46	54.2	57	64.2
0	0	03Nov 14	16:39:56	60.6	69.9	70.6
0	0	03Nov 14	16:40:06	69.2	75.1	79.2
0	0	03Nov 14	16:40:16	70.4	75	80.4
0	0	03Nov 14	16:40:26	60.2	65.9	70.2
0	0	03Nov 14	16:40:36	56.8	59.5	66.8

0	0	03Nov 14	16:40:46	59.8	64	69.8
0	0	03Nov 14	16:40:56	65.7	68.2	75.7
0	0	03Nov 14	16:41:06	68.2	72.5	78.2
0	0	03Nov 14	16:41:16	59.5	67.6	69.5
0	0	03Nov 14	16:41:26	54.9	57.7	64.9
0	0	03Nov 14	16:41:36	54.9	56.2	64.9
0	0	03Nov 14	16:41:46	52.3	55.2	62.3
0	0	03Nov 14	16:41:56	51.6	52.6	61.6
0	0	03Nov 14	16:42:06	52.3	53.7	62.3
0	0	03Nov 14	16:42:16	52.3	53.5	62.3
0	0	03Nov 14	16:42:26	52.3	53.7	62.3
0	0	03Nov 14	16:42:36	53.2	54	63.2
0	0	03Nov 14	16:42:46	52.7	53.9	62.7
0	0	03Nov 14	16:42:56	52.5	53.7	62.5
0	0	03Nov 14	16:43:06	53.3	54.5	63.3
0	0	03Nov 14	16:43:16	53.6	54.5	63.6
0	0	03Nov 14	16:43:26	53.1	54	63.1
0	0	03Nov 14	16:43:36	53.6	54.6	63.6
0	0	03Nov 14	16:43:46	53.1	54.1	63.1
0	0	03Nov 14	16:43:56	52.6	53.5	62.6
0	0	03Nov 14	16:44:06	53.3	54.5	63.3
0	0	03Nov 14	16:44:16	53.1	54.2	63.1
0	0	03Nov 14	16:44:26	52.9	53.8	62.9
0	0	03Nov 14	16:44:36	53.4	54.6	63.4
0	0	03Nov 14	16:44:46	53.7	55.1	63.7
0	0	03Nov 14	16:44:56	55.1	56.8	65.1
0	0	03Nov 14	16:45:06	56	58.8	66
0	0	03Nov 14	16:45:16	56.5	58.6	66.5
0	0	03Nov 14	16:45:26	59.8	63.1	69.8
0	0	03Nov 14	16:45:36	64.1	67	74.1
0	0	03Nov 14	16:45:46	61.8	65	71.8
0	0	03Nov 14	16:45:56	55.8	58.6	65.8
0	0	03Nov 14	16:46:06	60.6	63.3	70.6
0	0	03Nov 14	16:46:16	56.1	59.6	66.1
0	0	03Nov 14	16:46:26	57.6	63.7	67.6
0	0	03Nov 14	16:46:36	55.9	57.2	65.9
0	0	03Nov 14	16:46:46	55.5	56.8	65.5
0	0	03Nov 14	16:46:56	57.5	60.9	67.5
0	0	03Nov 14	16:47:06	58	61.1	68
0	0	03Nov 14	16:47:16	55	58.4	65
0	0	03Nov 14	16:47:26	54.2	55.9	64.2
0	0	03Nov 14	16:47:36	54	55.9	64
0	0	03Nov 14	16:47:46	54.8	55.8	64.8
0	0	03Nov 14	16:47:56	58.8	62.9	68.8
0	0	03Nov 14	16:48:06	53.3	54.5	63.3
0	0	03Nov 14	16:48:16	54.3	56.9	64.3
0	0	03Nov 14	16:48:26	55.7	58.1	65.7

0	0	03Nov 14	16:48:36	58.8	61.6	68.8
0	0	03Nov 14	16:48:46	54.6	58.2	64.6
0	0	03Nov 14	16:48:56	57.3	57.3	67.3
Stop	Intv					
Run	Key					
0	0	03Nov 14	16:52:19	54.8	59.7	64.8
0	0	03Nov 14	16:52:29	56.6	61	66.6
0	0	03Nov 14	16:52:39	52.5	58.8	62.5
0	0	03Nov 14	16:52:49	51.1	59	61.1
0	0	03Nov 14	16:52:59	47.8	49.4	57.8
0	0	03Nov 14	16:53:09	47.8	48.8	57.8
0	0	03Nov 14	16:53:19	48.2	50.3	58.2
0	0	03Nov 14	16:53:29	49.4	52.4	59.4
0	0	03Nov 14	16:53:39	50.3	52.3	60.3
0	0	03Nov 14	16:53:49	52.6	56.3	62.6
0	0	03Nov 14	16:53:59	56.3	58.8	66.3
0	0	03Nov 14	16:54:09	54.5	56.8	64.5
0	0	03Nov 14	16:54:19	53.1	55.3	63.1
0	0	03Nov 14	16:54:29	57.4	59.9	67.4
0	0	03Nov 14	16:54:39	51.2	54	61.2
0	0	03Nov 14	16:54:49	49.5	51.8	59.5
0	0	03Nov 14	16:54:59	49.5	52.4	59.5
0	0	03Nov 14	16:55:09	51.3	53.8	61.3
0	0	03Nov 14	16:55:19	50.3	52.6	60.3
0	0	03Nov 14	16:55:29	48.6	51.4	58.6
0	0	03Nov 14	16:55:39	49.3	52.1	59.3
0	0	03Nov 14	16:55:49	49.1	51.4	59.1
0	0	03Nov 14	16:55:59	49	51.8	59
0	0	03Nov 14	16:56:09	49.4	51.5	59.4
0	0	03Nov 14	16:56:19	49.3	51.8	59.3
0	0	03Nov 14	16:56:29	49.2	55.9	59.2
0	0	03Nov 14	16:56:39	49.3	51.9	59.3
0	0	03Nov 14	16:56:49	50.5	53	60.5
0	0	03Nov 14	16:56:59	51.9	55.8	61.9
0	0	03Nov 14	16:57:09	51.3	54.1	61.3
0	0	03Nov 14	16:57:19	50.2	54.3	60.2
0	0	03Nov 14	16:57:29	49	51.9	59
0	0	03Nov 14	16:57:39	50	52.1	60
0	0	03Nov 14	16:57:49	50	52.9	60
0	0	03Nov 14	16:57:59	50.6	54.1	60.6
0	0	03Nov 14	16:58:09	51.2	54.1	61.2
0	0	03Nov 14	16:58:19	50.5	55.9	60.5
0	0	03Nov 14	16:58:29	49	52.1	59
0	0	03Nov 14	16:58:39	50.6	60.1	60.6
0	0	03Nov 14	16:58:49	48.5	55.9	58.5
0	0	03Nov 14	16:58:59	62	74.9	72
0	0	03Nov 14	16:59:09	58.1	67.1	68.1

0	0	03Nov 14	16:59:19	57.9	67.5	67.9
0	0	03Nov 14	16:59:29	62.7	73.7	72.7
0	0	03Nov 14	16:59:39	56.2	68.9	66.2
0	0	03Nov 14	16:59:49	51.4	65.6	61.4
0	0	03Nov 14	16:59:59	50.9	57.1	60.9
0	0	03Nov 14	17:00:09	50.8	53.7	60.8
0	0	03Nov 14	17:00:19	51.4	53.9	61.4
0	0	03Nov 14	17:00:29	51.3	55.5	61.3
0	0	03Nov 14	17:00:39	55.6	59.1	65.6
0	0	03Nov 14	17:00:49	62.5	66.7	72.5
0	0	03Nov 14	17:00:59	53.9	59.6	63.9
0	0	03Nov 14	17:01:09	57.5	60	67.5
0	0	03Nov 14	17:01:19	61.4	68.9	71.4
0	0	03Nov 14	17:01:29	52.7	57.2	62.7
0	0	03Nov 14	17:01:39	51.7	56.1	61.7
0	0	03Nov 14	17:01:49	60.8	70.1	70.8
0	0	03Nov 14	17:01:59	61.1	67.2	71.1
0	0	03Nov 14	17:02:09	56.7	62.1	66.7
0	0	03Nov 14	17:02:19	57.6	63.4	67.6
0	0	03Nov 14	17:02:29	52.1	56.6	62.1
0	0	03Nov 14	17:02:39	55.2	60.2	65.2
0	0	03Nov 14	17:02:49	53.9	62.5	63.9
0	0	03Nov 14	17:02:59	50.6	52.9	60.6
0	0	03Nov 14	17:03:09	50.6	56.9	60.6
0	0	03Nov 14	17:03:19	50.9	53.2	60.9
0	0	03Nov 14	17:03:29	50.7	53.2	60.7
0	0	03Nov 14	17:03:39	61.3	69.7	71.3
0	0	03Nov 14	17:03:49	57.3	63.9	67.3
0	0	03Nov 14	17:03:59	57.1	66.2	67.1
0	0	03Nov 14	17:04:09	56.1	62.7	66.1
0	0	03Nov 14	17:04:19	55.2	59.3	65.2
0	0	03Nov 14	17:04:29	55.3	59.5	65.3
0	0	03Nov 14	17:04:39	57.7	61.1	67.7
0	0	03Nov 14	17:04:49	62.4	66	72.4
0	0	03Nov 14	17:04:59	57.3	61.7	67.3
0	0	03Nov 14	17:05:09	52.7	61.5	62.7
0	0	03Nov 14	17:05:19	52.2	60.9	62.2
0	0	03Nov 14	17:05:29	55.5	62.9	65.5
0	0	03Nov 14	17:05:39	50.7	58.4	60.7
0	0	03Nov 14	17:05:49	49.8	53.8	59.8
0	0	03Nov 14	17:05:59	49.7	52	59.7
0	0	03Nov 14	17:06:09	50.2	54.7	60.2
0	0	03Nov 14	17:06:19	49.3	52.8	59.3
0	0	03Nov 14	17:06:29	54.1	64.7	64.1
0	0	03Nov 14	17:06:39	51.6	60	61.6
0	0	03Nov 14	17:06:49	50.4	52.5	60.4
0	0	03Nov 14	17:06:59	53.2	57.5	63.2

0	0	03Nov 14	17:07:09	51.1	54.7	61.1
0	0	03Nov 14	17:07:19	53.5	53.5	63.5
Stop	Intv					
Run	Key					
0	0	03Nov 14	17:11:34	56.8	69.6	66.8
0	0	03Nov 14	17:11:44	58.9	69.1	68.9
0	0	03Nov 14	17:11:54	56	60.7	66
0	0	03Nov 14	17:12:04	56.9	61.1	66.9
0	0	03Nov 14	17:12:14	54.7	61.5	64.7
0	0	03Nov 14	17:12:24	53.2	56.5	63.2
0	0	03Nov 14	17:12:34	53	56.4	63
0	0	03Nov 14	17:12:44	55.6	61.4	65.6
0	0	03Nov 14	17:12:54	55	58.4	65
0	0	03Nov 14	17:13:04	55.5	58.5	65.5
0	0	03Nov 14	17:13:14	56.4	60.4	66.4
0	0	03Nov 14	17:13:24	66.2	75.4	76.2
0	0	03Nov 14	17:13:34	55.7	59.5	65.7
0	0	03Nov 14	17:13:44	65.2	70.6	75.2
0	0	03Nov 14	17:13:54	74.9	78	84.9
0	0	03Nov 14	17:14:04	68.6	73.7	78.6
0	0	03Nov 14	17:14:14	60.1	66.5	70.1
0	0	03Nov 14	17:14:24	54	59.2	64
0	0	03Nov 14	17:14:34	52.1	58.9	62.1
0	0	03Nov 14	17:14:44	52.5	55.9	62.5
0	0	03Nov 14	17:14:54	53.1	57.4	63.1
0	0	03Nov 14	17:15:04	61.8	71.9	71.8
0	0	03Nov 14	17:15:14	55.2	60	65.2
0	0	03Nov 14	17:15:24	67.7	76.7	77.7
0	0	03Nov 14	17:15:34	64.6	72	74.6
0	0	03Nov 14	17:15:44	63.2	71.9	73.2
0	0	03Nov 14	17:15:54	54.8	58.4	64.8
0	0	03Nov 14	17:16:04	51.2	56.7	61.2
0	0	03Nov 14	17:16:14	52.6	60.2	62.6
0	0	03Nov 14	17:16:24	53.5	58.5	63.5
0	0	03Nov 14	17:16:34	55	59.6	65
0	0	03Nov 14	17:16:44	54.5	57.9	64.5
0	0	03Nov 14	17:16:54	52.3	56.6	62.3
0	0	03Nov 14	17:17:04	54	59.9	64
0	0	03Nov 14	17:17:14	57.7	64.7	67.7
0	0	03Nov 14	17:17:24	63.1	70.1	73.1
0	0	03Nov 14	17:17:34	58.6	68.5	68.6
0	0	03Nov 14	17:17:44	52.2	55	62.2
0	0	03Nov 14	17:17:54	52.6	57.2	62.6
0	0	03Nov 14	17:18:04	52.8	57	62.8
0	0	03Nov 14	17:18:14	53	58.2	63
0	0	03Nov 14	17:18:24	59.6	64.9	69.6
0	0	03Nov 14	17:18:34	59	62.6	69

0	0	03Nov 14	17:18:44	63.8	72.4	73.8
0	0	03Nov 14	17:18:54	59.7	66	69.7
0	0	03Nov 14	17:19:04	54.5	60.4	64.5
0	0	03Nov 14	17:19:14	51.2	54	61.2
0	0	03Nov 14	17:19:24	54.6	63.5	64.6
0	0	03Nov 14	17:19:34	52	56.1	62
0	0	03Nov 14	17:19:44	50.9	54.5	60.9
0	0	03Nov 14	17:19:54	54	59.9	64
0	0	03Nov 14	17:20:04	67.1	76.2	77.1
0	0	03Nov 14	17:20:14	53.5	56	63.5
0	0	03Nov 14	17:20:24	59.6	67.5	69.6
0	0	03Nov 14	17:20:34	62.3	69.4	72.3
0	0	03Nov 14	17:20:44	51.1	56.3	61.1
0	0	03Nov 14	17:20:54	60.7	67	70.7
0	0	03Nov 14	17:21:04	57.9	63.6	67.9
0	0	03Nov 14	17:21:14	54	64.7	64
0	0	03Nov 14	17:21:24	52.9	57.9	62.9
0	0	03Nov 14	17:21:34	61.2	67.4	71.2
0	0	03Nov 14	17:21:44	62.3	71	72.3
0	0	03Nov 14	17:21:54	55.3	59.9	65.3
0	0	03Nov 14	17:22:04	54.7	60.2	64.7
0	0	03Nov 14	17:22:14	55.5	63.4	65.5
0	0	03Nov 14	17:22:24	54.4	59	64.4
0	0	03Nov 14	17:22:34	55.6	61.6	65.6
0	0	03Nov 14	17:22:44	56	61.7	66
0	0	03Nov 14	17:22:54	54.4	67.9	64.4
0	0	03Nov 14	17:23:04	51.9	60.8	61.9
0	0	03Nov 14	17:23:14	58.1	67	68.1
0	0	03Nov 14	17:23:24	58.6	66.8	68.6
0	0	03Nov 14	17:23:34	48.5	49.5	58.5
0	0	03Nov 14	17:23:44	60.4	67.6	70.4
0	0	03Nov 14	17:23:54	50.7	55.8	60.7
0	0	03Nov 14	17:24:04	48.7	50.1	58.7
0	0	03Nov 14	17:24:14	56.9	71.9	66.9
0	0	03Nov 14	17:24:24	63.7	72.4	73.7
0	0	03Nov 14	17:24:34	50.8	59.2	60.8
0	0	03Nov 14	17:24:44	57.2	64.9	67.2
0	0	03Nov 14	17:24:54	50.9	56.9	60.9
0	0	03Nov 14	17:25:04	53.4	62	63.4
0	0	03Nov 14	17:25:14	51.7	56.7	61.7
0	0	03Nov 14	17:25:24	61.9	69	71.9
0	0	03Nov 14	17:25:34	53.7	58.4	63.7
0	0	03Nov 14	17:25:44	52.3	56	62.3
0	0	03Nov 14	17:25:54	54.8	61.2	64.8
0	0	03Nov 14	17:26:04	53.5	58.1	63.5
0	0	03Nov 14	17:26:14	56	60.2	66
0	0	03Nov 14	17:26:24	55	58.7	65

0	0	03Nov 14	17:26:34	51.8	51.9	61.8
Stop	Intv					
Run	Key					
0	0	03Nov 14	17:29:56	60.8	77.1	70.8
0	0	03Nov 14	17:30:06	48	51.7	58
0	0	03Nov 14	17:30:16	50.2	53	60.2
0	0	03Nov 14	17:30:26	49.1	51.5	59.1
0	0	03Nov 14	17:30:36	54.8	60.6	64.8
0	0	03Nov 14	17:30:46	51.5	56.5	61.5
0	0	03Nov 14	17:30:56	53.7	55.6	63.7
0	0	03Nov 14	17:31:06	49.3	51.2	59.3
0	0	03Nov 14	17:31:16	49.4	50.5	59.4
0	0	03Nov 14	17:31:26	59.2	66.2	69.2
0	0	03Nov 14	17:31:36	51.7	60.1	61.7
0	0	03Nov 14	17:31:46	50	51.6	60
0	0	03Nov 14	17:31:56	49.4	52.7	59.4
0	0	03Nov 14	17:32:06	48.3	50.1	58.3
0	0	03Nov 14	17:32:16	48.9	50.4	58.9
0	0	03Nov 14	17:32:26	49.6	51.6	59.6
0	0	03Nov 14	17:32:36	49.3	52.4	59.3
0	0	03Nov 14	17:32:46	48	51.2	58
0	0	03Nov 14	17:32:56	48.5	50.1	58.5
0	0	03Nov 14	17:33:06	50.6	59.3	60.6
0	0	03Nov 14	17:33:16	57.6	64.5	67.6
0	0	03Nov 14	17:33:26	55.7	63.4	65.7
0	0	03Nov 14	17:33:36	54.9	63.4	64.9
0	0	03Nov 14	17:33:46	49.7	51.4	59.7
0	0	03Nov 14	17:33:56	49.4	51.3	59.4
0	0	03Nov 14	17:34:06	50.6	55.9	60.6
0	0	03Nov 14	17:34:16	53.3	57.7	63.3
0	0	03Nov 14	17:34:26	48.9	52.5	58.9
0	0	03Nov 14	17:34:36	48	49.7	58
0	0	03Nov 14	17:34:46	47.7	48.6	57.7
0	0	03Nov 14	17:34:56	48.5	50.1	58.5
0	0	03Nov 14	17:35:06	53	56.5	63
0	0	03Nov 14	17:35:16	51.4	54.4	61.4
0	0	03Nov 14	17:35:26	50.5	53.6	60.5
0	0	03Nov 14	17:35:36	51.2	53.9	61.2
0	0	03Nov 14	17:35:46	54.1	56.7	64.1
0	0	03Nov 14	17:35:56	57.1	62.6	67.1
0	0	03Nov 14	17:36:06	50.2	53.7	60.2
0	0	03Nov 14	17:36:16	50	52.1	60
0	0	03Nov 14	17:36:26	49.2	50.6	59.2
0	0	03Nov 14	17:36:36	49.3	56.3	59.3
0	0	03Nov 14	17:36:46	49.2	51.2	59.2
0	0	03Nov 14	17:36:56	55.3	64	65.3
0	0	03Nov 14	17:37:06	60.6	68.7	70.6

0	0	03Nov 14	17:37:16	63.6	70.1	73.6
0	0	03Nov 14	17:37:26	58	64.7	68
0	0	03Nov 14	17:37:36	55.1	66	65.1
0	0	03Nov 14	17:37:46	51.2	59.3	61.2
0	0	03Nov 14	17:37:56	49.7	53	59.7
0	0	03Nov 14	17:38:06	48	50.9	58
0	0	03Nov 14	17:38:16	54.8	60	64.8
0	0	03Nov 14	17:38:26	57.5	65.5	67.5
0	0	03Nov 14	17:38:36	47.7	48.7	57.7
0	0	03Nov 14	17:38:46	47.7	48.7	57.7
0	0	03Nov 14	17:38:56	48.4	51.2	58.4
0	0	03Nov 14	17:39:06	48.3	50	58.3
0	0	03Nov 14	17:39:16	49.1	51.6	59.1
0	0	03Nov 14	17:39:26	49.2	53	59.2
0	0	03Nov 14	17:39:36	48.9	52	58.9
0	0	03Nov 14	17:39:46	48.4	49.6	58.4
0	0	03Nov 14	17:39:56	49.6	52.7	59.6
0	0	03Nov 14	17:40:06	51	53.7	61
0	0	03Nov 14	17:40:16	49.6	51.9	59.6
0	0	03Nov 14	17:40:26	62	70.1	72
0	0	03Nov 14	17:40:36	48.5	49.6	58.5
0	0	03Nov 14	17:40:46	47.8	49.6	57.8
0	0	03Nov 14	17:40:56	47.2	53.7	57.2
0	0	03Nov 14	17:41:06	47	47.7	57
0	0	03Nov 14	17:41:16	49	52.5	59
0	0	03Nov 14	17:41:26	47.7	49.6	57.7
0	0	03Nov 14	17:41:36	50	54.9	60
0	0	03Nov 14	17:41:46	61	71.2	71
0	0	03Nov 14	17:41:56	50	52.1	60
0	0	03Nov 14	17:42:06	49.7	52.7	59.7
0	0	03Nov 14	17:42:16	49.8	51.2	59.8
0	0	03Nov 14	17:42:26	50.3	54	60.3
0	0	03Nov 14	17:42:36	49.5	50.3	59.5
0	0	03Nov 14	17:42:46	49.9	51.7	59.9
0	0	03Nov 14	17:42:56	49	49.8	59
0	0	03Nov 14	17:43:06	49	50.3	59
0	0	03Nov 14	17:43:16	48.8	50	58.8
0	0	03Nov 14	17:43:26	50.5	54.1	60.5
0	0	03Nov 14	17:43:36	50	53	60
0	0	03Nov 14	17:43:46	50	51.8	60
0	0	03Nov 14	17:43:56	50.4	52.2	60.4
0	0	03Nov 14	17:44:06	50.9	54.5	60.9
0	0	03Nov 14	17:44:16	49.6	52.5	59.6
0	0	03Nov 14	17:44:26	50.4	52.7	60.4
0	0	03Nov 14	17:44:36	51.3	53	61.3
0	0	03Nov 14	17:44:46	49.3	51.2	59.3
0	0	03Nov 14	17:44:56	49.1	49.1	59.1

Stop	Intv

Long Beach Riverwalk Project Run/Stop Data

Site	Location	Meas Number	Date	Time	Type	Cause
----"-------------------"------"----------"--------"----------"-----						
0		0	24Sep 14	17:05:12	Run	Key
0		0	24Sep 14	17:20:12	Stop	Intv
0		0	03Nov 14	16:33:56	Run	Key
0		0	03Nov 14	16:48:56	Stop	Intv
0		0	03Nov 14	16:52:19	Run	Key
0		0	03Nov 14	17:07:19	Stop	Intv
0		0	03Nov 14	17:11:34	Run	Key
0		0	03Nov 14	17:26:34	Stop	Intv
0		0	03Nov 14	17:29:56	Run	Key
0		0	03Nov 14	17:44:56	Stop	Intv

Noise Modeling Data

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

ProjectOnly: Daisy Ave between W. 49th St and W 48th St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                          95.2
Average automobile speed (mph):                        25.0
Medium truck volume (v/h):                        4.8
Average medium truck speed (mph):                      25.0
Heavy truck volume (v/h):                         0.0
Average heavy truck speed (mph):                       0.0
Bus volume (v/h):                           0.0
Average bus speed (mph):                          0.0
Motorcycle volume (v/h):                          0.0
Average Motorcycle speed (mph):                        0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 52.7
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Project Only: Daisy Ave south of W. 48th St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    124.7
Average automobile speed (mph):                  25.0
Medium truck volume (v/h):                  6.2
Average medium truck speed (mph):                25.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 53.9
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Project Only: W. 48th St between Daisy Ave and Pacific Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                     29.5
Average automobile speed (mph):                   25.0
Medium truck volume (v/h):                   1.5
Average medium truck speed (mph):                 25.0
Heavy truck volume (v/h):                    0.0
Average heavy truck speed (mph):                  0.0
Bus volume (v/h):                       0.0
Average bus speed (mph):                     0.0
Motorcycle volume (v/h):                     0.0
Average Motorcycle speed (mph):                   0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 47.6
```

```
        * * * * CASE INFORMATION * * * *

    * * * * Results calculated with TNM Version 2.5 * * * *

Existing: W. 48th St between Oregon Ave and Daisy Ave

  * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):              32.9
Average automobile speed (mph):            25.0
Medium truck volume (v/h):            1.6
Average medium truck speed (mph):          25.0
Heavy truck volume (v/h):             0.0
Average heavy truck speed (mph):           0.0
Bus volume (v/h):                 0.0
Average bus speed (mph):              0.0
Motorcycle volume (v/h):              0.0
Average Motorcycle speed (mph):            0.0


    * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:         soft


      * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):       35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 48.1
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Daisy Ave between Del Amo Blvd and W. 49th St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    131.9
Average automobile speed (mph):                  25.0
Medium truck volume (v/h):                  6.6
Average medium truck speed (mph):                25.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):        35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 54.1
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Daisy Ave between W. 49th St and W. 48th St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                          35.3
Average automobile speed (mph):                        25.0
Medium truck volume (v/h):                        1.8
Average medium truck speed (mph):                      25.0
Heavy truck volume (v/h):                         0.0
Average heavy truck speed (mph):                       0.0
Bus volume (v/h):                           0.0
Average bus speed (mph):                          0.0
Motorcycle volume (v/h):                          0.0
Average Motorcycle speed (mph):                        0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):           35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 48.4
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Daisy Ave south of W. 48th St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                        7.5
Average automobile speed (mph):                      25.0
Medium truck volume (v/h):                      0.4
Average medium truck speed (mph):                    25.0
Heavy truck volume (v/h):                       0.0
Average heavy truck speed (mph):                     0.0
Bus volume (v/h):                          0.0
Average bus speed (mph):                        0.0
Motorcycle volume (v/h):                        0.0
Average Motorcycle speed (mph):                      0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 41.7
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: W. 48th St between Daisy Ave and Pacific Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    49.9
Average automobile speed (mph):                  25.0
Medium truck volume (v/h):                  2.5
Average medium truck speed (mph):                25.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):        35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 49.9
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Pacific Ave between Del Amo Blvd and Pleasant St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    116.9
Average automobile speed (mph):                  25.0
Medium truck volume (v/h):                  5.8
Average medium truck speed (mph):                25.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 53.6
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: W. 48th St between Pacific Ave and Virginia Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                       70.1
Average automobile speed (mph):                     25.0
Medium truck volume (v/h):                     3.5
Average medium truck speed (mph):                   25.0
Heavy truck volume (v/h):                      0.0
Average heavy truck speed (mph):                    0.0
Bus volume (v/h):                         0.0
Average bus speed (mph):                       0.0
Motorcycle volume (v/h):                       0.0
Average Motorcycle speed (mph):                     0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 51.4
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: W. Arbor St between Virginia Ave and Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                        56.6
Average automobile speed (mph):                      25.0
Medium truck volume (v/h):                      2.8
Average medium truck speed (mph):                    25.0
Heavy truck volume (v/h):                       0.0
Average heavy truck speed (mph):                     0.0
Bus volume (v/h):                          0.0
Average bus speed (mph):                        0.0
Motorcycle volume (v/h):                        0.0
Average Motorcycle speed (mph):                      0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 50.4
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: W. 48th St between Virginia Ave and Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                        89.2
Average automobile speed (mph):                      25.0
Medium truck volume (v/h):                      4.5
Average medium truck speed (mph):                    25.0
Heavy truck volume (v/h):                       0.0
Average heavy truck speed (mph):                     0.0
Bus volume (v/h):                          0.0
Average bus speed (mph):                        0.0
Motorcycle volume (v/h):                        0.0
Average Motorcycle speed (mph):                      0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:             soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):        35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 52.4
```

* * * * CASE INFORMATION * * * *

* * * * Results calculated with TNM Version 2.5 * * * *

Existing: W 49th St west of Long Beach Blvd

* * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h): 237.5
Average automobile speed (mph): 25.0
Medium truck volume (v/h): 11.9
Average medium truck speed (mph): 25.0
Heavy truck volume (v/h): 0.0
Average heavy truck speed (mph): 0.0
Bus volume (v/h): 0.0
Average bus speed (mph): 0.0
Motorcycle volume (v/h): 0.0
Average Motorcycle speed (mph): 0.0

* * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface: soft

* * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER # 1

Residence

Distance from center of 12-ft wide, single lane roadway (ft): 35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 56.7

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Del Amo Blvd between Susana Rd and Daisy Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    3607.0
Average automobile speed (mph):                  45.0
Medium truck volume (v/h):                  180.4
Average medium truck speed (mph):                45.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.7
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Del Amo Blvd between Daisy Ave and Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    3441.0
Average automobile speed (mph):                  45.0
Medium truck volume (v/h):                  172.1
Average medium truck speed (mph):                45.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):        50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.5
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Del Amo Blvd east of Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    3276.0
Average automobile speed (mph):                  45.0
Medium truck volume (v/h):                  163.8
Average medium truck speed (mph):                45.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.2
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Long Beach Blvd south of Arbor St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                      2148.0
Average automobile speed (mph):                    35.0
Medium truck volume (v/h):                    107.4
Average medium truck speed (mph):                  35.0
Heavy truck volume (v/h):                     0.0
Average heavy truck speed (mph):                   0.0
Bus volume (v/h):                        0.0
Average bus speed (mph):                      0.0
Motorcycle volume (v/h):                      0.0
Average Motorcycle speed (mph):                    0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.4
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing: Long Beach Blvd north of Del Amo Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    1963.0
Average automobile speed (mph):                  35.0
Medium truck volume (v/h):                  98.2
Average medium truck speed (mph):                35.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.0
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: W. 48th St between Oregon Ave and Daisy Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                        32.9
Average automobile speed (mph):                      25.0
Medium truck volume (v/h):                      1.6
Average medium truck speed (mph):                    25.0
Heavy truck volume (v/h):                       0.0
Average heavy truck speed (mph):                     0.0
Bus volume (v/h):                          0.0
Average bus speed (mph):                        0.0
Motorcycle volume (v/h):                        0.0
Average Motorcycle speed (mph):                      0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 48.1
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Daisy Ave between Del Amo Blvd and W. 49th St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                      227.1
Average automobile speed (mph):                    25.0
Medium truck volume (v/h):                    11.4
Average medium truck speed (mph):                  25.0
Heavy truck volume (v/h):                     0.0
Average heavy truck speed (mph):                   0.0
Bus volume (v/h):                        0.0
Average bus speed (mph):                      0.0
Motorcycle volume (v/h):                      0.0
Average Motorcycle speed (mph):                    0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                 soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 56.5
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Daisy Ave between W. 49th St and W. 48th St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    130.5
Average automobile speed (mph):                 25.0
Medium truck volume (v/h):                  6.5
Average medium truck speed (mph):               25.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                0.0
Bus volume (v/h):                       0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                 0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 54.1
```

```
         * * * * CASE INFORMATION * * * *

    * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Daisy Ave south of W. 48th St

  * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                  132.2
Average automobile speed (mph):                25.0
Medium truck volume (v/h):                6.6
Average medium truck speed (mph):              25.0
Heavy truck volume (v/h):                 0.0
Average heavy truck speed (mph):               0.0
Bus volume (v/h):                    0.0
Average bus speed (mph):                  0.0
Motorcycle volume (v/h):                  0.0
Average Motorcycle speed (mph):                0.0


    * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:            soft


      * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):       35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 54.1
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: W. 48th St between Daisy Ave and Pacific Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                     79.4
Average automobile speed (mph):                   25.0
Medium truck volume (v/h):                   4.0
Average medium truck speed (mph):                 25.0
Heavy truck volume (v/h):                    0.0
Average heavy truck speed (mph):                  0.0
Bus volume (v/h):                       0.0
Average bus speed (mph):                     0.0
Motorcycle volume (v/h):                     0.0
Average Motorcycle speed (mph):                   0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 51.9
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Pacific Ave between Del Amo Blvd and Pleasant St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    116.9
Average automobile speed (mph):                  25.0
Medium truck volume (v/h):                  5.8
Average medium truck speed (mph):                25.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 53.6
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: W. 48th St between Pacific Ave and Virginia Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                        99.6
Average automobile speed (mph):                      25.0
Medium truck volume (v/h):                      5.0
Average medium truck speed (mph):                    25.0
Heavy truck volume (v/h):                       0.0
Average heavy truck speed (mph):                     0.0
Bus volume (v/h):                          0.0
Average bus speed (mph):                        0.0
Motorcycle volume (v/h):                        0.0
Average Motorcycle speed (mph):                      0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


        * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 52.9
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: W. Arbor St between Virginia Ave and Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                       56.6
Average automobile speed (mph):                     25.0
Medium truck volume (v/h):                     2.8
Average medium truck speed (mph):                   25.0
Heavy truck volume (v/h):                      0.0
Average heavy truck speed (mph):                    0.0
Bus volume (v/h):                         0.0
Average bus speed (mph):                       0.0
Motorcycle volume (v/h):                       0.0
Average Motorcycle speed (mph):                     0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 50.4
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: W. 48th St between Virginia Ave and Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                  118.7
Average automobile speed (mph):                25.0
Medium truck volume (v/h):                5.9
Average medium truck speed (mph):              25.0
Heavy truck volume (v/h):                 0.0
Average heavy truck speed (mph):               0.0
Bus volume (v/h):                    0.0
Average bus speed (mph):                  0.0
Motorcycle volume (v/h):                  0.0
Average Motorcycle speed (mph):                0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 53.6
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: W. 49th St west of Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                        237.5
Average automobile speed (mph):                      25.0
Medium truck volume (v/h):                      11.9
Average medium truck speed (mph):                    25.0
Heavy truck volume (v/h):                       0.0
Average heavy truck speed (mph):                     0.0
Bus volume (v/h):                          0.0
Average bus speed (mph):                        0.0
Motorcycle volume (v/h):                        0.0
Average Motorcycle speed (mph):                      0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         35.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 56.7
```

```
         * * * * CASE INFORMATION * * * *

    * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Del Amo Blvd between Susana Rd and Daisy Ave

  * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                3693.0
Average automobile speed (mph):              45.0
Medium truck volume (v/h):              184.6
Average medium truck speed (mph):            45.0
Heavy truck volume (v/h):               0.0
Average heavy truck speed (mph):             0.0
Bus volume (v/h):                  0.0
Average bus speed (mph):                0.0
Motorcycle volume (v/h):                0.0
Average Motorcycle speed (mph):              0.0


    * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:          soft


      * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):   50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.8
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Del Amo Blvd between Daisy Ave and Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    3454.0
Average automobile speed (mph):                  45.0
Medium truck volume (v/h):                  172.7
Average medium truck speed (mph):                45.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.5
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Del Amo Blvd east of Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    3289.0
Average automobile speed (mph):                  45.0
Medium truck volume (v/h):                  164.4
Average medium truck speed (mph):                45.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):        50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.3
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Long Beach Blvd south of Arbor St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    2173.0
Average automobile speed (mph):                  35.0
Medium truck volume (v/h):                  108.7
Average medium truck speed (mph):                35.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                 soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.4
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Existing+Project: Long Beach Blvd north of Del Amo Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    1969.0
Average automobile speed (mph):                  35.0
Medium truck volume (v/h):                  98.4
Average medium truck speed (mph):                35.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:              soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.0
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Cumulative+Project: Del Amo Blvd between Susana Rd and Daisy Ave

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                     4073.0
Average automobile speed (mph):                   45.0
Medium truck volume (v/h):                   203.6
Average medium truck speed (mph):                 45.0
Heavy truck volume (v/h):                    0.0
Average heavy truck speed (mph):                  0.0
Bus volume (v/h):                       0.0
Average bus speed (mph):                     0.0
Motorcycle volume (v/h):                     0.0
Average Motorcycle speed (mph):                   0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                   soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 73.2
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Cumulative+Project: Del Amo Blvd between Daisy Ave and Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    3821.0
Average automobile speed (mph):                  45.0
Medium truck volume (v/h):                  191.1
Average medium truck speed (mph):                45.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:             soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):        50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.9
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Cumulative+Project: Del Amo Blvd east of Long Beach Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    3640.0
Average automobile speed (mph):                  45.0
Medium truck volume (v/h):                  182.0
Average medium truck speed (mph):                45.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):         50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 72.7
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Cumulative+Project: Long Beach Blvd south of Arbor St

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                    2408.0
Average automobile speed (mph):                  35.0
Medium truck volume (v/h):                  120.4
Average medium truck speed (mph):                35.0
Heavy truck volume (v/h):                   0.0
Average heavy truck speed (mph):                 0.0
Bus volume (v/h):                      0.0
Average bus speed (mph):                    0.0
Motorcycle volume (v/h):                    0.0
Average Motorcycle speed (mph):                  0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:                 soft


       * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):        50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.9
```

```
          * * * * CASE INFORMATION * * * *

     * * * * Results calculated with TNM Version 2.5 * * * *

Cumulative+Project: Long Beach Blvd north of Del Amo Blvd

   * * * * TRAFFIC VOLUME/SPEED INFORMATION * * * *

Automobile volume (v/h):                     2182.0
Average automobile speed (mph):                   35.0
Medium truck volume (v/h):                   109.1
Average medium truck speed (mph):                 35.0
Heavy truck volume (v/h):                    0.0
Average heavy truck speed (mph):                  0.0
Bus volume (v/h):                       0.0
Average bus speed (mph):                     0.0
Motorcycle volume (v/h):                     0.0
Average Motorcycle speed (mph):                   0.0


     * * * * TERRAIN SURFACE INFORMATION * * * *

Terrain surface:               soft


        * * * * RECEIVER INFORMATION * * * *

DESCRIPTION OF RECEIVER #   1

Residence

Distance from center of 12-ft wide, single lane roadway (ft):          50.0
A-weighted Hourly Equivalent Sound Level without Barrier (dBA): 67.4
```

Decibel Addition and Subtraction Example

Decibel Addition and Subtraction

Sound levels are generally expressed in decibels, which are logarithmic and so cannot be manipulated without being converted back to a linear scale. You must first antilog each number, add or subtract and then log them again in the following way:

$$L = 10 \, \mathrm{Log}_{10} \left(\sum_{i=1}^{n} 10^{(L_i / 10)} \right)$$

For example, adding three levels 94.0 + 96.0 + 98.0:

$$L = 10 \, \mathrm{Log}_{10} (10^{9.4} + 10^{9.6} + 10^{9.8}) = 101.1 \text{ dB}$$

Appendix J

Transportation Impact Analysis

The Riverwalk

Transportation Impact Analysis

Final Report

Prepared for:
Integral Communities

March 26, 2015

OC13-0271

FEHR & PEERS

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VERSION CONTROL

Fehr & Peers submitted a final report that was submitted to the City of Long Beach on April 7, 2014. LLG Engineers performed a peer review of that report and submitted comments in a technical memorandum dated September 5, 2014. A summary of the comments and how this report has been updated is described below:

Comment 1 – Comment requested an update to the clearance intervals based on City guidelines.	Response 1 – The analysis and report have been updated based on this comment.
Comment 2 – Comment requested an update to the travel demand forecasts (opening year and cumulative year) to incorporate known approved and pending projects in the study area.	Response 2 – The analysis and report have been updated based on this comment and information received from City staff related to approved and pending developments in the City of Long Beach.
Comment 3- Comment questions why study intersection #5 traffic volumes on the graphics and on the technical assessment do not match the intersection counts in the technical appendix	Response 3 – This intersection has two approaches/departures to/from the west. As such, the count vendor split volumes to/from each roadway separately. The technical appendix inadvertently left out the second count sheet. The appendix has been updated to include the additional count information.
Comment 4 – Comment discusses typos on Page 12.	Response 4 – This report has been updated to address the comment.
Comment 5 – Comment discusses traffic distribution and recommends that 20% of the project traffic be distributed to the Long Beach Boulevard/Arbor Street intersection and 80% be distributed to the Daisy Avenue/Del Amo Boulevard intersection based on traffic counts.	Response 5 – Fehr & Peers has updated the assessment to assume 20% distribution to the south along Long Beach Boulevard south of the project site. Fehr & Peers also assigned some of the inbound traffic from the north/east of the site to the Long Beach Boulevard/Arbor Street intersection.
Comment 6 – Comment notes a typo in the documented growth rate.	Response 6 – Typo has been corrected.
Comment 7 – Comment notes a typo on how Table 7-1 is introduced.	Response 7 – Typo has been corrected.

Comment 8 – Comment requests modifications as follows: - Susana Road/I-710 Ramps – Code the southbound left-turn lane as protected/permissive. - Susana Road/Del Amo Boulevard – Code the westbound right-turn lane as an overlap phase. - Daisy Avenue/Del Amo Boulevard – change westbound left-turn phasing as permitted.	Response 8 – Please see below: - Susana/I-710 Ramps – This modification does not change the number of critical phases at the intersection and, as such, does not affect the assessment (although the lost time was percentage was updated). - Susana Road/Del Amo Boulevard – This modification does not change the number of critical phases or capacity of the intersection and, as such, does not affect the results of the technical assessment. - Daisy Avenue/Del Amo Boulevard – Analysis and results updated to reflect the requested modification.
Comment 9 – The project team should consider updating the projected opening year of the project.	Response 9 – The project applicant would like to begin construction as soon as possible and, as such, the project opening year has not been changed.
Comment 10 – A construction assessment should be included.	Response 10 – The City notified Fehr & Peers that LLG will be preparing the construction assessment. As such, that has not been included in this report.

After completing the updates referenced above, Fehr & Peers met with City staff, LLG staff, and Al Grover & Associates (AGA) staff to review the study and LLG work related to construction assessment and neighborhood intrusion assessment on February 10, 2015. At that time, the traffic report was "approved" by all reviewers for use in the CEQA assessment. However, Fehr & Peers was asked to update and incorporate the LLG findings into this updated report. This report includes all of the updates referenced above, plus it incorporates the update to LLG's findings related to construction and neighborhood intrusion.

1. EXECUTIVE SUMMARY

Fehr & Peers has completed an assessment for the proposed Riverwalk project in Long Beach, California. The proposed project consists of 131 homes in a gated community to be constructed at the end of Daisy Avenue, between the Los Angeles River, existing rail tracks, and West 48th Street.

As part of Fehr & Peers' assessment and consistent with Los Angeles County Congestion Management Program (CMP) requirements, the following scenarios were evaluated:

- Existing (2013) Conditions – Consists of existing (October 2013) counts collected at study intersections.

- Project Opening Year (2015) No Project Conditions – Consists of Existing (2013) Conditions traffic volumes plus an annual growth rate factor of 1.52 percent per year over the two-year period between the existing counts and the project opening year.

- Project Opening Year (2015) Plus Project Conditions – Consists of the Project Opening Year (2015) No Project Conditions traffic volumes plus traffic generated from the proposed project.

- Cumulative (Year 2030) No Project Conditions – Consists of traffic forecasts utilizing growth rates from the Los Angeles CMP, which assumes a 0.84% per year growth rate through Year 2030.

- Cumulative (Year 2030) Plus Project Conditions – Consists of Cumulative No Project Conditions traffic volumes plus traffic generated from the proposed project.

No significant impacts were identified at any analyzed intersections based on the City of Long Beach Mobility Element level of service standards and application of the Los Angeles CMP guidelines. Additionally, the project impacts to transit are considered less-than-significant.

Fehr & Peers also reviewed parking, site access, and on-site circulation for the project. There is more than sufficient parking provided on-site; however, the following site access and on-site circulation recommendations were made:

- The project sponsor should consider working with the City and the adjacent neighborhood to consider potential traffic calming techniques in the adjacent neighborhood to calm project traffic through the residential neighborhood
- The project sponsor should provide direct and safe access from the project site to the Los Angeles bicycle trail located adjacent to the site
- The project sponsor should consider bicycle parking racks at the community center and at the tot lot park
- The project sponsor should limit access to the rail tracks located south of the project site

2. INTRODUCTION AND ANALYSIS METHODOLOGIES

This chapter outlines the geographic scope of the traffic impact analysis, including the study area, analysis methodologies, and significance criteria employed in the study.

PROPOSED PROJECT

Project Description

The proposed Riverwalk project consists of 131 residential lots on 10.58 acres in the City of Long Beach. The project site is located south of Del Amo Boulevard and west of Long Beach Boulevard, bound by railroad tracks to the south, the Los Angeles River to the west and residential lots to the north and east. The proposed development is shown on Figure 2-1.

PROJECT STUDY AREA

Five study intersections were selected for evaluation for this effort. The following study intersections were identified for inclusion in the study, and are shown on Figure 2-2.

1. Susana Road at Del Amo Boulevard
2. I-710 Southbound Ramps at Del Amo Boulevard
3. Daisy Avenue at Del Amo Boulevard
4. Long Beach Boulevard at Del Amo Boulevard
5. Long Beach Boulevard at Arbor Street/48th Street

ANALYSIS SCENARIOS

The following analysis scenarios were evaluated consistent with the Los Angeles County Congestion Management Program (CMP) guidelines:

- Existing (2013) Conditions – Consists of existing (October 2013) counts collected at study intersections.

- Opening Year (2015) Conditions – Consists of Existing (2013) Conditions traffic volumes plus an annual growth rate factor of 1.52% based on recommended growth rates from the CMP guidelines plus traffic from approved and pending projects in the study area.

- Opening Year (2015) Plus Project Conditions – Consists of the Project Horizon Year (2015) No Project Conditions traffic volumes plus traffic generated from the proposed project.

- Cumulative Year (2030) Conditions – Consists of Existing (2013) Conditions traffic volumes plus an annual growth rate factor of 0.84% based on recommended growth rates from the CMP guidelines plus traffic from approved and pending projects in the study area.

- Cumulative Year (2030) Plus Project Conditions – Consists of the Project Cumulative Year (2030) No Project Conditions traffic volumes plus traffic generated from the proposed project.

PROJECT SUMMARY:

- NET AREA : 460,092 s.f. (10.56 ACRES)
- TOTAL NUMBER OF UNITS: 131
- NET DENSITY (131 units / 10.56 acres) = 12.4 du/ac
- 1ST FLOOR BLDG. FOOTPRINT:
  - -Plan 1: (1,450 s.f. x 30 units) = 43,500 s.f.
  - -Plan 2: (1,125 s.f. x 32 units) = 36,000 s.f.
  - -Plan 3: (1,126 s.f. x 35 units) = 39,375 s.f.
  - -Plan 4: (1,119 s.f. x 34 units) = 38,046 s.f.
  - -Rec Center. + Lift Station = 2,130 s.f.
  - -Total Bldg Footprint Area = 159,051 s.f.
- LOT COVERAGE = (159,087 s.f./ 460,092 s.f.) = 35%

- INTERIOR STREET:	34' Curb to Curb (26' clear) (w/ Parking on 1 side)
- ALLEY DRIVE:	20' min. (w/ 6' apron)
- GARAGE TO GARAGE:	32' (Door to door)
- REC. AREA:	15,131 s.f.
- TOT LOT AREA:	6,725 s.f.
- TURF AREA:	6,238 s.f.

- LANDSCAPE /OPEN SPACE AREA:
  - TOTAL PRIVATE LANDSCAPE AREA = 69,015 S.F.
  - TOTAL H.O.A. LANDSCAPE AREA = 125,320 S.F.
  - TOTAL LANDSCAPE/OPEN SPACE AREA = 194,335 S.F. (45%)

PLAN SUMMARY

UNIT MIX :

PLAN 1: 30 Units TOTAL
PLAN 2: 32 units TOTAL
PLAN 3: 35 units TOTAL (3 with enhanced side elevation)
PLAN 4: 34 units TOTAL (1 with enhanced side elevation)

TOTAL: 131 UNITS

✱ ASTERISK SYMBOL INDICATES UNIT WITH ENHANCED SIDE ELEVATION:
- PLAN 3: (UNITS # 31, #98 AND 104)
- PLAN 4: (UNIT #93)

PARKING SUMMARY

Garage Parking :	
- PLAN 1: (2-car) x 30 units	= 60
- PLAN 2: (2-car) x 32 units	= 64
- PLAN 3: (2-car) x 35 units	= 70
- PLAN 4: (2-car) x 34 units	= 68
- Total Garage spaces	= 262 (2.00 / unit)
GUEST PARKING:	
- Total guest spaces: (8'x20' parallel space)	= 40 (.3 / unit)
TOTAL	= 302 Spaces (2.3 spaces / unit)

Figure 2-1

Project Site Plan

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Date: March, 2014

Figure 2-2

Project Area and Study Intersections

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Date: November, 2013

ANALYSIS METHODOLOGIES

Traffic Analysis

For signalized intersections, the traffic analysis of this project was evaluated in accordance with the CMP guidelines using the Intersection Capacity Utilization (ICU) methodology. For unsignalized intersections, methodologies consistent with the *Highway Capacity Manual (HCM)* (Transportation Research Board, 2000) were applied

The ICU methodology is considered a standard approach for evaluating signalized intersection operations in Los Angeles County and in the City of Long Beach. It reports the volume-to-capacity (V/C) ratio at the intersection for signalized intersections, which evaluates the critical movements for each signal and compares that to the critical movement capacity of the intersection. Four of the five study intersections are currently signalized.

After the quantitative V/C and delay estimates are complete, the methodologies assign a qualitative letter grade that represents the operations of the intersection. These grades range from level of service (LOS) A (minimal delay) to LOS F (excessive congestion). LOS E represents at-capacity operations. Descriptions of the LOS letter grades for intersections are provided in Table 2-1.

The following parameters, based on the Los Angeles CMP guidelines, were used in this traffic analysis:

- Through lane capacities of 1,600 vehicles per hour per lane, turn lane capacities of 1,600 vehicles per hour per lane (2,880 vehicles per hour was used for dual left-turn lanes).
- A clearance interval was applied consistent with City requirements, as noted below:
    - 2 critical phases – 10%
    - 3 critical phases (Protected-Permitted) – 12%
    - 3 critical phases (Protected) – 15%
    - 4 critical phases (Protected-Permitted) – 14%
    - 4 critical phases (Protected) – 18%
- A peak hour factor (PHF) of 1.00 is used for the ICU analysis.
- A peak hour truck percentage of 2% was applied to represent heavy truck and general traffic characteristics in our study area based on our field visit and knowledge of the study area.

For the one unsignalized study intersection, the HCM methodology estimates user delay for all turning movements at the intersection. For side-street stop-controlled intersections, the weighted average for longest-delayed turning movement is reported. In cases where there are shared lanes, the average delay in that lane is reported. Please note that, because weighted average delay is utilized, the weighted average delay at intersections can be reduced when a project adds traffic to movements with lower delay. Table 2-1 also summarizes the LOS letter grades for unsignalized intersections.

Transit Assessment

Consistent with the CMP guidelines, transit assessment has been completed. This includes:

- A summary of existing transit services in the project area
- Estimate of potential transit ridership in the area

    - This is estimated by multiplying the vehicle trip generation by 1.4 to convert vehicle trips to person trips, and assigning 3.5% of the person trips to transit
- Analysis of expected project impacts on current transit services and proposed project mitigation measures by estimating if the transit share percentage during peak hours would significantly impact transit vehicles

TABLE 2-1 – INTERSECTION LEVEL OF SERVICE CRITERIA

Level of Service	Description	Volume-to-Capacity (V/C) Ratio	Delay (Seconds)
A	Signalized: Operations with very low delay occurring with favorable progression and/or short cycle length. Unsignalized: Little or no delay.	0.000-0.600	≤ 10.0
B	Signalized: Operations with low delay occurring with good progression and/or short cycle lengths. Unsignalized: Short traffic delays.	0.601-0.700	>10.0 to 15.0
C	Signalized: Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear. Unsignalized: Average traffic delays.	0.701-0.800	>15.0 to 25.0
D	Signalized: Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable. Unsignalized: Long traffic delays.	0.801-0.900	>25.0 to 35.0
E	Signalized: Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. Unsignalized: Very long traffic delays.	0.901-1.000	>35.0 to 50.0
F	Signalized: Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths. Unsignalized: Extreme traffic delays with intersection capacity exceeded.	Greater than 1.000	Greater than 50.0

FUTURE FORECASTING

Project Opening Year (2015) Conditions

Future volumes for Project Opening Year (2015) Conditions were developed by applying a 1.52% per year growth rate to existing volumes. This includes trips from approved and pending development projects (as provided from City Staff in 2015) that would add traffic to study intersections that were provided by City staff as noted below:

- Oregon Park – Local neighborhood park
- Douglas Park – three industrial buildings totaling 502,076 sq. ft.
- Lot D (Pacific Pointe East) – 91,560 sq. ft. of medical office buildings
- Weiland Brewery Restaurant
- Dutch's Brewery Restaurant
- Chick-fil-A – Located at 3290 Atlantic Avenue

Cumulative Year (2030) Conditions

Future volumes for Cumulative Year (2030) Conditions were developed using a 0.84% per year growth rate consistent with the Los Angeles County CMP guidelines.

SIGNIFICANCE CRITERIA

The following level of service (LOS) significance criteria was employed to determine if the project causes significant traffic impacts to the study area. The criteria are consistent with the City of Long Beach's Mobility Element's level of service policy and the Los Angeles County CMP guidelines.

Traffic Impacts

A significant impact would occur at a signalized study intersection when the project-related traffic causes:

- A signalized intersection to degrade from an acceptable LOS D or better to LOS E or LOS F, or
- The V/C ratio to increase by 0.02 or more at a signalized intersection operate at LOS E or LOS F, or
- Causes an unsignalized intersection operating at LOS D or better to degrade to LOS E or LOS F and the intersection satisfies the Manual for Uniform Traffic Control Devices (MUTCD) Peak Hour Volume Warrant for Traffic Signal Installation, or
- Adds traffic to an unsignalized intersection operate at an unacceptable LOS E or LOS F such that it satisfies the MUTCD Peak Hour Volume Warrant for traffic signal installation.

3. EXISTING (2013) CONDITIONS

This chapter discusses the existing transportation conditions in the project study area. This discussion addresses the roadway, transit, and pedestrian networks.

Existing Roadway Facilities

Primary regional access to the project site is provided by the Long Beach Freeway (I-710), the San Diego Freeway (I-405), and the Artesia Freeway (SR-91). I-710 runs in the north/south direction west of the project site, I-405 runs in the east/west direction south of the project site, and SR-91 runs in the east/west direction north of the project site. Local access to the project site is provided by Del Amo Boulevard, Long Beach Boulevard, Atlantic Avenue, and Daisy Avenue. These roadways are classified in the City's General Plan and described in detail below.

Regional Roads

- Interstate 710 (I-710) Freeway – The I-710 Freeway is a north-south freeway that extends from Los Angeles to Long Beach. Within the study area the freeway has a north-south orientation and generally provides four travel lanes in each direction. Access to the project site is provided via the Del Amo Blvd and Long Beach Blvd ramps.
- State Route 405 (I-405) Freeway – The I-405 Freeway is a north-south freeway that extends from the I-5 Freeway in North Los Angeles to where it reconnects with the I-5 Freeway in Irvine. Within the study area the freeway has an east-west orientation and provides five travel lanes in each direction. Access to the project site is provided via the Long Beach Boulevard ramps.
- State Route 91 (SR-91) Freeway – SR-91 is an east-west freeway that extends from I-110 in Gardena to SR-60 in San Bernardino where it turns into I-215. Within the study area, SR-91 has an east-west orientation and generally provides five travel lanes in each direction. Access to the project site is provided via the Atlantic Avenue ramps

Local Access Roads

- Del Amo Boulevard – Del Amo Boulevard is classified in the City of Long Beach Mobility Element as a Major Avenue. This roadway runs in the east-west direction north of the project site, providing direct access to I-710. Within the study area, Del Amo has three lanes in each direction, and is divided by a raised, landscaped median. On-street parking is generally permitted along Del Amo Blvd and the posted speed limit varies between 40-45 miles per hour (MPH).
- Long Beach Boulevard – Long Beach Boulevard is classified in the City of Long Beach Mobility Element as a Boulevard. The roadway runs in the north-south direction east of the project site providing direct access to I-710 and I-405 Freeway. Within the study area, Long Beach Blvd provides two lanes in each direction and is generally divided by either a raised median or two-way left turn median. On-street parking is permitted along some portions of Long Beach Blvd. The posted speed limit varies between 30-35 MPH.

- Atlantic Avenue – Atlantic Avenue is classified in the City of Long Beach Mobility Element as a Major Avenue. The roadway runs in the north-south direction east of the project site providing direct access to SR-91. Within the study area, Atlantic Ave provides two lanes in each direction and is divided by a two-way left turn median. On-street parking is permitted along some portions of Atlantic Ave. The posted speed limit is 30-35 MPH.

- Daisy Avenue – Daisy Avenue is classified in the City of Long Beach Mobility Element as a Local Street. It runs in the north-south direction providing direct access to the project site. Daisy Ave has one lane in each direction, and is undivided. On-street parking is generally permitted along Daisy Ave. The posted speed limit is 25 MPH.

- Susana Road – Susana Road is classified in the City of Long Beach Mobility Element as a Local Road. The roadway runs in the north-south direction west of the project site providing direct access to SR-91 and I-710. Within the study area, Susana Road provides two lanes in each direction and is divided by either a raised median or a two-way left turn median. On-street parking is not permitted along Susana Rd and the posted speed limit is 45 MPH.

Existing Transit Facilities

There are five transit lines that currently operate in the study area. The lines, operated by Long Beach Transit and METRO, are described in detail below:

Long Beach

- Route 191 (Santa Fe/Del Amo Blvd) – This route travels north-south from the Long Beach Downtown Civic Center stop to the Del Amo Station on Del Amo Boulevard where it turns into an east-west route, ending at Artesia High School. Near the project site, this route travels along Del Amo Boulevard with stops a quarter mile from the project site and peak period headways ranging between 30 and 60 minutes.

- Route 192 (Santa Fe/South St) – This route travels north-south from the Long Beach Downtown Civic Center stop to the Del Amo Station on Del Amo Boulevard and then becomes an east-west route traveling along South Street until the Los Cerritos Center. Near the project site, this route travels along Del Amo Boulevard with stops a quarter mile from the project site and peak period headways ranging between 30 and 60 minutes.

- Route 51 (Long Beach Boulevard to Artesia Station) – This route travels north-south from the Transit Mall Station near Downtown Civic Center to Artesia Station via Long Beach Boulevard. Near the project site, this route travels along Long Beach Boulevard with stops a half mile from the project site and peak period headways ranging between 10 and 30 minutes.

METRO

- Metro Blue Line (Downtown LA to Long Beach) - This light rail route travels north-south from Downtown Long Beach to Downtown Los Angeles, running parallel to Long Beach Boulevard and Willowbrook Avenue. Near the project site, the Blue Line stops at Del Amo Boulevard at Santa Fe Avenue about a mile from the project site. Peak period headways range between 6-12 minutes and weekend service headways ranging from 10-12 minutes.

- Local Bus Route 202 (Willowbrook-Compton-Wilmington via Alameda St) – This route travels north-south from Wilmington to Willowbrook on Del Amo Boulevard along Alameda Street, Santa Fe Street, and Willowbrook Avenue parallel to the Metro Blue line. Near the project site, this route travels briefly along Del Amo Boulevard and north on Susana Road with stops a half mile from the project site and headways ranging between 50-60 minutes during peak periods. There is no mid-day or weekend service for this route.

- Local Bus Route 60 (Downtown LA-Artesia Station via Long Beach Bl - Owl Service to Downtown Long Beach) – This route travels north-south from the Transit Mall Station near Downtown Civic Center in Long Beach to Downtown Los Angeles via Long Beach Boulevard. This bus only services Long Beach Boulevard south of Artesia during its owl service. Near the project site, this route travels along Long Beach Boulevard with stops a half mile from the project site and headways ranging between 25 and 60 minutes between 10PM and 5AM.

There are no planned transit improvements within the study area.

Bicycle Network

The bicycle network in the study area consists of dedicated bicycle facilities. The City of Long Beach has two bikeway classifications.

- Class I Path – Dedicated travel-way for bicyclists. Most common applications of Class I Bikeways are along rivers, canals, and utility right-of-ways, college campuses or within and between parks.

- Class II Lane – Delineated right-of-way assigned to bicyclists along roadways. Signs and pavement markings help define bike lanes.

Existing bikeways within the study area can be found at the following location:

- A Class I Bike Lane exists on along the Los Angeles River that passes directly west of the project site

Pedestrian Network

The pedestrian network in the study area consists of sidewalks, pedestrian crosswalks, and pedestrian crossing controls. Sidewalks are generally provided throughout the study area along with crosswalks at signalized intersections.

Traffic Volumes and Lane Configurations

Existing morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak period intersection counts were conducted at the five study intersections the first week of October 2013. These time periods generally correspond to peak period traffic conditions on typical roadways.

Existing peak traffic volumes for study intersections are shown on Figure 3-1. Lane configurations and existing traffic counts are provided in Appendix B.

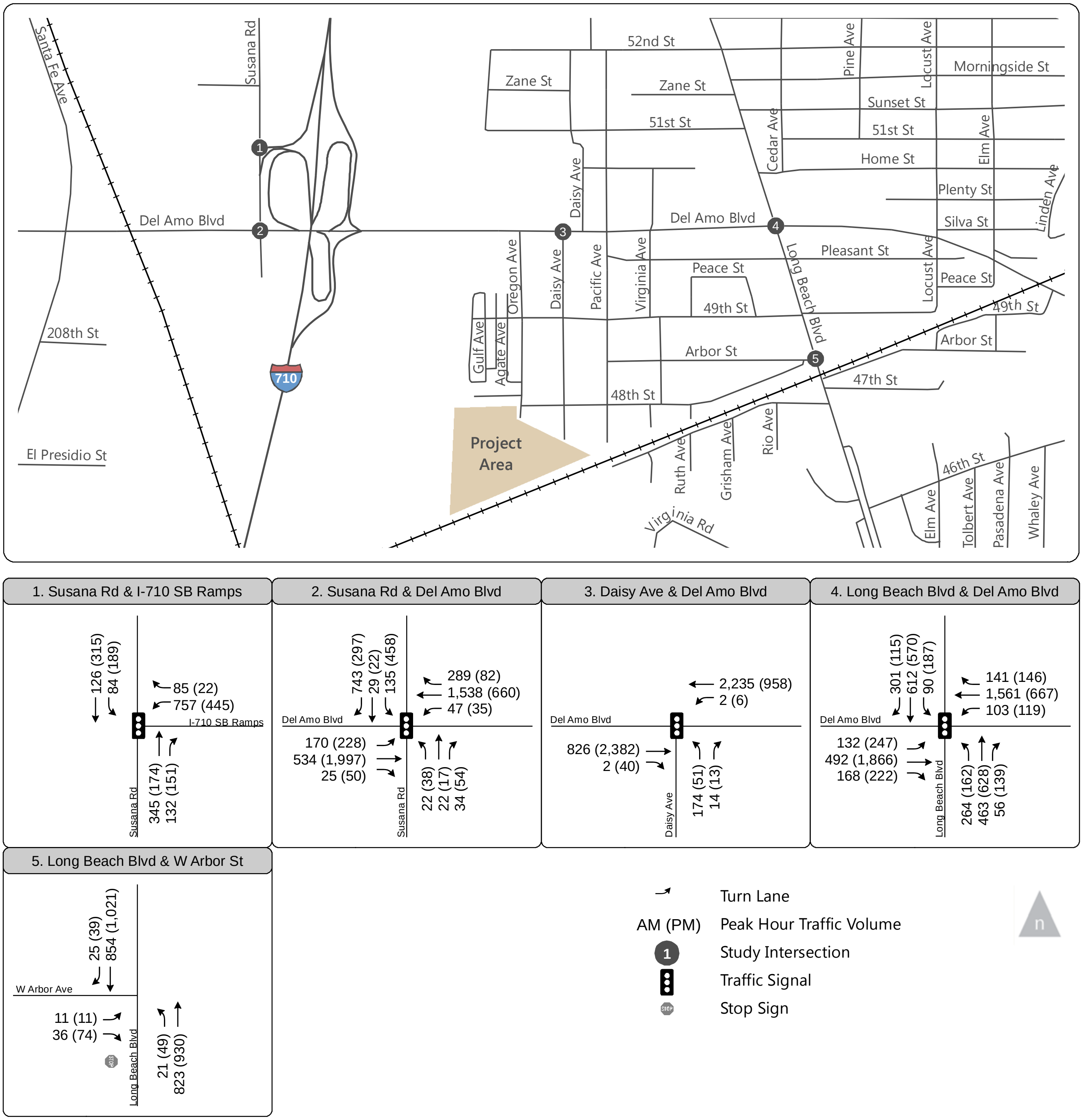

Figure 3-1

Peak Hour Traffic Volumes - Existing (2013) Conditions

FEHR PEERS

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Date: November, 2013

As part of the field inventory, Fehr & Peers also collected the following information:

- Lane configurations
- Signal phasing
- Land uses in the study area
- Existing pedestrian and bicycle facilities (sidewalks, crosswalks and bike lanes)
- On-street parking conditions
- Public transit service

Existing Intersection Operations

Fehr & Peers utilized the existing traffic volumes, lane configurations, and signal phasing information collected in the field to evaluate traffic operations at study intersections for the AM and PM peak hours. The results are summarized in Table 3-1. The technical calculations are presented in Appendix C.

As shown in Table 3-1, the five analyzed intersections currently operate at an LOS of D or better except for the following:

- Susana Road at Del Amo Boulevard – LOS E during the AM peak hour
- Long Beach Boulevard at Del Amo Boulevard – LOS E during the AM and PM peak hours

TABLE 3-1 – INTERSECTION LEVEL OF SERVICE
EXISTING (2013) CONDITIONS

Intersection	Control	AM Peak		PM Peak	
		V/C[1] or Delay[2]	LOS	V/C[1] or Delay[2]	LOS
1. Susana Road at I-710 SB Ramps	Signal	0.543	A	0.478	A
2. Susana Road at Del Amo Boulevard	Signal	0.967	E	0.846	D
3. Daisy Avenue at Del Amo Boulevard	Signal	0.683	B	0.648	B
4. Long Beach Boulevard at Del Amo Boulevard	Signal	0.907	E	0.923	E
5. Long Beach Boulevard at Arbor Avenue/48th Avenue	Side-Street Stop	17.2	C	20.4	C

Notes:

1- V/C for signalized intersections based on application of Intersection Capacity Utilization methodology using Traffix software. V/C = Volume / Capacity Ratio.

2- Delay for unsignalized intersections based on application of Highway Capacity Methodology using Traffix software. Delay reported is the worst-case approach delay.

Source: Fehr & Peers, 2013

4. PROJECT OPENING YEAR (2015) NO PROJECT TRAFFIC CONDITIONS

This chapter evaluates the Project Opening Year (2015) No Project Conditions as outlined in Chapter 2. This scenario includes the addition of ambient growth from Existing (2013) volumes to Year 2015, as well as traffic generated from pending and approved development projects.

Traffic Volumes

Traffic was estimated using a 1.52% per year growth rate, consistent with growth recommendations outlined in the CMP, plus traffic from approved and pending projects as noted earlier in Chapter 2 of this report. Project Opening Year (2015) No Project peak traffic volumes for study intersections are shown on Figure 4-1.

Roadway Improvements

There are no roadway improvements scheduled to take place by 2015 in the study area that would affect operations at the study intersections.

Intersection Operations

Intersection level of service analysis results for Project Opening Year (2015) No Project Conditions are summarized in Table 4-1. Level of service analysis sheets are provided in Appendix C. As shown in Table 4-1, most of the study intersections will continue to operate at LOS D both peak hours except for the following locations:

- Susana Road at Del Amo Boulevard – LOS E during the AM peak hour
- Long Beach Boulevard at Del Amo Boulevard – LOS E during the AM and PM peak hours

TABLE 4-1 – INTERSECTION LEVEL OF SERVICE
OPENING YEAR (2015) NO PROJECT CONDITIONS

Intersection	Control	AM Peak		PM Peak	
		V/C[1] or Delay[2]	LOS	V/C[1] or Delay[2]	LOS
1. Susana Road at I-710 SB Ramps	Signal	0.563	A	0.492	A
2. Susana Road at Del Amo Boulevard	Signal	0.994	E	0.872	D
3. Daisy Avenue at Del Amo Boulevard	Signal	0.704	C	0.669	B
4. Long Beach Boulevard at Del Amo Boulevard	Signal	0.935	E	0.951	E
5. Long Beach Boulevard at Arbor Avenue/48th Avenue	Side-Street Stop	17.8	C	21.6	C

Notes:

1- V/C for signalized intersections based on application of Intersection Capacity Utilization methodology using Traffix software. V/C = Volume / Capacity Ratio.

2- Delay for unsignalized intersections based on application of Highway Capacity Methodology using Traffix software. Delay reported is the worst-case approach delay.

Source: Fehr & Peers, 2013

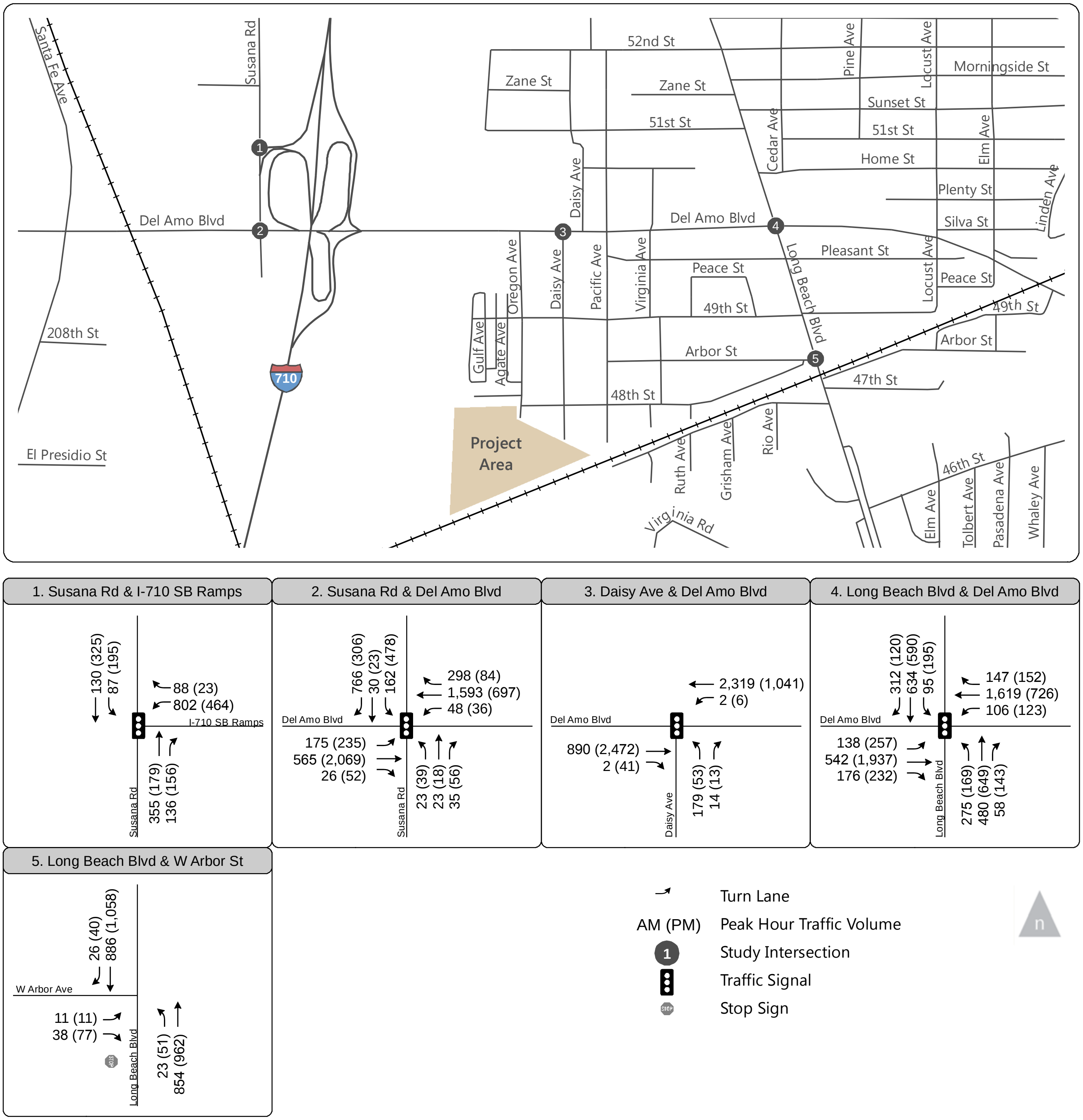

Figure 4-1

Peak Hour Traffic Volumes -

Opening Year (2015) No Project

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Date: November, 2013

5. PROJECT OPENING YEAR (2015) PLUS PROJECT TRAFFIC CONDITIONS

This chapter evaluates the Project Opening Year (2015) Plus Project Conditions as outlined in Chapter 1. This scenario analyzes the intersection conditions with the addition of ambient growth (1.52% per year) from Existing (2013) to Opening Year 2015 plus traffic associated with approved and pending projects in the study area plus traffic generated from the proposed project.

This condition is used to evaluate the net change in traffic conditions and to identify potential traffic impacts associated with the proposed project.

Traffic Volumes

Traffic was estimated for the proposed project using a three step process. First, the numbers of project trips were estimated using the Institute of Transportation Engineers' (ITE) *Trip Generation*. Next the distribution of those trips to the broader network was estimated. Finally, the trips were assigned the study network based on the distribution of those trips. This process is described in detail below.

Trip Generation

The proposed project consists of 131 single family homes. The estimated trip generation is summarized below. As shown, the project is estimated to generate 1,247 daily trips, 98 peak hour trips (24 inbound and 74 outbound), and 131 PM peak hour trips (83 inbound and 48 outbound).

TABLE 5-1 - TRIP GENERATION RATES AND ESTIMATES

Unit Count	ITE Reference	Daily	AM Peak Hour			PM Peak Hour		
			Inbound	**Outbound**	**Total**	**Inbound**	**Outbound**	**Total**
ITE (9th Edition) Trip Generation Rates								
Single Family Detached Housing		9.52	25%	75%	0.75	63%	37%	1.00
Trip Generation Estimates								
131	Single Family	1,247	24	74	98	83	48	131

Trip Distribution

Fehr & Peers estimated the trip distribution in the study area based on our knowledge of the area, existing traffic patterns in the study area, and the locations of complimentary land uses. Our estimated trip distribution is shown on Figure 5-3 and is summarized below:

- 15% to the north on I-710
- 10% to the south on I-710
- 15% to the west on I-405
- 20% to the east on I-405
- 5% to the north on Long Beach Boulevard
- 10% to the south on Long Beach Boulevard
- 5% to the west on Del Amo Boulevard
- 5% to the east on Del Amo Boulevard
- 5% to the north on Atlantic
- 10% to the south on Atlantic

Trip Assignment

Fehr & Peers used the trip generation and trip distribution information to assign project trips to the study intersections. The project trip assignment volumes are presented on Figure 5-1. The project trips were added to the Project Opening Year No Project traffic volumes to develop Project Opening Year Plus Project traffic volumes presented on Figure 5-2.

Intersection Operations

Intersection LOS results for Project Opening Year (2015) Plus Project Conditions are summarized in Table 5-2. Level of service analysis sheets are provided in Appendix C. As shown in Table 5-2, most of the study intersections will continue to operate at LOS D or better, an acceptable level, except for:

- Susana Road/De Amo Road intersection (LOS E during the AM peak hour)
- Long Beach Boulevard/De Amo Boulevard (LOS E during the AM and PM peak hours)

Intersection Impact Assessment

Based on the significance criteria described in Chapter 2, a significant impact would occur if the project increased the V/C ratio by more than 0.02 at an intersection operating at an unacceptable level. As such, the changes in the V/C ratio at the two study intersection that operate at an unacceptable level are summarized below:

- Susana Road/De Amo Road (AM peak hour) – +0.002 in the AM peak hour
- Long Beach Boulevard/De Amo Boulevard (AM and PM peak hours) – +0.002 in the AM peak hour and +0.002 in the PM peak hour

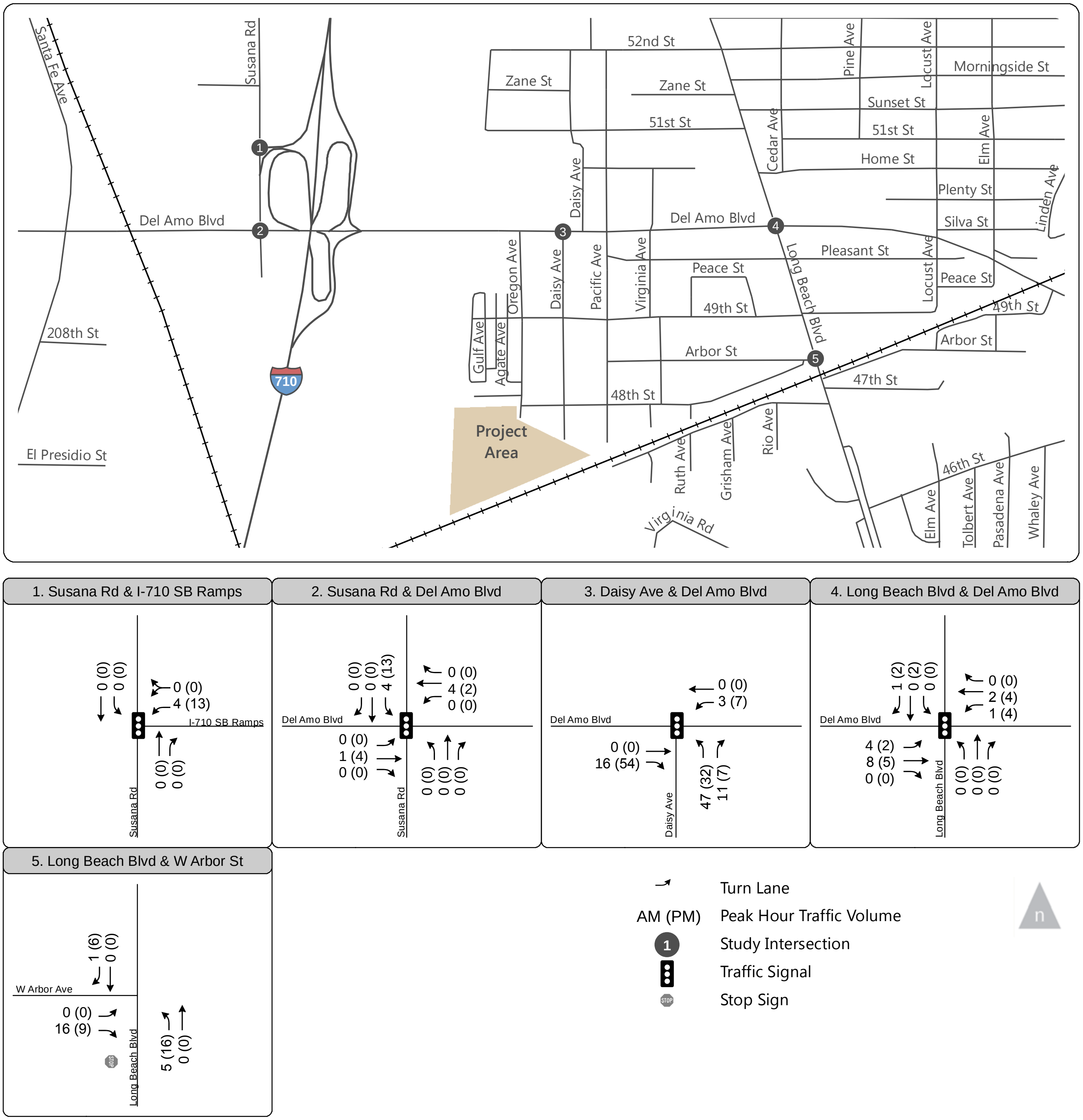

Figure 5-1

Peak Hour Traffic Volumes - Project Only Conditions

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Date: April, 2014

FEHR PEERS

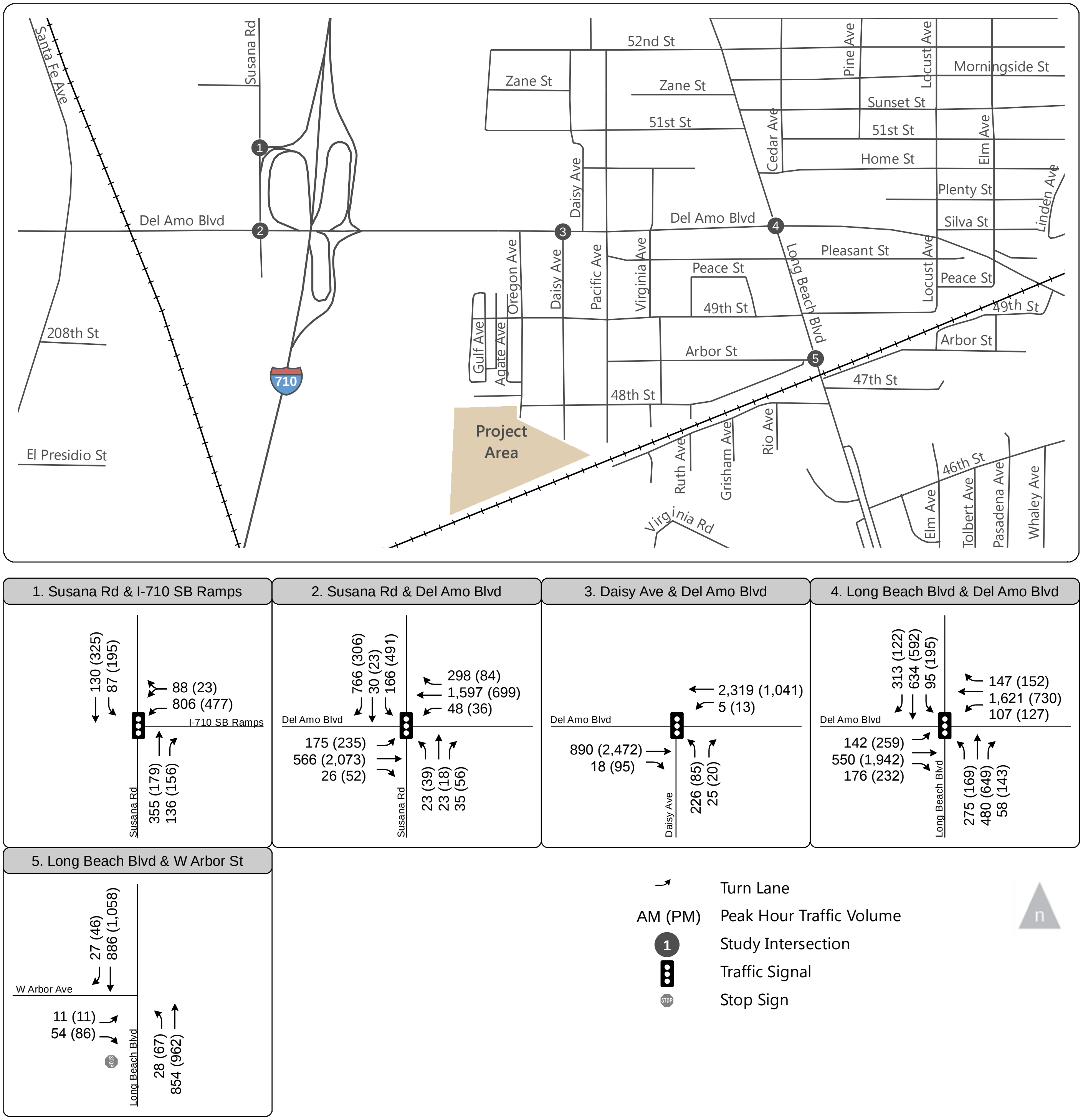

Figure 5-2

Peak Hour Traffic Volumes - Project Opening Year (2015) Plus Project

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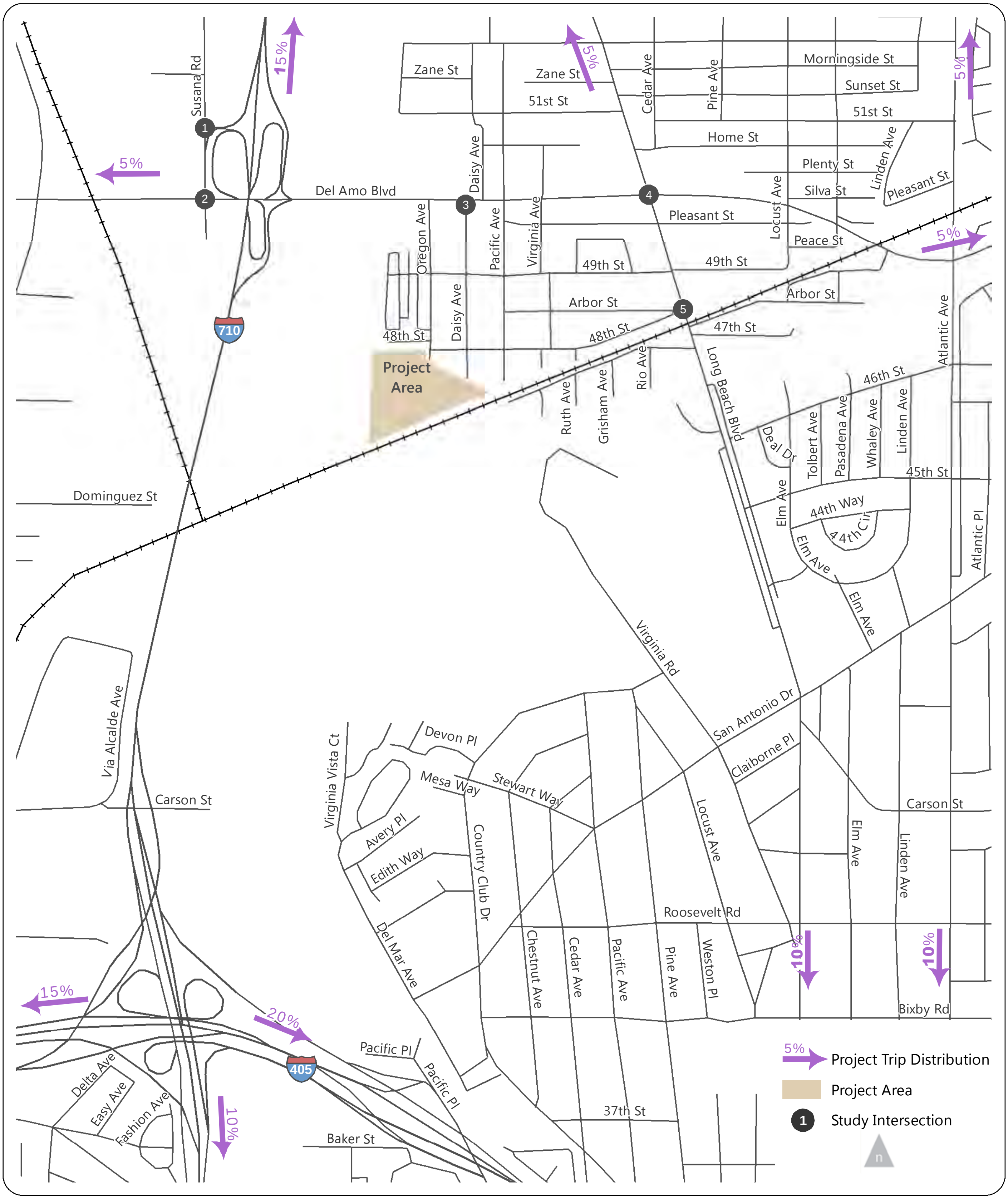

Figure 5-3

Trip Distribution

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Date: November, 2013

TABLE 5-2 – INTERSECTION LEVEL OF SERVICE
OPENING YEAR (2015) PLUS PROJECT CONDITIONS

Intersection	Control	AM Peak		PM Peak	
		V/C[1] or Delay[2]	LOS	V/C[1] or Delay[2]	LOS
1. Susana Road at I-710 SB Ramps	Signal	0.565	A	0.496	A
2. Susana Road at Del Amo Boulevard	Signal	0.996	E	0.876	D
3. Daisy Avenue at Del Amo Boulevard	Signal	0.740	C	0.709	C
4. Long Beach Boulevard at Del Amo Boulevard	Signal	0.937	E	0.953	E
5. Long Beach Boulevard at Arbor Avenue/48th Avenue	Side-Street Stop	17.1	C	22.2	C

Notes:

1- V/C for signalized intersections based on application of Intersection Capacity Utilization methodology using Traffix software. V/C = Volume / Capacity Ratio.

2- Delay for unsignalized intersections based on application of Highway Capacity Methodology using Traffix software. Delay reported is the worst-case approach delay.

Source: Fehr & Peers, 2013

Since the project does not increase the V/C ratio by more than 0.02, the project impacts to these locations is considered ***less-than-significant***.

TRANSIT ANALYSIS

As described previously, the number of transit trips generated by the project was estimated by taking the peak hour trip generation (131 PM peak hour trips), multiplying it by 1.4 to convert auto trips to person trips (183 person trips), and assuming that up-to 3.5% of those trips could be transit trips. This results in a total potential of six PM peak hour transit trips generated by the site. With five transit routes (excluding the Blue Line) serving the study area, this would equate to just over one trip per bus route. Also, with multiple buses operating on most of the routes during the peak hours, this would result in less than one additional rider per transit vehicle.

The CMP does not have a threshold for determining the significance of impacts on the transit system; however, at these levels (less than one trip per transit vehicle in the peak hour) project-related impacts on the regional transit system would not be considered significant.

6. CUMULATIVE (YEAR 2030) NO PROJECT TRAFFIC CONDITIONS

This chapter evaluates the Cumulative (Year 2030) No Project Conditions as outlined in Chapter 1.

TRAFFIC VOLUMES

Future volumes for Cumulative No Project Conditions were developed by applying a 0.84% per year growth rate to the existing Year 2013 traffic volumes and adding traffic from approved and pending projects in the study area. The resulting Cumulative No Project Conditions volumes are shown on Figure 6-1.

Please note that, for this assessment, no intersection capacity enhancement projects are assumed.

Intersection Operations

Intersection level of service analysis results for Cumulative No Project Conditions are summarized in Table 6-1. Level of service analysis sheets are provided in Appendix C. As shown in Table 6-1, the Susana Road/Del Amo Blvd and Long Beach Boulevard/Del Amo Blvd intersections are projected to operate at LOS E or LOS F during both of the peak hours.

TABLE 6-1 – INTERSECTION LEVEL OF SERVICE
CUMULATIVE NO PROJECT CONDITIONS

Intersection	Control	AM Peak		PM Peak	
		V/C[1] or Delay[2]	LOS	V/C[1] or Delay[2]	LOS
1. Susana Road at I-710 SB Ramps	Signal	0.611	B	0.532	A
2. Susana Road at Del Amo Boulevard	Signal	1.082	F	0.945	E
3. Daisy Avenue at Del Amo Boulevard	Signal	0.770	C	0.730	C
4. Long Beach Boulevard at Del Amo Boulevard	Signal	1.017	F	1.034	F
5. Long Beach Boulevard at Arbor Avenue/48th Avenue	Side-Street Stop	21.4	C	29.0	D

Notes:

1- V/C for signalized intersections based on application of Intersection Capacity Utilization methodology using Traffix software. V/C = Volume / Capacity Ratio.

2- Delay for unsignalized intersections based on application of Highway Capacity Methodology using Traffix software. Delay reported is the worst-case approach delay.

Source: Fehr & Peers, 2013

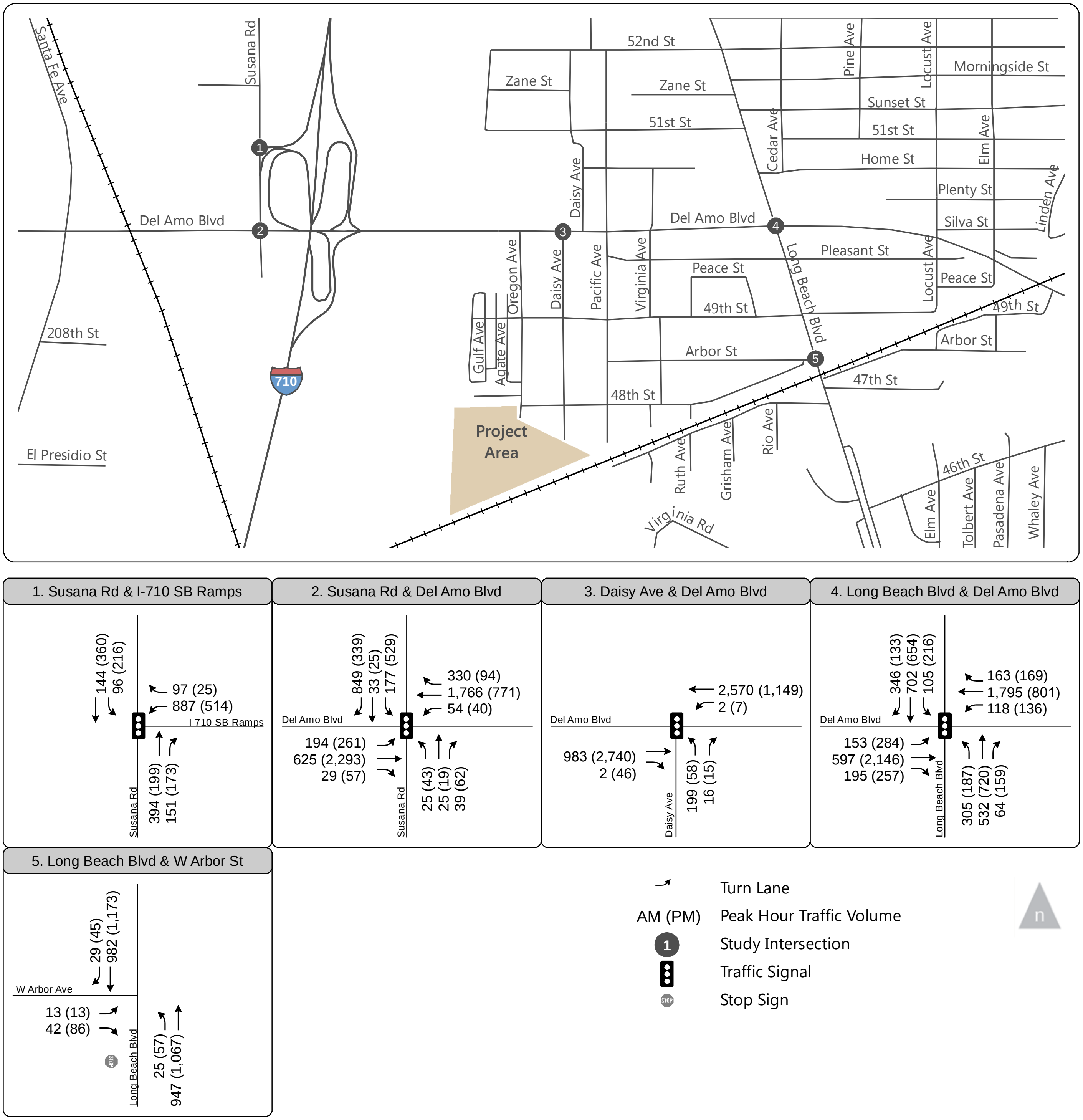

Figure 6-1

Peak Hour Traffic Volumes -

Cumulative Year (2030) No Project

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Date: November, 2013

7. CUMULATIVE (YEAR 2030) PLUS PROJECT TRAFFIC CONDITIONS

This chapter evaluates the Cumulative (Year 2030) Plus Project Conditions as outlined in Chapter 1. This scenario analyzes the intersection conditions with the addition of traffic generated from the proposed project under the Cumulative Condition.

Traffic Volumes

To estimate Cumulative Plus Project traffic volumes, the project-only traffic volumes shown on Figure 5-1 was added to the Cumulative No Project traffic volumes shown on Figure 6-1. The resulting Cumulative Plus Project traffic volumes are shown on Figure 7-1.

Please note that, for this assessment, no additional lane capacity is assumed at the study intersections.

Intersection Operations

Intersection LOS results for Cumulative Plus Project Conditions are summarized in Table 7-1 and the corresponding level of service analysis sheets are provided in Appendix C.

TABLE 7-1 – INTERSECTION LEVEL OF SERVICE
CUMULATIVE YEAR (2030) PLUS PROJECT CONDITIONS

Intersection	Control	AM Peak		PM Peak	
		V/C[1] or Delay[2]	LOS	V/C[1] or Delay[2]	LOS
1. Susana Road at I-710 SB Ramps	Signal	0.612	B	0.534	A
2. Susana Road at Del Amo Boulevard	Signal	1.084	F	0.949	E
3. Daisy Avenue at Del Amo Boulevard	Signal	0.806	D	0.768	C
4. Long Beach Boulevard at Del Amo Boulevard	Signal	1.019	F	1.037	F
5. Long Beach Boulevard at Arbor Avenue/48th Avenue	Side-Street Stop	20.5	C	30.6	D

Notes:

1- V/C for signalized intersections based on application of Intersection Capacity Utilization methodology using Traffix software. V/C = Volume / Capacity Ratio.

2- Delay for unsignalized intersections based on application of Highway Capacity Methodology using Traffix software. Delay reported is the worst-case approach delay.

Source: Fehr & Peers, 2013

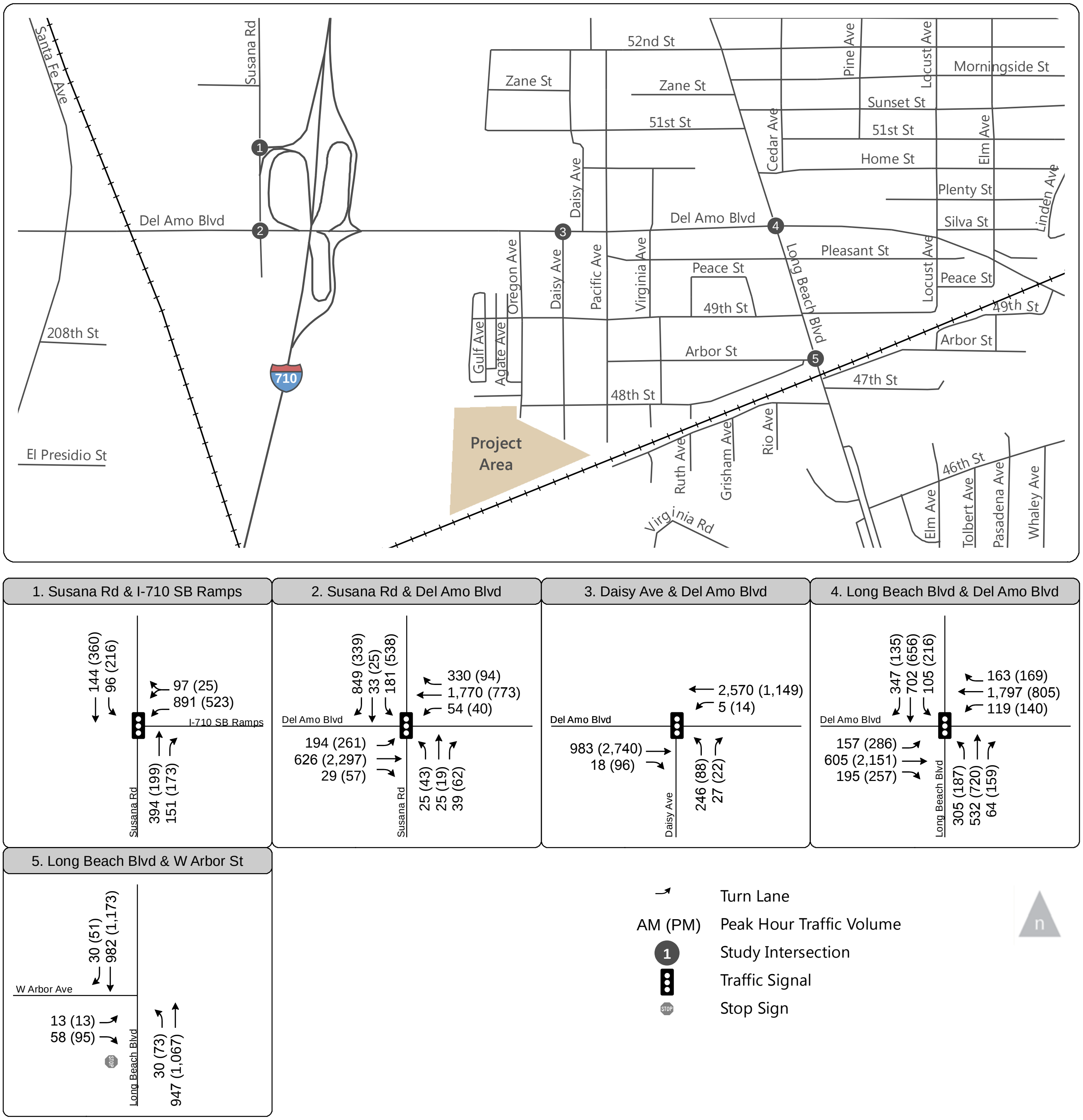

Figure 7-1

Peak Hour Traffic Volumes -
Cumulative Year (2030) Plus Project

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Date: April, 2014

As shown in Table 7-1, the following two intersections will continue to operate at an unacceptable level of service during both peak hours under the Cumulative Plus Project scenario:

- Susana Road/Del Amo Blvd
- Long Beach Blvd/Del Amo Blvd

Impact Assessment

According to the significance criteria described in Chapter 2, the project would be required to increase the volume-to-capacity ratio at study intersections by 0.02 or more to be considered a significant impact as both intersections referenced above operate at LOS E or LOS F under the Cumulative No Project scenario. As such, the change in the volume-to-capacity ratio between the Cumulative No Project and Cumulative Plus Project Conditions at these two intersections is summarized below:

- Susana Road/Del Amo Blvd – +0.002 in the AM peak hour and +0.004 in the PM peak hour
- Long Beach Blvd/Del Amo Blvd – +0.002 in the AM peak hour and +0.003 in the PM peak hour

Since the volume-to-capacity ratio increase at both intersections is less than 0.02, the cumulative project impact to these intersections is considered less-than-significant and no mitigation is required.

8. PARKING, SITE ACCESS, ON-SITE CIRCULATION, AND CONSTRUCTION ACTIVITIES

This chapter summarizes our review of parking, site access, on-site circulation, and construction activities. Fehr & Peers' review is based on the site plan for the project dated June 6, 2014.

Parking

To address the adequacy of parking, we reviewed the City of Long Beach Municipal Code parking requirements (Table 41-1A); for residential uses with more than two bedrooms, the following parking should be provided:

- 2.00 residential spaces per unit
- 0.25 guest spaces per unit (or one space per four units)

As such the project must supply 2.25 spaces per unit. Multiplying the parking requirement by the 131 proposed residential units yields a requirement of 295 on-site parking spaces. The project site plan shows a total of 302 parking spaces; as such, the proposed project provides more than enough on-site parking for the project based on the City's parking requirements.

Fehr & Peers does recommend that, at the community pool area and at the tot lot park area, the project sponsor consider providing bicycle parking for its residents.

Site Access

Vehicle Access

Vehicle access to the project site is provided via Daisy Avenue, a residential street, which provides access to a grid-system of residential streets connecting to Del Amo Boulevard and Long Beach Boulevard. At the direction of City Staff, LLG (a local transportation engineering firm) collected traffic data within the adjacent neighborhood to establish an existing baseline traffic condition by which the potential implications of added project traffic volumes could be qualitatively assessed. Fehr & Peers has been requested by City Staff to incorporate the LLG information below:

Neighborhood Transportation Assessment

LLG collected traffic counts at the following ten roadway segments located within the neighborhood adjacent to the proposed project on November 6, 2014. The traffic count sheets are included in Appendix B.

1) W. 48th Street between Oregon Avenue and Daisy Avenue
2) Daisy Avenue between Del Amo Boulevard and W. 49th Street
3) Daisy Avenue between W. 49th Street and W. 48th Street
4) Daisy Avenue south of W. 48th Street
5) W. 48th Street between Daisy Avenue and Pacific Avenue

6) Pacific Avenue between Del Amo Boulevard and Pleasant Street
7) W. 48th Street between Pacific Avenue and Virginia Avenue
8) W. Arbor Street between Virginia Avenue and Long Beach Boulevard
9) W. 48th Street between Virginia Avenue and Long Beach Boulevard
10) W. 49th Street west of Long Beach Boulevard

The City of Long Beach currently does not have specific standards for acceptable levels of traffic on local (residential) roadways. As such, LLG conducted research at other cities within Los Angeles County to identify an appropriate standard to be applied for this effort. Based on their research, the City of Glendale has guidelines showing that the upper limit of acceptable traffic for a residential street is 2,500 vehicles per day for local residential streets[1]. Therefore this value from the City of Glendale was used as a standard to qualitatively evaluate the impact of added traffic volumes by the proposed project.

As shown in Table 8-1, all of the roadways adjacent to the project site will operate below the identified 2,500 upper limit with completion of the proposed project. However, as shown in Table 8-1, the project is more than doubling the traffic volumes on some streets in the adjacent neighborhood. The roadways that are expected to have the highest level of added traffic included Daisy Avenue and 48th Street. Although these roadways will operate below the referenced upper limit, the traffic increases are not inconsequential to residents on those roadways.

As such, Fehr & Peers recommends that the project sponsor work with the City to set up a funding account to pay for the City to work with the neighborhood to develop and implement a comprehensive traffic calming program. Traffic calming is a method where measures can be implemented to either manage speeds or traffic volumes on a given roadway. However, as shown in the flowchart below (which was developed as part of the La Habra Traffic Calming Program), the success of any traffic calming program is interfacing with the community to develop a plan that serves them. As such, a community-based program would allow the City to implement a traffic calming plan to meet the needs and desires of the community. Of course, any traffic calming project will need to be reviewed by the City and first response units to ensure that the projects can be implemented without jeopardizing services to the community.

Fehr & Peers would recommend that the City hire a qualified consultant to work with the community on this effort and that the effort follows the process and recommendations documented in the US Traffic Calming Manual (Planners Press, 2009).

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[1] Source: *City of Glendale Circulation Element of the General Plan,* Planning and Public Works Divisions, dated August 1998.

Table 8-1 - Existing Plus Project Traffic Conditions Daily Roadway Segment Analysis Summary

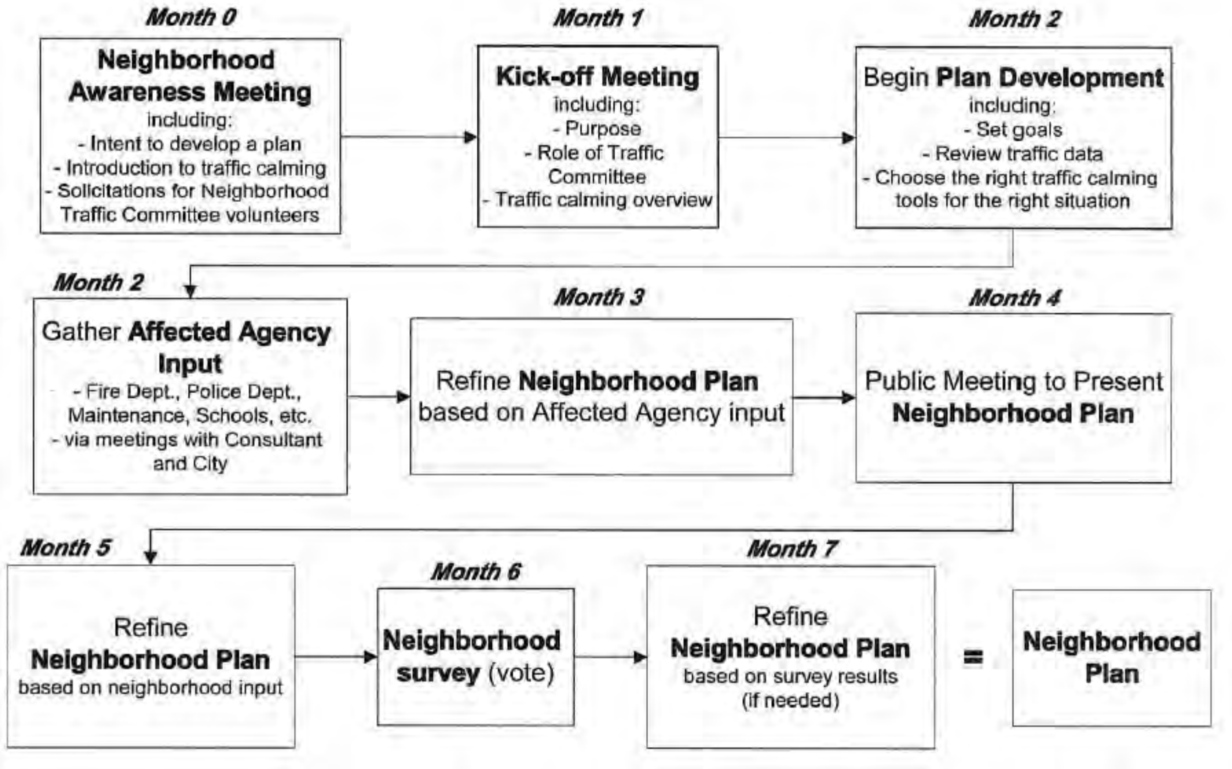
Key Roadway Segment	Type of Roadway	Upper Limit Traffic Level	Existing Traffic Conditions: Daily Traffic Volume	Existing Traffic Conditions: Above or Below the Upper Limit?	Project Only Daily Traffic Volumes	Existing Plus Project Traffic Conditions: Daily Traffic Volume	Existing Plus Project Traffic Conditions: Above or Below the Upper Limit?
1. W. 48th between Oregon and Daisy	2-lane Residential	2,500	329	Below	0	329	Below
2. Daisy between Del Amo and W. 49th	2-lane Residential	2,500	1,319	Below	952	2,271	Below
3. Daisy between W. 49th and W. 48th	2-lane Residential	2,500	353	Below	952	1,305	Below
4. Daisy south of W. 48th	2-lane Residential	2,500	75	Below	1,247	1,322	Below
5. W. 48th between Daisy and Pacific	2-lane Residential	2,500	499	Below	295	794	Below
6. Pacific between Del Amo and Pleasant	2-lane Residential	2,500	1,169	Below	0	1,169	Below
7. W. 48th between Pacific and Virginia	2-lane Residential	2,500	701	Below	295	996	Below
8. W. Arbor between Virginia and Long Beach	2-lane Residential	2,500	566	Below	0	566	Below
9. W. 48th between Virginia and Long Beach	2-lane Residential	2,500	892	Below	295	1,187	Below
10. W. 49th west of Long Beach	2-lane Residential	2,500	2,375	Below	0	2,375	Below

Source: LLG and Fehr & Peers, 2015

Bicycle Access

One major accessibility benefit of the project is its proximity to the Los Angeles River Bicycle Trail. This trail connects the study area to the region from a bicycle connectivity perspective.

Fehr & Peers recommends that the project sponsor ensure that direct, convenient, and safe connectivity to the bicycle trail is provided.



ON-SITE CIRCULATION

On-site circulation is provided by a 34-foot wide primary loop road connecting the whole of the site. 20-foot wide lanes provide access to the individual properties where primary residential access would occur. Use of the 20-foot wide lanes will minimize speeding adjacent to the residential access areas and is considered beneficial to the project.

The site plan shows pedestrian sidewalks within the project site along the outer edge of the internal loop road. These facilities will provide direct access for residents to walk to/from the community center area and the tot lot park area.

The project site also abuts the rail tracks located along the south end of the project site. Fehr & Peers would also recommend that measures be installed to prohibit access between the proposed project and the rail tracks.

CONTRUCTION TRAFFIC

Construction traffic was assessed by LLG and is summarized below. Its purpose is to summarize potential impacts due to construction activities at the project site.

The construction activities associated with the proposed Project include 1) site preparation, 2) rough grading and 3) building construction. The following section describes the potential construction related trips associated with each construction activity and provides an assessment as to whether or not the forecast construction trips will have an impact on the existing street system.

It should be noted that the construction analysis evaluated the same five (5) key study intersections evaluated in in this report.

Construction Traffic Trip Generation

In order to forecast the potential construction related trips associated with the construction activities at the project site, the following assumptions, as provided by the project applicant and Rincon Consultants (the EIR consultant for the project) and refined by the project applicant, have been utilized for the three aforementioned construction components.

Site Preparation

- A five-day work week (Monday – Friday) and eight-hour workday was assumed.
- The site preparation phase is anticipated to last approximately 20 days.
- Maximum of one haul truck per day (i.e. two total daily truck trips).
- A total of three workers will be on the site (i.e. six total daily worker trips).

Rough Grading

- 28,900 cubic yards of soil to be imported during this construction phase.
- A six-day work week (Monday – Saturday) and eight-hour workday was assumed.
- The rough grading phase is anticipated to last approximately 60 days.
- Each haul truck has a capacity of 14 cubic yards.
- Maximum of 37 haul trucks per day (i.e. 74 total daily truck trips) resulting in 518 cubic yards of soil imported each day.
- Maximum of one delivery per day (i.e. two total daily truck trips).
- A total of four workers will be on the site (i.e. eight total daily worker trips).

Building Construction

- A five-day work week (Monday – Friday) and eight-hour workday was assumed.
- The building construction phase is anticipated to last approximately 680 days.
- Based on the schedule provided, a maximum of 12 homes are under construction concurrently.
- Maximum of 24 deliveries per day (i.e. 48 total daily truck trips).
- A total of 36 workers will be on the site (i.e. 72 total daily worker trips).

In addition to the aforementioned assumptions for each construction component, the following assumptions were utilized for truck trips and employee trips.

- Each truckload requires an inbound trip and an outbound trip.
- The daily number of truck trips was averaged over the eight-hour workday to obtain the number of peak hour truck trips (50% entering and 50% exiting).
- All truck trips were converted to passenger car equivalents (P.C.E.'s) using a P.C.E. factor of 3.0.
- Each worker would make 2 trips per day (one during the AM peak hour and one during the PM peak hour).

Using the aforementioned assumptions, Table 8-2 provides a summary of the forecast construction peak hour and daily traffic volumes for each of the three construction components. As shown in the Table, the site preparation construction component is expected to generate 12 daily trips with nine trips produced during the AM peak hour and three trips produced during the PM peak hour. Rough grading construction component is expected to generate 236 daily trips with 34 trips produced during the AM peak hour and 34 trips produced during the PM peak hour. The building construction component is expected to generate 216 daily trips with 54 trips produced during the AM peak hour and 54 trips produced during the PM peak hour.

Construction Traffic Impact Assessment

Given that the building construction component will generate the greatest amount of construction-related traffic; this construction traffic assessment focuses to the potential impacts associated with the building construction component (i.e. 216 daily trips, 54 AM peak hour trips and 54 PM peak hour trips).

Construction Traffic Distribution Pattern

Regional access to/from the project site for construction trucks associated with hauls/deliveries were assumed to be provided via the I-710 Freeway (to/from the north). For truck traffic traveling to the project site, it is assumed that trucks would exit the I-710 Freeway at Susana Road, travel south on Susana Road to Del Amo Boulevard, make a left onto Del Amo Boulevard, travel east on Del Amo Boulevard to Daisy Avenue, make a right-turn onto Daisy Avenue and travel south on Daisy Avenue to the project site. Trucks leaving the project site would travel north on Daisy Avenue, make a left onto Del Amo Boulevard and travel west on Del Amo Boulevard to the I-710 Freeway.

Construction worker traffic is anticipated to utilize both regional and local roadways to travel to/from the project site. The following assumptions were utilized for worker traffic:

- 35% to/from the north via the I-710 Freeway
- 5% to/from the north via Long Beach Boulevard
- 25% to/from the south via the I-710 Freeway
- 10% to/from the south via Long Beach Boulevard

Table 8-2 - Project construction–related traffic generation

Project Description	Daily 2-Way	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Site Preparation Generation Forecast:							
• Construction Truck Traffic (1 Truck)	2	1	1	2	0	0	0
Passenger Car Equivalent Factor[1]	3	3	3	3	3	3	3
Subtotal	6	3	3	6	0	0	0
• Employees (3 Workers)	6	3	0	3	0	3	3
Total Site Preparation Construction Related Traffic Trip Generation Potential	**12**	**6**	**3**	**9**	**0**	**3**	**3**
Rough Grading Generation Forecast:							
• Construction Truck Traffic (38 Trucks)	76	5	5	10	5	5	10
Passenger Car Equivalent Factor	3	3	3	3	3	3	3
Subtotal[1]	228	15	15	30	15	15	30
• Employees (4 Workers)	8	4	0	4	0	4	4
Total Rough Grading Construction Related Traffic Trip Generation Potential	**236**	**19**	**15**	**34**	**15**	**19**	**34**
Building Construction Generation Forecast:							
• Construction Truck Traffic (24 Trucks)	48	3	3	6	3	3	6
Passenger Car Equivalent Factor[1]	3	3	3	3	3	3	3
Subtotal	144	9	9	18	9	9	18
• Employees (36 Workers)	72	36	0	36	0	36	36
Total Building Construction Related Traffic Trip Generation Potential	**216**	**45**	**9**	**54**	**9**	**45**	**54**

[1] A passenger car equivalent factor of 3.0 was applied to the truck trips to convert them into passenger car trips.

- 10% to/from the west via Del Amo Boulevard
- 15% to/from the east via Del Amo Boulevard

Existing Plus Building Construction Traffic Volumes

The AM and PM peak hour building construction trips were then added to the existing AM and PM peak hour traffic volumes to obtain existing plus building construction AM peak hour and PM peak hour traffic volumes for the five (5) key study intersections evaluated in this traffic study.

Existing Plus Construction Traffic Level of Service Results

Table 8-3 summarizes the results of the existing plus construction traffic level of service analysis at the five (5) key study intersections for the building construction component. The significance criteria identified earlier in this report were applied to identify if peak construction activities would create any significant impacts at the study intersections. As shown in Table 8-3, construction activity would not result in any significant impacts to area intersections.

Table 8-3 - Existing Plus Construction Traffic Peak Hour Intersection Capacity Analysis

Key Intersections		Time Period	Existing Traffic Conditions		Existing Plus Construction Traffic Conditions			
			ICU/ HCM	LOS	ICU/ HCM	LOS	Change in ICU/ HCM	Signif-icant Impact
1.	Susana Road at I-710 SB Ramps	AM	0.543	A	0.550	A	+0.007	No
		PM	0.478	A	0.481	A	+0.003	No
2.	Susana Road at Del Amo Boulevard	AM	**0.967**	**E**	**0.967**	**E**	+0.000	No
		PM	0.846	D	0.849	D	+0.003	No
3.	Daisy Avenue at Del Amo Boulevard	AM	0.683	B	0.689	B	+0.006	No
		PM	0.648	B	0.676	B	+0.028	No
4.	Long Beach Boulevard at Del Amo Boulevard	AM	**0.907**	**E**	**0.908**	**E**	+0.001	No
		PM	**0.923**	**E**	**0.924**	**E**	+0.001	No
5.	Long Beach Boulevard at Arbor Street	AM	17.2 sec	C	17.3 sec	C	+0.1 sec	No
		PM	20.4 sec	C	20.3 sec	C	-0.1 sec	No

Notes:
Bold ICU/LOS or **Delay/LOS** values indicate adverse service levels based on City of Long Beach LOS standards
Reduction in delay occurs as vehicles are added to turning movements with lower delay (as such, the weighted average delay decreases).

Construction Management Plan

To ensure impacts to the surrounding street system are managed appropriately, it is recommended that a Construction Management Plan for the proposed project be developed. The Construction Management

Plan should be developed in coordination with the City of Long Beach and, at a minimum, address the following:

- Traffic control for any street closure, detour, or other disruption to traffic circulation.
- Identify the routes that construction vehicles will utilize for the delivery of construction materials (i.e. lumber, tiles, piping, windows, etc.), to access the site, traffic controls and detours, and proposed construction phasing plan for the project.
- Specify the hours during which transport activities can occur and methods to mitigate construction-related impacts to adjacent streets.
- The haul route for the soil import will be prepared to the satisfaction of the City Engineer.
- Require the Applicant to keep all haul routes clean and free of debris including but not limited to gravel and dirt as a result of its operations. The Applicant shall clean adjacent streets, as directed by the City Engineer (or representative of the City Engineer), of any material which may have been spilled, tracked, or blown onto adjacent streets or areas.
- Hauling or transport of oversize loads will be allowed between the hours of 9:00 AM and 4:00 PM only, Monday through Friday, unless approved otherwise by the City Engineer. No hauling or transport will be allowed during nighttime hours, weekends or Federal holidays.
- Use of local streets shall be prohibited unless approved as part of the haul route.
- Haul trucks entering or exiting public streets shall at all times yield to public traffic; the use of flagman will be incorporated as necessary.
- If hauling operations cause any damage to existing pavement, street, curb, and/or gutter along the haul route, the applicant will be fully responsible for repairs. The repairs shall be completed to the satisfaction of the City Engineer.
- All construction-related parking and staging of vehicles will be kept out of the adjacent public roadways/residential streets and will occur on-site.
- This Plan shall meet standards established in the current California Manual on Uniform Traffic Control Device (MUTCD) as well as City of Long Beach requirements.

APPENDIX A:
ANALYSIS AND METHODOLOGY MEMO

Proposed Scope of Services for the Riverwalk Project in Long Beach Transportation Impact Study

9.27.2013

Fehr & Peers has been retained by the developer of the Riverwalk Project in the City of Long Beach. The DRAFT project site plan is attached to this document.

The project is generally located north of the railroad tracks, south of the termini of Daisy Avenue and Oregon Avenue, east of the Los Angeles River Bicycle Path, and west of Daisy Avenue. Fehr & Peers has completed a preliminary trip generation, distribution, and trip assignment estimate, which is also attached for your review. We've also attached our proposed scope of services for this effort for your review.

We are requesting that the City of Long Beach review and provide any comments on our preliminary assumptions and proposed scope of services to identify impacts associated with the proposed project.

Trip Generation

The proposed project consists of 120 single family homes. The estimated trip generation is summarized below:

Table 1: Trip Generation Rate and Estimates

Unit Count	ITE Reference	Daily	AM Peak Hour			PM Peak Hour		
			Inbound	Outbound	Total	Inbound	Outbound	Total
ITE (9^{th} Edition) Trip Generation Rates								
Single Family Detached Housing		9.52	25%	75%	0.75	63%	37%	1.00
Trip Generation Estimates								
120	Single Family	1,142	22	68	90	76	44	120

Trip Distribution

Fehr & Peers estimated the trip distribution in the study area based on our knowledge of the area. Our proposed trip distribution is summarized below:

- 25% to the north on I-710
- 10% to the south on I-710

- 15% to the west on I-405
- 20% to the east on I-405
- 5% to the north on Long Beach Boulevard
- 5% to the south on Long Beach Boulevard
- 5% to the west on Del Amo Boulevard
- 5% to the east on Del Amo Boulevard
- 5% to the north on Atlantic
- 5% to the south on Atlantic

Proposed Study Intersection

Using the trip generation and trip distribution information above, Fehr & Peers completed a preliminary hand assignment of traffic to the local transportation system. As such, we propose that the following locations be included in the level of service assessment:

- Del Amo Boulevard/S. Susana Road
- Del Amo Boulevard/I-710 Northbound Ramps
- Del Amo Boulevard/I-710 Southbound Ramps
- Del Amo Boulevard/Daisy Avenue
- Del Amo Boulevard/Long Beach Boulevard
- Long Beach Boulevard/West Arbor Street

Methodology

Fehr & Peers also understands that the City has recently completed a mobility element update, where multi-modal level of service (MMLOS) has been identified to evaluate study facilities. Additionally, we understand that the City has traditionally utilized Intersection Capacity Utilization methodologies to evaluate development projects. As such, we are requesting the City to provide verification and direction on the methodology that should be applied for this project.

Site Calculations

Total Acerage:	10.58 AC
Total Lots:	120
Density:	11.3DU/AC
Arch Product:	The Terraces
Min. Lot Area	1,925 SF
Min. Lot Width	35 FT
Maximum Height	32/35 FT
Front Setback	8 Ft (AVE.)
Side Setback	3 FT
Rear Setback	8 FT
Floor Area Ratio	1.2

Parking Calculations

Parking Required:	270	(2.5 / UNIT)
Parking Provided:		
Garage parking	240	(2 / UNIT)
Plan 1 Driveway Space	40	Driveway space
Guest parking	103	
Total Provided:	**383**	(3.2/UNIT)

RIVERWALK LONG BEACH

UA JOB #: 13-091 DATE: 09.16.13

CONCEPTUAL SITE PLAN OPTION E

INTEGRAL Communities A DIVERSIFIED REAL ESTATE COMPANY

URBAN ARENA

SCALE: 1"= 40'-0"

0 20 40 80

APPENDIX B:
TRAFFIC COUNT SHEETS AND LANE CONFIGURATIONS

Study Intersections Lane Configurations

Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1. Susana Rd & I-710 SB Ramps		2	1	1	2					1.5		0.5
2. Susana Rd & Del Amo Blvd	0.5	0.5	0.5	1.5	0.5	2	1	2.5	0.5	1	2	1
3. Daisy Ave & Del Amo Blvd	0.5		0.5					2.5	0.5	1	3	
4. Long Beach Blvd & Del Amo Blvd	1	2	1	1	2	1	2	3	1	2	3	1
5. Long Beach Blvd & Arbor St/48th St	1	2			1.5	0.5	0.5		0.5			

Notes:

1. Half lanes indicate shared lanes.

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-002

Day: Thursday

City: Long Beach

Date: 10/3/2013

AM

NS/EW Streets:	Susana Rd			Susana Rd			I-710 SB Ramps			I-710 SB Ramps			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	0	1	0	3	0	0	2	1	
7:00 AM	0	45	31	26	27	0	0	0	0	210	0	16	355
7:15 AM	0	71	30	18	35	0	0	0	0	184	0	12	350
7:30 AM	0	85	33	18	42	0	0	0	0	176	0	11	365
7:45 AM	0	104	29	19	34	0	0	0	0	204	0	8	398
8:00 AM	0	83	28	23	28	0	0	0	0	199	0	28	389
8:15 AM	0	81	32	23	29	0	0	0	0	175	0	22	362
8:30 AM	0	77	43	19	35	0	0	0	0	179	0	27	380
8:45 AM	0	64	29	18	30	0	0	0	0	162	0	37	340
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	610	255	164	260	0	0	0	0	1489	0	161	2939
APPROACH %'s :	0.00%	70.52%	29.48%	38.68%	61.32%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	90.24%	0.00%	9.76%	
PEAK HR START TIME :	745 AM												TOTAL
PEAK HR VOL :	0	345	132	84	126	0	0	0	0	757	0	85	1529
PEAK HR FACTOR :		0.897			0.972			0.000			0.927		0.960

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

CONTROL : 1-Way Stop SB

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-002

City: Long Beach

Day: Thursday

Date: 10/3/2013

PM

NS/EW Streets:	Susana Rd			Susana Rd			I-710 SB Ramps			I-710 SB Ramps			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	0	1	0	3	0	0	2	1	
4:00 PM	0	52	39	40	64	0	0	0	0	124	0	11	330
4:15 PM	0	37	41	36	66	0	0	0	0	116	0	10	306
4:30 PM	0	52	32	39	71	0	0	0	0	112	0	3	309
4:45 PM	0	39	33	32	80	0	0	0	0	110	0	1	295
5:00 PM	0	46	45	82	98	0	0	0	0	107	0	8	386
5:15 PM	0	35	31	47	57	0	0	0	0	116	0	3	289
5:30 PM	0	24	42	30	44	0	0	0	0	117	0	6	263
5:45 PM	0	22	33	30	32	0	0	0	0	121	0	7	245

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	307	296	336	512	0	0	0	0	923	0	49	2423
APPROACH %'s :	0.00%	50.91%	49.09%	39.62%	60.38%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	94.96%	0.00%	5.04%	

PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	0	174	151	189	315	0	0	0	0	445	0	22	1296
PEAK HR FACTOR :	0.893			0.700			0.000			0.927			0.839

CONTROL : 1-Way Stop SB

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-001

Day: Thursday

City: Long Beach

Date: 10/3/2013

AM

NS/EW Streets:	Susana Rd			Susana Rd			Del Amo Blvd			Del Amo Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	2	1	3	0	1	2.5	0.5	
7:00 AM	2	2	6	28	9	202	40	121	9	11	332	36	798
7:15 AM	4	0	5	28	5	187	46	131	7	14	370	60	857
7:30 AM	8	6	7	27	10	172	35	130	10	16	416	77	914
7:45 AM	8	8	8	38	10	198	43	137	1	12	395	88	946
8:00 AM	2	8	14	42	4	186	46	136	7	5	357	64	871
8:15 AM	5	5	7	38	5	156	46	132	2	9	312	71	788
8:30 AM	3	4	13	61	4	155	46	158	3	5	224	65	741
8:45 AM	7	3	2	44	3	155	31	124	4	10	221	54	658
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	39	36	62	306	50	1411	333	1069	43	82	2627	515	6573
APPROACH %'s :	28.47%	26.28%	45.26%	17.32%	2.83%	79.85%	23.04%	73.98%	2.98%	2.54%	81.48%	15.97%	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	22	22	34	135	29	743	170	534	25	47	1538	289	3588
PEAK HR FACTOR :		0.813			0.922			0.964			0.920		0.948

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-001

Day: Thursday

City: Long Beach

Date: 10/3/2013

PM

NS/EW Streets:	Susana Rd			Susana Rd			Del Amo Blvd			Del Amo Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	1	2	1	3	0	1	2.5	0.5	
4:00 PM	8	4	25	104	4	87	53	437	12	8	151	33	926
4:15 PM	3	7	17	112	8	63	50	478	3	12	183	21	957
4:30 PM	7	4	20	113	4	76	60	455	9	11	171	27	957
4:45 PM	9	5	10	121	5	72	51	514	13	7	143	22	972
5:00 PM	10	3	13	123	10	78	68	487	12	14	162	23	1003
5:15 PM	12	5	11	101	3	71	49	541	16	3	184	10	1006
5:30 PM	4	6	15	95	7	68	52	535	7	3	143	9	944
5:45 PM	6	2	14	89	11	56	42	466	14	10	121	10	841
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	59	36	125	858	52	571	425	3913	86	68	1258	155	7606
APPROACH %'s :	26.82%	16.36%	56.82%	57.93%	3.51%	38.56%	9.61%	88.45%	1.94%	4.59%	84.94%	10.47%	
PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	38	17	54	458	22	297	228	1997	50	35	660	82	3938
PEAK HR FACTOR :		0.879			0.921			0.939			0.929		0.979

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-004

Day: Thursday

City: Long Beach

Date: 10/3/2013

AM

NS/EW Streets:	Daisy Ave (south leg)			Daisy Ave (south leg)			Del Amo Blvd			Del Amo Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	0	0	0	3	0	1	3	0	
7:00 AM	21	0	0	0	0	0	0	167	0	0	550	0	738
7:15 AM	40	0	3	0	0	0	0	189	0	1	593	0	826
7:30 AM	55	0	1	0	0	0	0	193	1	0	599	0	849
7:45 AM	45	0	4	0	0	0	0	233	0	0	528	0	810
8:00 AM	34	0	6	0	0	0	0	211	1	1	515	0	768
8:15 AM	21	0	4	0	0	0	0	239	0	0	441	0	705
8:30 AM	22	0	11	0	0	0	0	267	0	3	363	0	666
8:45 AM	12	0	4	0	0	0	0	219	0	2	350	0	587

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	250	0	33	0	0	0	0	1718	2	7	3939	0	5949
APPROACH %'s :	88.34%	0.00%	11.66%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	99.88%	0.12%	0.18%	99.82%	0.00%	

PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	174	0	14	0	0	0	0	826	2	2	2235	0	3253
PEAK HR FACTOR :		0.839			0.000			0.888			0.934		0.958

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-004

Day: Thursday

City: Long Beach

Date: 10/3/2013

PM

NS/EW Streets:	Daisy Ave (south leg)			Daisy Ave (south leg)			Del Amo Blvd			Del Amo Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	0	0	0	0	3	0	1	3	0	
4:00 PM	9	0	0	0	0	0	0	521	7	2	222	0	761
4:15 PM	16	0	0	0	0	0	0	576	0	0	238	0	830
4:30 PM	12	0	3	0	0	0	0	603	8	4	261	0	891
4:45 PM	8	0	4	0	0	0	0	600	10	2	234	0	858
5:00 PM	13	0	2	0	0	0	0	585	7	0	231	0	838
5:15 PM	18	0	4	0	0	0	0	594	15	0	232	0	863
5:30 PM	11	0	7	0	0	0	0	607	5	0	251	0	881
5:45 PM	11	0	3	0	0	0	0	594	6	2	207	0	823
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	98	0	23	0	0	0	0	4680	58	10	1876	0	6745
APPROACH %'s :	80.99%	0.00%	19.01%	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	98.78%	1.22%	0.53%	99.47%	0.00%	
PEAK HR START TIME :	430 PM												TOTAL
PEAK HR VOL :	51	0	13	0	0	0	0	2382	40	6	958	0	3450
PEAK HR FACTOR :		0.727			0.000			0.991			0.909		0.968

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-005

Day: Thursday

City: Long Beach

Date: 10/3/2013

AM

NS/EW Streets:	Long Beach Blvd			Long Beach Blvd			Del Amo Blvd			Del Amo Blvd			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	1	1	2	1	2	3	1	2	3	1	
7:00 AM	58	106	19	33	117	66	27	110	27	14	379	17	973
7:15 AM	68	116	13	20	131	90	28	120	39	18	407	23	1073
7:30 AM	63	105	11	25	174	90	32	121	34	23	415	42	1135
7:45 AM	71	111	14	29	152	66	34	130	50	32	373	44	1106
8:00 AM	62	131	18	16	155	55	38	121	45	30	366	32	1069
8:15 AM	56	91	12	21	148	42	50	131	45	25	324	31	976
8:30 AM	69	93	19	37	152	52	45	155	71	22	254	25	994
8:45 AM	49	93	13	39	160	37	53	117	48	22	256	32	919
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	496	846	119	220	1189	498	307	1005	359	186	2774	246	8245
APPROACH %'s :	33.95%	57.91%	8.15%	11.54%	62.35%	26.11%	18.37%	60.14%	21.48%	5.80%	86.53%	7.67%	

UTURNS			
NB	SB	EB	WB
0	0	2	0
0	0	6	0
0	0	1	0
0	0	1	0
0	0	2	0
0	0	3	0
0	0	2	0
0	0	5	0
NB	SB	EB	WB
0	0	22	0

PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	264	463	56	90	612	301	132	492	168	103	1561	141	4383
PEAK HR FACTOR :		0.928			0.868			0.925			0.940		0.965

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-005 **Day:** Thursday

City: Long Beach **Date:** 10/3/2013

PM

NS/EW Streets:	Long Beach Blvd			Long Beach Blvd			Del Amo Blvd			Del Amo Blvd							
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				UTURNS			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB
LANES:	1	2	1	1	2	1	2	3	1	2	3	1					
4:00 PM	36	118	30	41	122	28	56	423	82	32	156	34	1158	0	0	0	0
4:15 PM	37	149	40	43	151	29	48	394	73	31	161	43	1199	0	0	0	0
4:30 PM	40	150	35	43	159	35	58	421	74	21	172	30	1238	0	0	0	0
4:45 PM	36	126	29	46	150	33	50	424	58	36	141	30	1159	0	0	0	0
5:00 PM	40	171	40	49	140	28	43	469	59	28	186	38	1291	0	0	0	1
5:15 PM	41	180	35	48	154	23	65	452	46	34	177	38	1293	0	0	0	1
5:30 PM	44	136	31	44	140	36	55	486	65	28	170	27	1262	0	0	0	0
5:45 PM	37	141	33	46	136	28	84	459	52	29	134	43	1222	0	0	0	0

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB
TOTAL VOLUMES :	311	1171	273	360	1152	240	459	3528	509	239	1297	283	9822	0	0	0	2
APPROACH %'s :	17.72%	66.72%	15.56%	20.55%	65.75%	13.70%	10.21%	78.47%	11.32%	13.14%	71.30%	15.56%					

PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	162	628	139	187	570	115	247	1866	222	119	667	146	5068
PEAK HR FACTOR :		0.907			0.969			0.963			0.925		0.980

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-006

Day: Thursday

City: Long Beach

Date: 10/3/2013

AM

NS/EW Streets:	Long Beach Blvd			Long Beach Blvd			W Arbor St			W Arbor St			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	0	2	0	0	1	0	0	0	0	
7:00 AM	1	172	0	0	165	0	3	0	2	0	0	0	343
7:15 AM	4	194	0	0	189	2	5	0	4	0	0	0	398
7:30 AM	2	188	0	0	221	3	2	0	4	0	0	0	420
7:45 AM	2	213	0	0	230	6	0	0	4	0	0	0	455
8:00 AM	3	228	0	0	214	2	0	0	0	0	0	0	447
8:15 AM	1	143	0	0	215	3	4	0	2	0	0	0	368
8:30 AM	0	159	0	0	230	5	1	0	1	0	0	0	396
8:45 AM	0	139	0	0	221	3	1	0	1	0	0	0	365
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	13	1436	0	0	1685	24	16	0	18	0	0	0	3192
APPROACH %'s :	0.90%	99.10%	0.00%	0.00%	98.60%	1.40%	47.06%	0.00%	52.94%	#DIV/0!	#DIV/0!	#DIV/0!	
PEAK HR START TIME :	715 AM												TOTAL
PEAK HR VOL :	11	823	0	0	854	13	7	0	12	0	0	0	1720
PEAK HR FACTOR :		0.903			0.918			0.528			0.000		0.945

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

CONTROL : 1-Way Stop (EB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-006 **Day:** Thursday

City: Long Beach **Date:** 10/3/2013

PM

NS/EW Streets:	Long Beach Blvd			Long Beach Blvd			W Arbor St			W Arbor St			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	0	2	0	0	1	0	0	0	0	
4:00 PM	5	198	0	0	216	7	3	0	2	0	0	0	431
4:15 PM	5	213	0	0	243	4	2	0	1	0	0	0	468
4:30 PM	2	219	0	0	260	3	0	0	7	0	0	0	491
4:45 PM	3	182	0	0	242	4	0	0	4	0	0	0	435
5:00 PM	6	285	0	0	242	2	1	0	8	0	0	0	544
5:15 PM	7	225	0	0	265	5	1	0	5	0	0	0	508
5:30 PM	3	224	0	0	264	3	0	0	5	0	0	0	499
5:45 PM	3	196	0	0	250	8	3	0	3	0	0	0	463

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	34	1742	0	0	1982	36	10	0	35	0	0	0	3839
APPROACH %'s :	1.91%	98.09%	0.00%	0.00%	98.22%	1.78%	22.22%	0.00%	77.78%	#DIV/0!	#DIV/0!	#DIV/0!	

UTURNS			
NB	SB	EB	WB
0	0	0	0

PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	19	930	0	0	1021	18	5	0	21	0	0	0	2014
PEAK HR FACTOR :		0.815			0.962			0.722			0.000		0.926

CONTROL : 1-Way Stop (EB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-106

Day: Thursday

City: Long Beach

Date: 10/3/2013

AM

NS/EW Streets:	Long Beach Blvd			Long Beach Blvd			W 48th St			W 48th St			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	0	2	0	0	1	0	0	0	0	
7:00 AM	2	0	0	0	0	1	3	0	4	0	0	0	10
7:15 AM	1	0	0	0	0	0	2	0	9	0	0	1	13
7:30 AM	0	0	0	0	0	0	2	0	9	0	0	0	11
7:45 AM	2	0	0	0	0	5	1	0	10	0	0	0	18
8:00 AM	2	0	0	0	0	3	0	0	4	0	0	0	9
8:15 AM	3	0	0	0	0	0	1	0	4	0	0	0	8
8:30 AM	3	0	0	0	0	4	2	0	6	0	0	2	17
8:45 AM	1	0	0	0	0	6	2	0	5	0	0	0	14
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	14	0	0	0	0	19	13	0	51	0	0	3	100
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	20.31%	0.00%	79.69%	0.00%	0.00%	100.00%	
PEAK HR START TIME :	745 AM												TOTAL
PEAK HR VOL :	10	0	0	0	0	12	4	0	24	0	0	2	52
PEAK HR FACTOR :	0.833			0.600			0.636			0.250			0.722

UTURNS			
NB	SB	EB	WB
NB	SB	EB	WB
0	0	0	0

CONTROL : 1-Way Stop (EB)

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 13-5514-106

Day: Thursday

City: Long Beach

Date: 10/3/2013

PM

NS/EW Streets:	Long Beach Blvd			Long Beach Blvd			W 48th St			W 48th St			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2	0	0	2	0	0	1	0	0	0	0	
4:00 PM	5	0	0	0	0	3	0	0	6	0	0	1	15
4:15 PM	1	0	0	0	0	2	4	0	12	0	0	0	19
4:30 PM	4	0	0	0	0	4	1	0	17	0	0	1	27
4:45 PM	6	0	0	0	0	8	1	0	12	0	0	0	27
5:00 PM	10	0	0	0	0	3	1	0	12	0	0	0	26
5:15 PM	8	0	0	0	0	8	1	0	13	0	0	0	30
5:30 PM	6	0	0	0	0	2	3	0	16	0	0	0	27
5:45 PM	6	0	0	0	0	1	2	0	14	0	0	0	23
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	46	0	0	0	0	31	13	0	102	0	0	2	194
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	0.00%	100.00%	11.30%	0.00%	88.70%	0.00%	0.00%	100.00%	

UTURNS			
NB	SB	EB	WB
0	0	0	0

PEAK HR START TIME :	445 PM												TOTAL
PEAK HR VOL :	30	0	0	0	0	21	6	0	53	0	0	0	110
PEAK HR FACTOR :	0.750			0.656			0.776			0.000			0.917

CONTROL : 1-Way Stop (EB)

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location : W. 48TH STREET
Segment : OREGON AVE TO DAISY AVE
Client : LL&G

Site: LONG BEACH
Date: 11/06/14

Day: Thursday

Interval	WB				EB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	0	2	3	7	0	0	1	5	0	2	4	12
12:15	1		2		0		2		1		4	
12:30	1		0		0		2		1		2	
12:45	0		2		0		0		0		2	
01:00	0	0	0	3	0	1	5	7	0	1	5	10
01:15	0		1		1		0		1		1	
01:30	0		1		0		0		0		1	
01:45	0		1		0		2		0		3	
02:00	0	0	2	11	0	0	2	20	0	0	4	31
02:15	0		4		0		10		0		14	
02:30	0		1		0		4		0		5	
02:45	0		4		0		4		0		8	
03:00	0	0	6	12	0	0	2	6	0	0	8	18
03:15	0		2		0		0		0		2	
03:30	0		1		0		2		0		3	
03:45	0		3		0		2		0		5	
04:00	0	1	6	15	1	2	5	15	1	3	11	30
04:15	0		5		0		2		0		7	
04:30	1		1		1		5		2		6	
04:45	0		3		0		3		0		6	
05:00	0	1	5	18	1	4	8	23	1	5	13	41
05:15	1		6		0		6		1		12	
05:30	0		5		3		5		3		10	
05:45	0		2		0		4		0		6	
06:00	0	6	3	9	2	10	4	10	2	16	7	19
06:15	1		3		0		1		1		4	
06:30	3		1		4		3		7		4	
06:45	2		2		4		2		6		4	
07:00	2	14	3	11	6	18	0	8	8	32	3	19
07:15	9		2		8		4		17		6	
07:30	2		4		2		2		4		6	
07:45	1		2		2		2		3		4	
08:00	1	13	2	10	1	11	2	6	2	24	4	16
08:15	4		2		2		0		6		2	
08:30	4		5		4		4		8		9	
08:45	4		1		4		0		8		1	
09:00	6	8	2	8	1	3	1	6	7	11	3	14
09:15	2		2		2		2		4		4	
09:30	0		2		0		2		0		4	
09:45	0		2		0		1		0		3	
10:00	2	3	0	0	2	4	1	1	4	7	1	1
10:15	0		0		0		0		0		0	
10:30	0		0		0		0		0		0	
10:45	1		0		2		0		3		0	
11:00	1	5	1	3	0	5	1	4	1	10	2	7
11:15	2		0		1		2		3		2	
11:30	0		1		2		0		2		1	
11:45	2		1		2		1		4		2	
Totals	53		107		58		111		111		218	
Split%	47.7		49.1		52.3		50.9					
Day Totals		160				169				329		
Day Splits		48.6				51.4						
Peak Hour	08:15		04:45		06:30		05:00		06:30		04:45	
Volume	18		19		22		23		38		41	
Factor	0.75		0.79		0.69		0.72		0.56		0.79	

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location: : DAISY AVENUE
Segment: : DEL AMO BLVD TO W. 49TH ST
Client: : LL&G

Site: LONG BEACH
Date: 11/06/14

Day: Thursday

Interval	SB				NB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	3	3	10	32	1	2	7	26	4	5	17	58
12:15	0		4		0		3		0		7	
12:30	0		8		1		6		1		14	
12:45	0		10		0		10		0		20	
01:00	5	7	6	22	0	2	10	43	5	9	16	65
01:15	1		8		2		8		3		16	
01:30	0		4		0		15		0		19	
01:45	1		4		0		10		1		14	
02:00	0	2	6	27	0	0	10	35	0	2	16	62
02:15	0		6		0		10		0		16	
02:30	1		7		0		7		1		14	
02:45	1		8		0		8		1		16	
03:00	1	3	5	23	0	0	9	43	1	3	14	66
03:15	1		9		0		14		1		23	
03:30	1		3		0		12		1		15	
03:45	0		6		0		8		0		14	
04:00	1	5	6	40	0	2	18	49	1	7	24	89
04:15	0		7		1		20		1		27	
04:30	3		15		0		5		3		20	
04:45	1		12		1		6		2		18	
05:00	4	24	14	69	2	25	14	46	6	49	28	115
05:15	4		22		1		11		5		33	
05:30	8		22		12		8		20		30	
05:45	8		11		10		13		18		24	
06:00	6	40	13	42	11	52	8	28	17	92	21	70
06:15	9		10		8		4		17		14	
06:30	16		7		16		14		32		21	
06:45	9		12		17		2		26		14	
07:00	14	82	4	21	18	93	5	14	32	175	9	35
07:15	20		6		20		4		40		10	
07:30	25		8		28		2		53		10	
07:45	23		3		27		3		50		6	
08:00	14	68	6	31	25	73	2	17	39	141	8	48
08:15	24		6		19		1		43		7	
08:30	12		11		16		12		28		23	
08:45	18		8		13		2		31		10	
09:00	13	46	14	31	8	20	2	10	21	66	16	41
09:15	12		9		1		2		13		11	
09:30	12		6		5		2		17		8	
09:45	9		2		6		4		15		6	
10:00	7	18	4	10	6	21	4	7	13	39	8	17
10:15	5		3		4		1		9		4	
10:30	4		1		7		0		11		1	
10:45	2		2		4		2		6		4	
11:00	5	33	2	11	4	15	1	6	9	48	3	17
11:15	12		2		1		2		13		4	
11:30	8		2		7		1		15		3	
11:45	8		5		3		2		11		7	
Totals	331		359		305		324		636		683	
Split%	52.0		52.6		48.0		47.4					
Day Totals		690				629				1,319		
Day Splits		52.3				47.7						
Peak Hour	07:30		04:45		07:15		03:30		07:30		05:00	
Volume	86		70		100		58		185		115	
Factor	0.86		0.80		0.89		0.73		0.87		0.87	

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location: : DAISY AVENUE
Segment: : W. 49TH ST TO W. 48TH ST
Client: : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	SB				NB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	1	1	1	7	0	0	1	8	1	1	2	15
12:15	0		2		0		1		0		3	
12:30	0		2		0		0		0		2	
12:45	0		2		0		6		0		8	
01:00	1	3	3	11	2	3	1	9	3	6	4	20
01:15	0		1		1		2		1		3	
01:30	0		4		0		3		0		7	
01:45	2		3		0		3		2		6	
02:00	0	1	1	11	0	0	1	6	0	1	2	17
02:15	0		6		0		1		0		7	
02:30	0		1		0		2		0		3	
02:45	1		3		0		2		1		5	
03:00	0	1	5	17	0	1	2	4	0	2	7	21
03:15	1		3		1		2		2		5	
03:30	0		7		0		0		0		7	
03:45	0		2		0		0		0		2	
04:00	1	2	5	17	0	1	2	9	1	3	7	26
04:15	0		6		0		2		0		8	
04:30	0		4		0		3		0		7	
04:45	1		2		1		2		2		4	
05:00	1	10	6	22	0	1	0	8	1	11	6	30
05:15	0		8		0		4		0		12	
05:30	7		3		1		2		8		5	
05:45	2		5		0		2		2		7	
06:00	1	7	2	12	3	9	4	6	4	16	6	18
06:15	0		2		2		0		2		2	
06:30	4		3		2		1		6		4	
06:45	2		5		2		1		4		6	
07:00	3	12	3	12	2	12	0	2	5	24	3	14
07:15	2		2		2		0		4		2	
07:30	5		2		2		2		7		4	
07:45	2		5		6		0		8		5	
08:00	6	22	4	10	3	9	1	1	9	31	5	11
08:15	2		1		2		0		4		1	
08:30	8		3		4		0		12		3	
08:45	6		2		0		0		6		2	
09:00	5	12	4	15	1	4	0	3	6	16	4	18
09:15	2		6		0		0		2		6	
09:30	0		4		2		3		2		7	
09:45	5		1		1		0		6		1	
10:00	6	12	6	8	0	1	0	2	6	13	6	10
10:15	3		1		0		2		3		3	
10:30	0		1		0		0		0		1	
10:45	3		0		1		0		4		0	
11:00	1	14	1	3	3	12	0	0	4	26	1	3
11:15	5		0		2		0		7		0	
11:30	7		0		6		0		13		0	
11:45	1		2		1		0		2		2	
Totals	97		145		53		58		150		203	
Split%	64.7		71.4		35.3		28.6					
Day Totals		242				111				353		
Day Splits		68.6				31.4						
Peak Hour	08:00		05:00		07:45		12:45		07:45		05:00	
Volume	22		22		15		12		33		30	
Factor	0.69		0.69		0.63		0.50		0.69		0.63	

Location : DAISY AVENUE
Segment : S/O W. 48TH STREET
Client : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	SB				NB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	0	0	0	0	0	0	1	2	0	0	1	2
12:15	0		0		0		0		0		0	
12:30	0		0		0		0		0		0	
12:45	0		0		0		1		0		1	
01:00	0	0	0	0	0	0	2	6	0	0	2	6
01:15	0		0		0		1		0		1	
01:30	0		0		0		2		0		2	
01:45	0		0		0		1		0		1	
02:00	0	0	0	2	0	0	6	9	0	0	6	11
02:15	0		1		0		2		0		3	
02:30	0		1		0		1		0		2	
02:45	0		0		0		0		0		0	
03:00	0	0	0	1	0	0	0	2	0	0	0	3
03:15	0		1		0		2		0		3	
03:30	0		0		0		0		0		0	
03:45	0		0		0		0		0		0	
04:00	0	0	3	6	0	1	1	1	0	1	4	7
04:15	0		0		0		0		0		0	
04:30	0		3		0		0		0		3	
04:45	0		0		1		0		1		0	
05:00	0	0	0	3	0	0	0	0	0	0	0	3
05:15	0		1		0		0		0		1	
05:30	0		2		0		0		0		2	
05:45	0		0		0		0		0		0	
06:00	0	0	2	4	0	4	0	0	0	4	2	4
06:15	0		1		3		0		3		1	
06:30	0		0		0		0		0		0	
06:45	0		1		1		0		1		1	
07:00	0	1	0	1	2	3	0	0	2	4	0	1
07:15	0		0		0		0		0		0	
07:30	0		0		0		0		0		0	
07:45	1		1		1		0		2		1	
08:00	0	2	1	4	0	0	0	0	0	2	1	4
08:15	0		0		0		0		0		0	
08:30	1		1		0		0		1		1	
08:45	1		2		0		0		1		2	
09:00	0	0	0	2	2	2	0	0	2	2	0	2
09:15	0		0		0		0		0		0	
09:30	0		2		0		0		0		2	
09:45	0		0		0		0		0		0	
10:00	1	1	4	4	0	2	1	1	1	3	5	5
10:15	0		0		1		0		1		0	
10:30	0		0		1		0		1		0	
10:45	0		0		0		0		0		0	
11:00	0	1	0	2	0	6	1	2	0	7	1	4
11:15	0		2		2		1		2		3	
11:30	1		0		4		0		5		0	
11:45	0		0		0		0		0		0	
Totals	5		29		18		23		23		52	
Split%	21.7		55.8		78.3		44.2					
Day Totals		34				41				75		
Day Splits		45.3				54.7						
Peak Hour	07:45		03:45		06:15		01:30		10:45		01:30	
Volume	2		6		6		11		7		12	
Factor	0.50		0.50		0.50		0.46		0.35		0.50	

* Data File : D1411004

Printed : 11/10/2014

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location : W. 48TH STREET
Segment : DAISY AVE TO PACIFIC AVE
Client : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	WB				EB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	1	1	5	15	0	2	1	7	1	3	6	22
12:15	0		4		1		1		1		5	
12:30	0		1		1		4		1		5	
12:45	0		5		0		1		0		6	
01:00	0	0	2	13	0	0	6	11	0	0	8	24
01:15	0		6		0		0		0		6	
01:30	0		2		0		2		0		4	
01:45	0		3		0		3		0		6	
02:00	0	1	6	18	0	0	2	19	0	1	8	37
02:15	0		3		0		9		0		12	
02:30	0		3		0		3		0		6	
02:45	1		6		0		5		1		11	
03:00	0	0	4	13	0	0	3	15	0	0	7	28
03:15	0		2		0		3		0		5	
03:30	0		3		0		5		0		8	
03:45	0		4		0		4		0		8	
04:00	0	3	5	22	1	3	5	15	1	6	10	37
04:15	0		7		0		3		0		10	
04:30	1		5		1		4		2		9	
04:45	2		5		1		3		3		8	
05:00	1	3	8	18	3	6	7	25	4	9	15	43
05:15	1		4		0		7		1		11	
05:30	0		4		3		4		3		8	
05:45	1		2		0		7		1		9	
06:00	2	7	6	19	1	10	2	15	3	17	8	34
06:15	2		6		3		4		5		10	
06:30	2		3		3		3		5		6	
06:45	1		4		3		6		4		10	
07:00	2	14	6	16	6	23	2	5	8	37	8	21
07:15	5		4		9		0		14		4	
07:30	5		3		6		1		11		4	
07:45	2		3		2		2		4		5	
08:00	4	13	6	25	4	20	2	8	8	33	8	33
08:15	3		7		2		1		5		8	
08:30	3		7		4		3		7		10	
08:45	3		5		10		2		13		7	
09:00	6	13	3	16	6	9	1	8	12	22	4	24
09:15	1		5		2		4		3		9	
09:30	0		6		1		1		1		7	
09:45	6		2		0		2		6		4	
10:00	4	5	4	8	6	15	2	4	10	20	6	12
10:15	0		2		5		1		5		3	
10:30	1		2		1		1		2		3	
10:45	0		0		3		0		3		0	
11:00	3	15	1	3	3	14	1	4	6	29	2	7
11:15	7		1		4		2		11		3	
11:30	3		1		4		0		7		1	
11:45	2		0		3		1		5		1	
Totals	75		186		102		136		177		322	
Split%	42.4		57.8		57.6		42.2					
Day Totals		261				238				499		
Day Splits		52.3				47.7						
Peak Hour	07:15		04:15		06:45		05:00		06:45		04:30	
Volume	16		25		24		25		37		43	
Factor	0.80		0.78		0.67		0.89		0.66		0.72	

* Data File : D1411005

Printed : 11/10/2014

A-5

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location : PACIFIC AVENUE
Segment : DEL AMO BLVD TO PLEASANT ST
Client : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	SB				NB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	2	6	7	26	0	5	6	31	2	11	13	57
12:15	1		5		3		7		4		12	
12:30	1		3		0		6		1		9	
12:45	2		11		2		12		4		23	
01:00	0	4	10	29	1	4	8	33	1	8	18	62
01:15	1		10		1		8		2		18	
01:30	2		8		2		5		4		13	
01:45	1		1		0		12		1		13	
02:00	2	3	6	28	1	6	10	31	3	9	16	59
02:15	1		9		2		12		3		21	
02:30	0		9		1		2		1		11	
02:45	0		4		2		7		2		11	
03:00	2	6	10	40	1	2	8	27	3	8	18	67
03:15	2		6		0		2		2		8	
03:30	1		10		1		11		2		21	
03:45	1		14		0		6		1		20	
04:00	2	5	17	69	1	12	6	24	3	17	23	93
04:15	1		18		1		6		2		24	
04:30	0		19		7		6		7		25	
04:45	2		15		3		6		5		21	
05:00	2	10	22	75	4	18	10	35	6	28	32	110
05:15	0		14		3		8		3		22	
05:30	6		26		6		11		12		37	
05:45	2		13		5		6		7		19	
06:00	5	17	13	38	6	25	10	30	11	42	23	68
06:15	4		10		6		5		10		15	
06:30	5		3		6		7		11		10	
06:45	3		12		7		8		10		20	
07:00	9	28	10	36	4	29	4	18	13	57	14	54
07:15	5		6		12		3		17		9	
07:30	8		10		6		8		14		18	
07:45	6		10		7		3		13		13	
08:00	4	27	13	49	12	56	5	30	16	83	18	79
08:15	5		11		10		8		15		19	
08:30	5		18		20		13		25		31	
08:45	13		7		14		4		27		11	
09:00	7	28	7	21	5	15	11	30	12	43	18	51
09:15	7		1		4		6		11		7	
09:30	2		6		2		8		4		14	
09:45	12		7		4		5		16		12	
10:00	2	17	12	30	6	30	6	12	8	47	18	42
10:15	2		9		4		4		6		13	
10:30	6		7		8		1		14		8	
10:45	7		2		12		1		19		3	
11:00	3	23	4	14	2	27	4	10	5	50	8	24
11:15	5		4		8		2		13		6	
11:30	7		5		7		1		14		6	
11:45	8		1		10		3		18		4	
Totals	174		455		229		311		403		766	
Split%	43.2		59.4		56.8		40.6					
Day Totals		629				540				1,169		
Day Splits		53.8				46.2						
Peak Hour	08:30		04:45		08:00		01:30		08:00		04:45	
Volume	32		77		56		39		83		112	
Factor	0.62		0.74		0.70		0.81		0.77		0.76	

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location : W. 48TH STREET
Segment : PACIFIC AVE TO VIRGINIA AVE
Client : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	EB				WB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	0	4	4	17	1	4	7	21	1	8	11	38
12:15	1		1		0		5		1		6	
12:30	1		6		1		2		2		8	
12:45	2		6		2		7		4		13	
01:00	1	1	5	25	0	1	1	11	1	2	6	36
01:15	0		4		0		4		0		8	
01:30	0		8		1		4		1		12	
01:45	0		8		0		2		0		10	
02:00	1	2	6	31	0	1	1	14	1	3	7	45
02:15	0		11		0		7		0		18	
02:30	1		7		1		0		2		7	
02:45	0		7		0		6		0		13	
03:00	1	2	4	23	0	0	6	19	1	2	10	42
03:15	0		5		0		6		0		11	
03:30	0		6		0		3		0		9	
03:45	1		8		0		4		1		12	
04:00	1	3	8	31	1	3	4	26	2	6	12	57
04:15	0		10		0		10		0		20	
04:30	1		8		1		8		2		16	
04:45	1		5		1		4		2		9	
05:00	3	10	13	38	0	2	8	19	3	12	21	57
05:15	0		8		0		2		0		10	
05:30	4		8		2		2		6		10	
05:45	3		9		0		7		3		16	
06:00	1	14	6	31	2	6	4	19	3	20	10	50
06:15	2		9		2		5		4		14	
06:30	4		6		2		6		6		12	
06:45	7		10		0		4		7		14	
07:00	4	29	9	18	2	13	4	15	6	42	13	33
07:15	10		1		4		2		14		3	
07:30	10		2		6		4		16		6	
07:45	5		6		1		5		6		11	
08:00	7	29	3	14	6	14	10	28	13	43	13	42
08:15	7		2		5		3		12		5	
08:30	6		4		1		10		7		14	
08:45	9		5		2		5		11		10	
09:00	8	25	4	11	8	12	5	17	16	37	9	28
09:15	7		6		1		4		8		10	
09:30	4		0		0		5		4		5	
09:45	6		1		3		3		9		4	
10:00	4	16	4	11	3	13	2	5	7	29	6	16
10:15	5		2		2		1		7		3	
10:30	2		5		6		0		8		5	
10:45	5		0		2		2		7		2	
11:00	2	21	5	9	3	17	2	6	5	38	7	15
11:15	6		2		6		0		12		2	
11:30	5		0		2		3		7		3	
11:45	8		2		6		1		14		3	
Totals	156		259		86		200		242		459	
Split%	64.5		56.4		35.5		43.6					
Day Totals		415				286				701		
Day Splits		59.2				40.8						
Peak Hour	07:15		05:00		07:30		04:15		07:15		04:15	
Volume	32		38		18		30		49		66	
Factor	0.80		0.73		0.75		0.75		0.77		0.79	

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location : W. ARBOR STREET
Segment : VIRGINIA AVE TO LONG BEACH BVD
Client : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	WB				EB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	0	1	4	18	0	1	2	15	0	2	6	33
12:15	1		4		0		3		1		7	
12:30	0		5		0		5		0		10	
12:45	0		5		1		5		1		10	
01:00	0	0	2	9	0	1	2	20	0	1	4	29
01:15	0		4		1		8		1		12	
01:30	0		2		0		4		0		6	
01:45	0		1		0		6		0		7	
02:00	0	1	6	13	1	4	4	13	1	5	10	26
02:15	0		1		2		4		2		5	
02:30	1		4		0		2		1		6	
02:45	0		2		1		3		1		5	
03:00	0	1	3	11	0	0	2	8	0	1	5	19
03:15	0		2		0		1		0		3	
03:30	0		4		0		3		0		7	
03:45	1		2		0		2		1		4	
04:00	1	3	8	36	1	3	10	37	2	6	18	73
04:15	0		9		2		6		2		15	
04:30	2		8		0		7		2		15	
04:45	0		11		0		14		0		25	
05:00	1	6	8	33	0	3	12	31	1	9	20	64
05:15	2		12		0		6		2		18	
05:30	2		6		3		4		5		10	
05:45	1		7		0		9		1		16	
06:00	1	10	9	21	0	11	12	26	1	21	21	47
06:15	1		4		5		5		6		9	
06:30	4		1		1		3		5		4	
06:45	4		7		5		6		9		13	
07:00	5	13	4	16	2	15	4	25	7	28	8	41
07:15	3		4		4		12		7		16	
07:30	2		2		5		3		7		5	
07:45	3		6		4		6		7		12	
08:00	6	18	0	6	4	17	5	12	10	35	5	18
08:15	2		1		3		6		5		7	
08:30	4		1		4		0		8		1	
08:45	6		4		6		1		12		5	
09:00	4	12	1	7	1	15	1	7	5	27	2	14
09:15	5		1		5		0		10		1	
09:30	1		4		4		2		5		6	
09:45	2		1		5		4		7		5	
10:00	6	8	1	4	0	6	0	6	6	14	1	10
10:15	1		2		1		2		2		4	
10:30	1		0		4		1		5		1	
10:45	0		1		1		3		1		4	
11:00	4	18	2	6	4	14	0	5	8	32	2	11
11:15	5		0		5		1		10		1	
11:30	4		0		2		2		6		2	
11:45	5		4		3		2		8		6	
Totals	91		180		90		205		181		385	
Split%	50.3		46.8		49.7		53.2					
Day Totals		271				295				566		
Day Splits		47.9				52.1						
Peak Hour	08:30		04:30		07:15		04:15		08:00		04:30	
Volume	19		39		17		39		35		78	
Factor	0.79		0.81		0.85		0.70		0.73		0.78	

Location : W. 48TH STREET
Segment : VIRGINIA AVE TO LONG BEACH BVD
Client : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	EB				WB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	0	6	6	24	1	2	4	17	1	8	10	41
12:15	2		2		1		3		3		5	
12:30	3		6		0		4		3		10	
12:45	1		10		0		6		1		16	
01:00	2	4	6	25	2	2	4	15	4	6	10	40
01:15	2		7		0		4		2		11	
01:30	0		3		0		5		0		8	
01:45	0		9		0		2		0		11	
02:00	0	1	9	37	0	0	5	24	0	1	14	61
02:15	0		8		0		13		0		21	
02:30	1		8		0		2		1		10	
02:45	0		12		0		4		0		16	
03:00	0	0	12	42	0	0	5	20	0	0	17	62
03:15	0		10		0		4		0		14	
03:30	0		8		0		5		0		13	
03:45	0		12		0		6		0		18	
04:00	2	5	10	40	0	0	5	27	2	5	15	67
04:15	0		10		0		9		0		19	
04:30	2		14		0		8		2		22	
04:45	1		6		0		5		1		11	
05:00	2	13	16	41	0	2	10	39	2	15	26	80
05:15	3		11		1		7		4		18	
05:30	4		6		1		11		5		17	
05:45	4		8		0		11		4		19	
06:00	4	21	5	21	3	11	10	37	7	32	15	58
06:15	6		8		8		8		14		16	
06:30	6		4		0		10		6		14	
06:45	5		4		0		9		5		13	
07:00	9	45	12	34	2	9	2	9	11	54	14	43
07:15	13		7		4		3		17		10	
07:30	18		5		2		2		20		7	
07:45	5		10		1		2		6		12	
08:00	12	43	13	39	5	9	1	14	17	52	14	53
08:15	9		7		1		4		10		11	
08:30	11		11		1		9		12		20	
08:45	11		8		2		0		13		8	
09:00	13	37	4	16	5	12	5	21	18	49	9	37
09:15	10		6		3		7		13		13	
09:30	9		3		1		7		10		10	
09:45	5		3		3		2		8		5	
10:00	2	22	2	16	3	13	5	17	5	35	7	33
10:15	4		8		4		6		8		14	
10:30	9		4		6		4		15		8	
10:45	7		2		0		2		7		4	
11:00	5	33	1	5	6	19	2	3	11	52	3	8
11:15	8		2		3		0		11		2	
11:30	8		1		4		1		12		2	
11:45	12		1		6		0		18		1	
Totals	230		340		79		243		309		583	
Split%	74.4		58.3		25.6		41.7					
Day Totals		570				322				892		
Day Splits		63.9				36.1						
Peak Hour	07:15		04:30		11:00		05:30		07:15		05:00	
Volume	48		47		19		40		60		80	
Factor	0.67		0.73		0.79		0.91		0.75		0.77	

Transportation Studies, Inc.

2640 Walnut Avenue, Suite H
Tustin, CA. 92780

Location : W. 49TH STREET
Segment : W/O LONG BEACH BLVD
Client : LL&G

Site: LONG BEACH
Date: 11/06/14
Day: Thursday

Interval	EB				WB				Combined			
Begin	AM		PM		AM		PM		AM		PM	
12:00	2	7	10	45	2	7	14	63	4	14	24	108
12:15	1		10		1		20		2		30	
12:30	2		15		2		17		4		32	
12:45	2		10		2		12		4		22	
01:00	1	4	11	54	1	7	18	69	2	11	29	123
01:15	1		13		1		20		2		33	
01:30	1		15		4		17		5		32	
01:45	1		15		1		14		2		29	
02:00	1	1	14	62	2	5	23	90	3	6	37	152
02:15	0		12		1		27		1		39	
02:30	0		26		1		22		1		48	
02:45	0		10		1		18		1		28	
03:00	0	0	18	89	0	3	22	87	0	3	40	176
03:15	0		8		3		23		3		31	
03:30	0		25		0		20		0		45	
03:45	0		38		0		22		0		60	
04:00	1	6	25	108	1	4	21	111	2	10	46	219
04:15	2		22		0		28		2		50	
04:30	2		29		2		36		4		65	
04:45	1		32		1		26		2		58	
05:00	4	22	32	134	1	15	34	120	5	37	66	254
05:15	6		30		3		30		9		60	
05:30	4		40		5		26		9		66	
05:45	8		32		6		30		14		62	
06:00	8	41	31	91	9	45	28	87	17	86	59	178
06:15	6		32		6		14		12		46	
06:30	14		15		15		21		29		36	
06:45	13		13		15		24		28		37	
07:00	21	83	6	34	29	129	17	60	50	212	23	94
07:15	30		11		24		12		54		23	
07:30	18		7		38		16		56		23	
07:45	14		10		38		15		52		25	
08:00	16	65	6	39	40	122	16	53	56	187	22	92
08:15	20		19		30		17		50		36	
08:30	16		8		32		10		48		18	
08:45	13		6		20		10		33		16	
09:00	10	45	6	22	19	43	12	40	29	88	18	62
09:15	15		8		6		10		21		18	
09:30	7		5		11		7		18		12	
09:45	13		3		7		11		20		14	
10:00	20	50	4	16	6	34	8	19	26	84	12	35
10:15	8		4		11		3		19		7	
10:30	6		4		10		6		16		10	
10:45	16		4		7		2		23		6	
11:00	13	55	3	11	19	58	4	20	32	113	7	31
11:15	12		1		15		6		27		7	
11:30	19		4		14		6		33		10	
11:45	11		3		10		4		21		7	
Totals	379		705		472		819		851		1,524	
Split%	44.5		46.3		55.5		53.7					
Day Totals		1,084				1,291				2,375		
Day Splits		45.6				54.4						
Peak Hour	07:00		05:30		07:30		04:30		07:15		05:00	
Volume	83		135		146		126		218		254	
Factor	0.69		0.84		0.91		0.88		0.97		0.96	

Data File : D1411010

Printed : 11/10/2014

APPENDIX C:
LEVEL OF SERVICE CALCULATION SHEETS

Riverwalk Subdivision
Existing Conditions
AM Peak

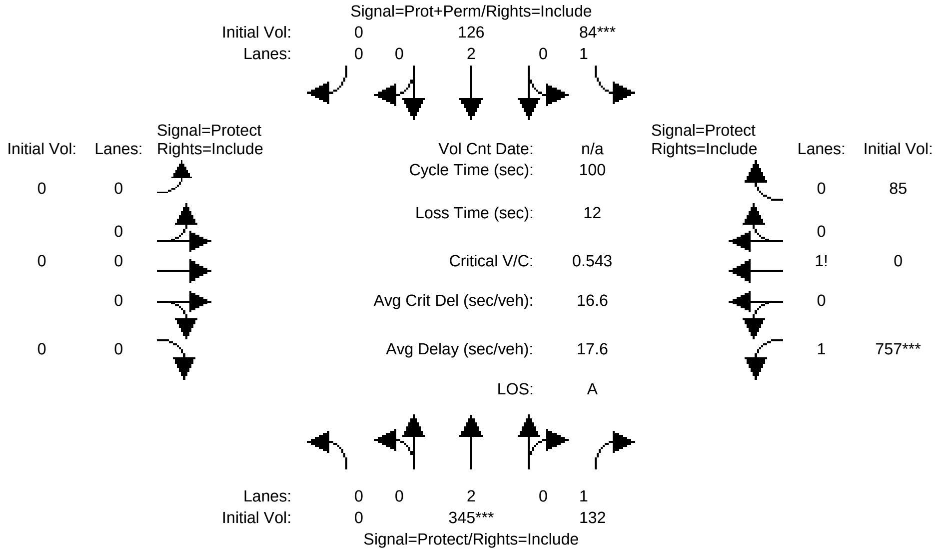
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	17.6	0.543	16.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	E	32.5	0.967	40.8	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	B	7.2	0.683	8.1	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	E	30.8	0.907	34.1	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	0.6	0.074	0.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Existing Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps

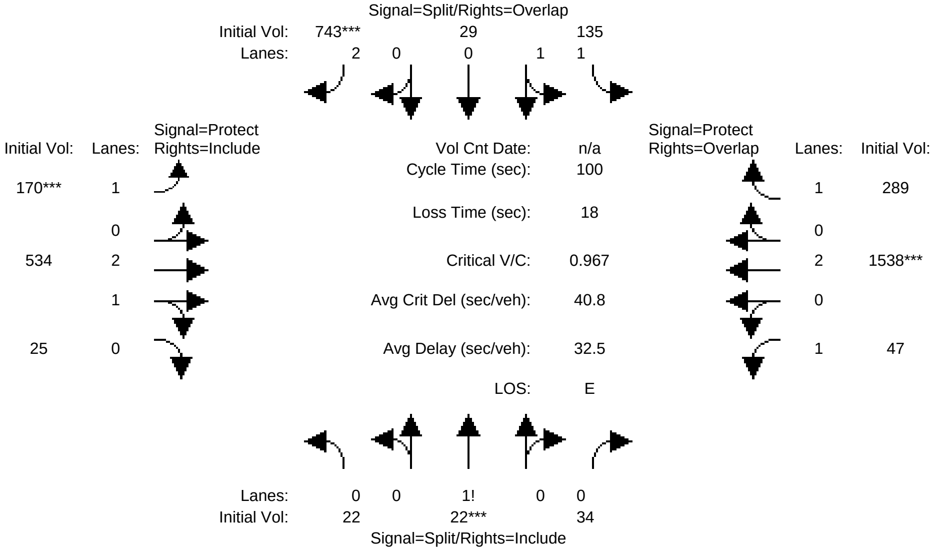


```
Street Name:              Susana Rd                     I-710 SB Ramps
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  345   132   84  126     0    0    0     0  757    0    85
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0  345   132   84  126     0    0    0     0  757    0    85
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    0  345   132   84  126     0    0    0     0  757    0    85
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     0  345   132   84  126     0    0    0     0  757    0    85
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0  345   132   84  126     0    0    0     0  757    0    85
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:    0  345   132   84  126     0    0    0     0  757    0    85
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.00 2.00  1.00 1.00 2.00  0.00 0.00 0.00  0.00 1.80 0.00  0.20
Final Sat.:     0 3200  1600 1600 3200     0    0    0     0 2877    0   323
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.11  0.08 0.05 0.04  0.00 0.00 0.00  0.00 0.26 0.00  0.26
Crit Moves:       ****       ****                              ****
```

Riverwalk Subdivision
Existing Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd



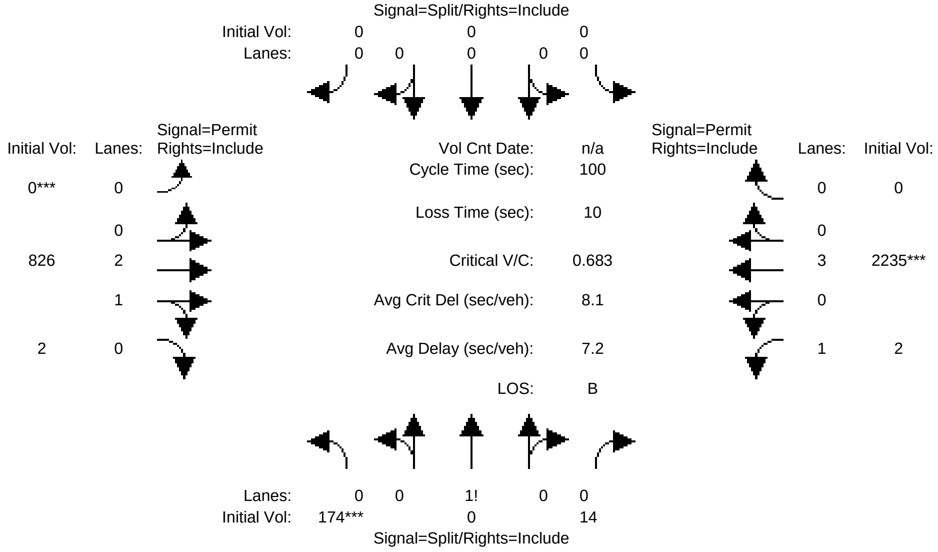
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 0.967
Avg Crit Del (sec/veh): 40.8
Avg Delay (sec/veh): 32.5
LOS: E

```
Street Name:              Susana Rd                         Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     22   22    34  135   29   743  170  534    25   47 1538   289
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  22   22    34  135   29   743  170  534    25   47 1538   289
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:  22   22    34  135   29   743  170  534    25   47 1538   289
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:   22   22    34  135   29   743  170  534    25   47 1538   289
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  22   22    34  135   29   743  170  534    25   47 1538   289
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  22   22    34  135   29   743  170  534    25   47 1538   289
OvlAdjVol:                                437                           207
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment: 1.00 1.00  1.00 1.00 1.00  0.90 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:      0.28 0.28  0.44 1.65 0.35  2.00 1.00 2.87  0.13 1.00 2.00  1.00
Final Sat.:  451  451   697 2634  566  2880 1600 4585   215 1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.05 0.05  0.05 0.05 0.05  0.26 0.11 0.12  0.12 0.03 0.48  0.18
OvlAdjV/S:                                0.15                          0.13
Crit Moves:      ****                     **** ****                ****
```

Riverwalk Subdivision
Existing Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd

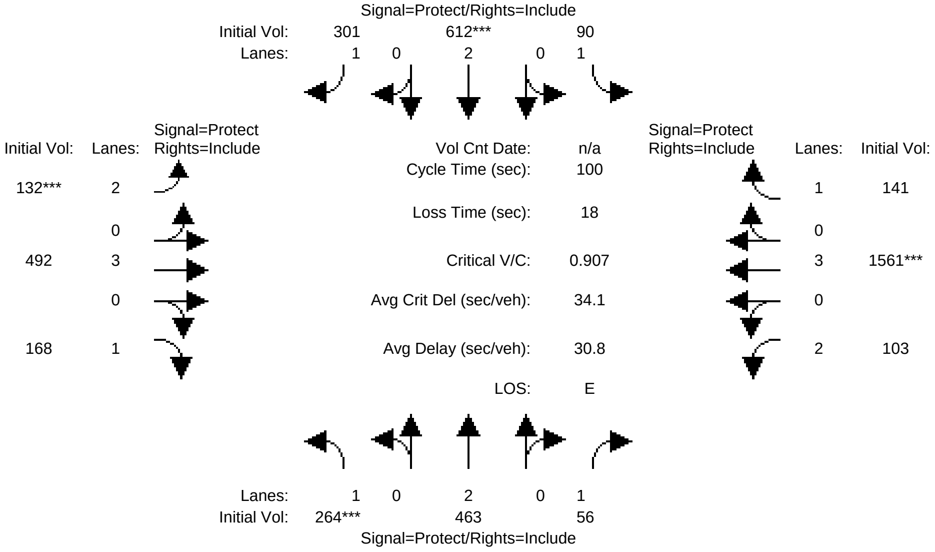


```
Street Name:              Daisy Ave                         Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     174    0    14     0    0     0     0  826     2     2 2235     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  174    0    14     0    0     0     0  826     2     2 2235     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  174    0    14     0    0     0     0  826     2     2 2235     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   174    0    14     0    0     0     0  826     2     2 2235     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  174    0    14     0    0     0     0  826     2     2 2235     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  174    0    14     0    0     0     0  826     2     2 2235     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.93 0.00  0.07  0.00 0.00  0.00  0.00 2.99  0.01  1.00 3.00  0.00
Final Sat.:  1481    0   119     0    0     0     0 4788    12  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.12 0.00  0.12  0.00 0.00  0.00  0.00 0.17  0.17  0.00 0.47  0.00
Crit Moves:  ****                              ****                   ****
```

Riverwalk Subdivision
Existing Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd

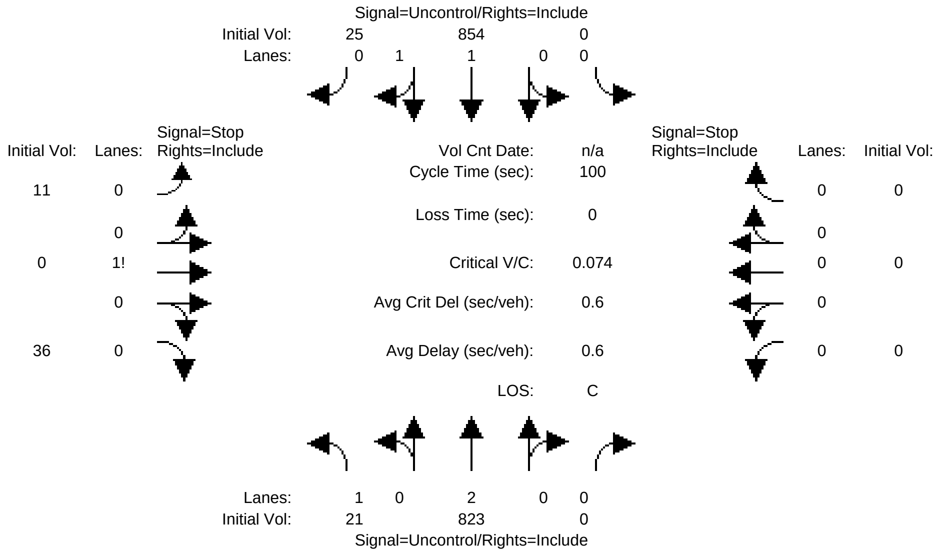


```
Street Name:          Long Beach Blvd                    Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     264  463    56    90  612   301   132  492   168   103 1561   141
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  264  463    56    90  612   301   132  492   168   103 1561   141
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  264  463    56    90  612   301   132  492   168   103 1561   141
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   264  463    56    90  612   301   132  492   168   103 1561   141
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  264  463    56    90  612   301   132  492   168   103 1561   141
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  264  463    56    90  612   301   132  492   168   103 1561   141
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.17 0.14  0.04  0.06 0.19  0.19  0.05 0.10  0.11  0.04 0.33  0.09
Crit Moves:  ****                 ****         ****                   ****
```

Riverwalk Subdivision
Existing Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
                         Signal=Uncontrol/Rights=Include
              Initial Vol:     25        854        0
                   Lanes:    0    1       1     0    0

              Signal=Stop                                     Signal=Stop
Initial Vol: Lanes: Rights=Include   Vol Cnt Date:    n/a     Rights=Include   Lanes: Initial Vol:
                                  Cycle Time (sec):   100
  11      0                                                                  0        0
          0                        Loss Time (sec):    0                     0
   0     1!                            Critical V/C:  0.074                  0        0
          0                  Avg Crit Del (sec/veh):   0.6                   0
  36      0                     Avg Delay (sec/veh):   0.6                   0        0
                                               LOS:    C

                   Lanes:    1    0       2     0    0
              Initial Vol:     21        823        0
                         Signal=Uncontrol/Rights=Include
```

```
Street Name:         Long Beach Blvd                   Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      21  823     0     0  854    25    11    0    36     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   21  823     0     0  854    25    11    0    36     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   21  823     0     0  854    25    11    0    36     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    21  823     0     0  854    25    11    0    36     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   21  823     0     0  854    25    11    0    36     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  879 xxxx xxxxx  xxxx xxxx xxxxx  1320 1732   440  xxxx xxxx xxxxx
Potent Cap.:  777 xxxx xxxxx  xxxx xxxx xxxxx   151   89   571  xxxx xxxx xxxxx
Move Cap.:    777 xxxx xxxxx  xxxx xxxx xxxxx   148   87   571  xxxx xxxx xxxxx
Volume/Cap:  0.03 xxxx  xxxx  xxxx xxxx  xxxx  0.07 0.00  0.06  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:  9.8 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  342 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.5 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 17.2 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             17.2           xxxxxx
ApproachLOS:         *                *                C                *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   21  823     0     0  854    25    11    0    36     0    0     0
ApproachDel:    xxxxxx           xxxxxx             17.2           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.2]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=47]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1770]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   21  823     0     0  854    25    11    0    36     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             1723
Minor Approach Volume:           47
Minor Approach Volume Threshold: 97 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Existing Conditions
PM Peak

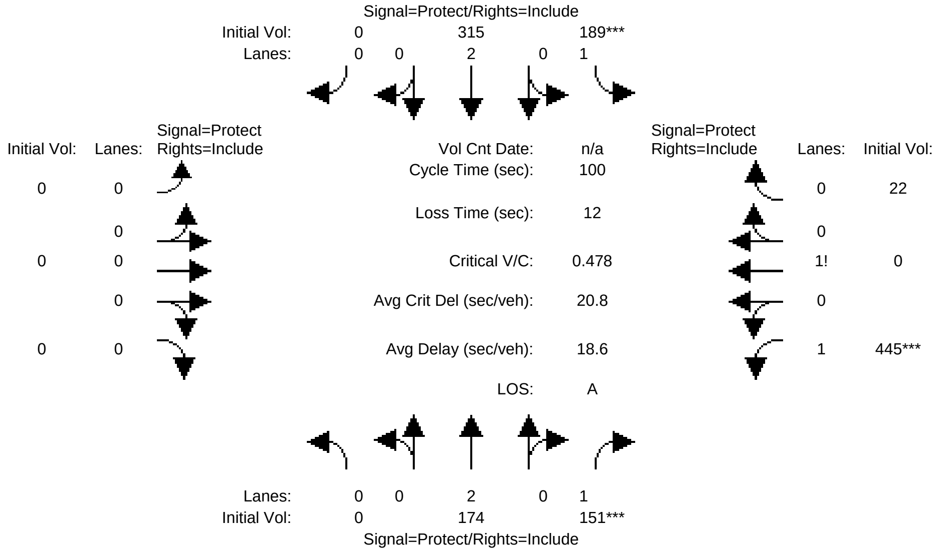
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	18.6	0.478	20.8	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	D	23.8	0.846	24.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	B	3.2	0.648	3.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	E	30.4	0.923	32.9	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	1.1	0.148	1.1	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Existing Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps



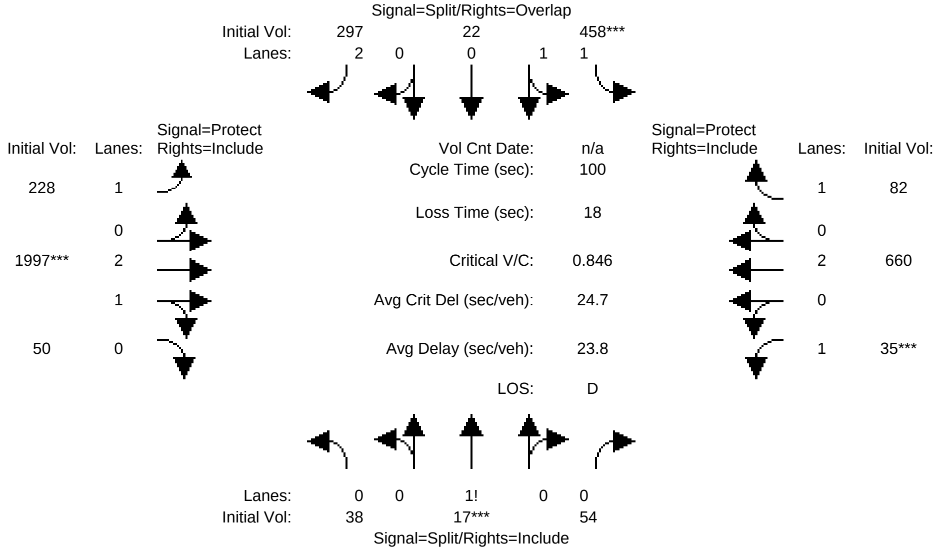
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 12
Critical V/C: 0.478
Avg Crit Del (sec/veh): 20.8
Avg Delay (sec/veh): 18.6
LOS: A

```
Street Name:              Susana Rd                        I-710 SB Ramps
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  174   151  189  315     0    0    0     0  445    0    22
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0  174   151  189  315     0    0    0     0  445    0    22
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    0  174   151  189  315     0    0    0     0  445    0    22
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     0  174   151  189  315     0    0    0     0  445    0    22
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0  174   151  189  315     0    0    0     0  445    0    22
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:    0  174   151  189  315     0    0    0     0  445    0    22
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.00 2.00  1.00 1.00 2.00  0.00 0.00 0.00  0.00 1.91 0.00  0.09
Final Sat.:     0 3200  1600 1600 3200     0    0    0     0 3049    0   151
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.05  0.09 0.12 0.10  0.00 0.00 0.00  0.00 0.15 0.00  0.15
Crit Moves:             **** ****                               ****
```

Riverwalk Subdivision
Existing Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd

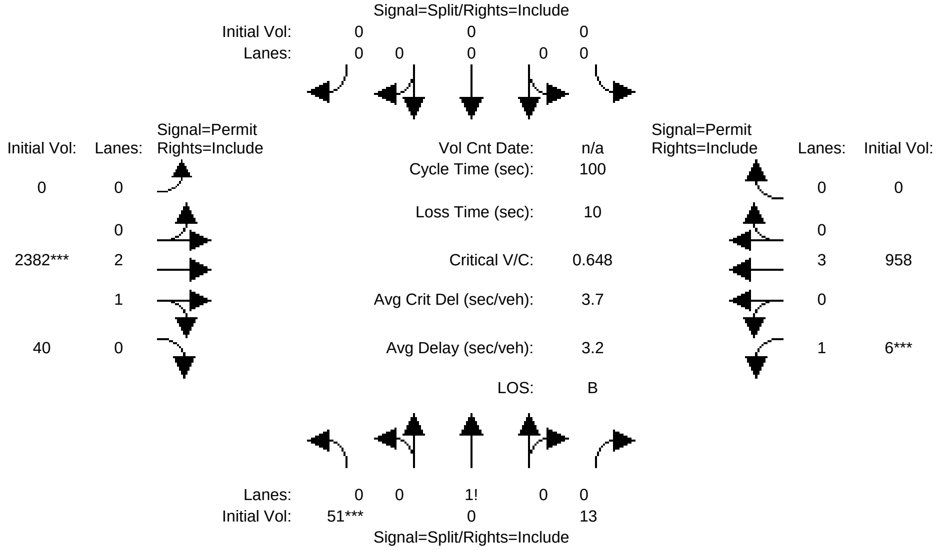


```
Street Name:              Susana Rd                          Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      38   17    54   458   22   297   228 1997    50    35  660    82
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   38   17    54   458   22   297   228 1997    50    35  660    82
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   38   17    54   458   22   297   228 1997    50    35  660    82
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    38   17    54   458   22   297   228 1997    50    35  660    82
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   38   17    54   458   22   297   228 1997    50    35  660    82
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   38   17    54   458   22   297   228 1997    50    35  660    82
OvlAdjVol:                                  0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  0.90  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.35 0.16  0.49  1.91 0.09  2.00  1.00 2.93  0.07  1.00 2.00  1.00
Final Sat.:   558  250   793  3053  147  2880  1600 4683   117  1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07 0.07  0.07  0.15 0.15  0.10  0.14 0.43  0.43  0.02 0.21  0.05
OvlAdjV/S:                               0.00
Crit Moves:       ****        ****                   ****        ****
```

Riverwalk Subdivision
Existing Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd



```
                              Signal=Split/Rights=Include
               Initial Vol:      0          0          0
                     Lanes:      0    0     0     0    0

                 Signal=Permit                                   Signal=Permit
Initial Vol: Lanes: Rights=Include      Vol Cnt Date:    n/a     Rights=Include   Lanes:  Initial Vol:
                                     Cycle Time (sec):   100
     0        0                                                                     0        0
                                      Loss Time (sec):    10
              0                                                                     0
 2382***      2                          Critical V/C:  0.648                       3      958
              1                  Avg Crit Del (sec/veh):  3.7                       0
    40        0                     Avg Delay (sec/veh):  3.2                       1       6***
                                                  LOS:     B

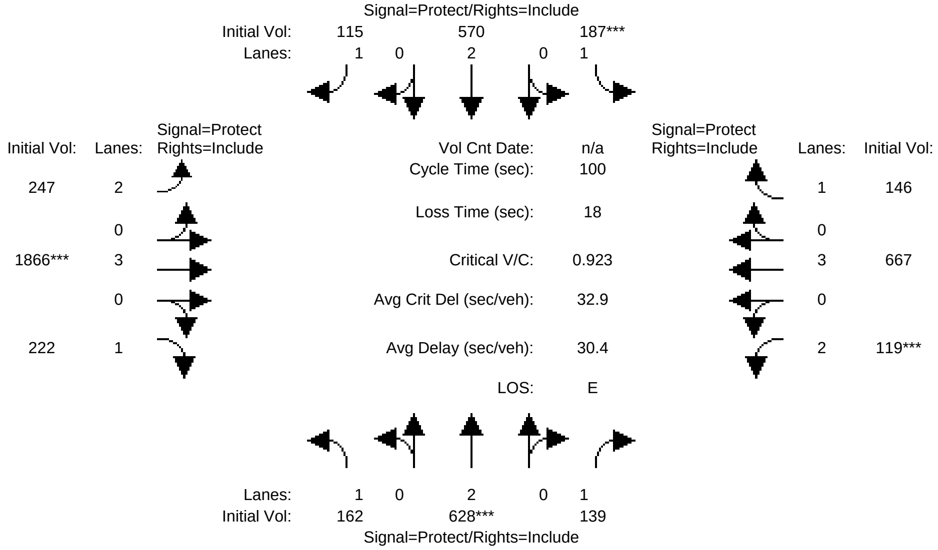
                     Lanes:      0    0     1!    0    0
               Initial Vol:   51***         0          13
                              Signal=Split/Rights=Include
```

```
Street Name:            Daisy Ave                          Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      51    0    13     0    0     0     0 2382    40     6  958     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   51    0    13     0    0     0     0 2382    40     6  958     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   51    0    13     0    0     0     0 2382    40     6  958     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    51    0    13     0    0     0     0 2382    40     6  958     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   51    0    13     0    0     0     0 2382    40     6  958     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   51    0    13     0    0     0     0 2382    40     6  958     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.80 0.00  0.20  0.00 0.00  0.00  0.00 2.95  0.05  1.00 3.00  0.00
Final Sat.:  1275    0   325     0    0     0     0 4721    79  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.04 0.00  0.04  0.00 0.00  0.00  0.00 0.50  0.50  0.00 0.20  0.00
Crit Moves:  ****                                   ****        ****
```

Riverwalk Subdivision
Existing Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd



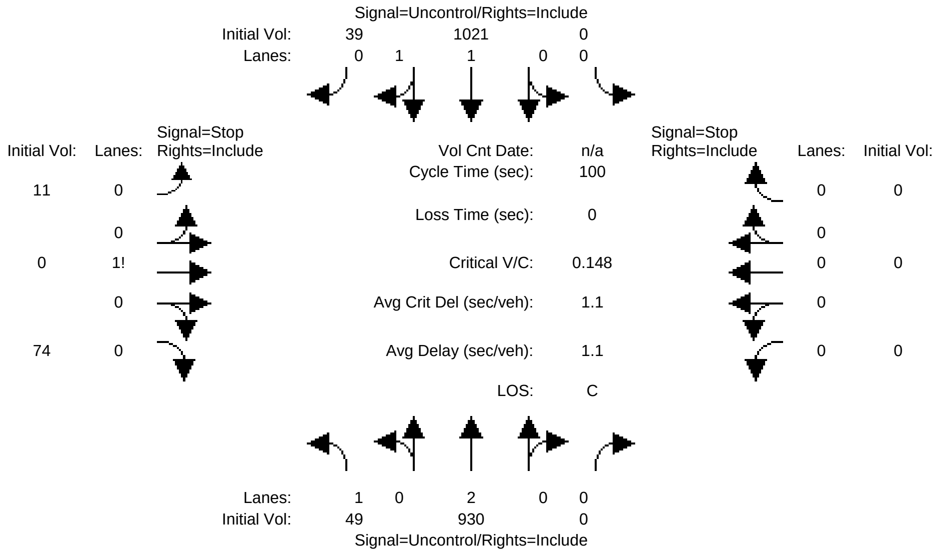
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 0.923
Avg Crit Del (sec/veh): 32.9
Avg Delay (sec/veh): 30.4
LOS: E

```
Street Name:          Long Beach Blvd                    Del Amo Blvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     162  628   139   187  570   115   247 1866   222   119  667   146
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  162  628   139   187  570   115   247 1866   222   119  667   146
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  162  628   139   187  570   115   247 1866   222   119  667   146
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   162  628   139   187  570   115   247 1866   222   119  667   146
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  162  628   139   187  570   115   247 1866   222   119  667   146
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  162  628   139   187  570   115   247 1866   222   119  667   146
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.10 0.20  0.09  0.12 0.18  0.07  0.09 0.39  0.14  0.04 0.14  0.09
Crit Moves:       ****        ****                   ****        ****
```

Riverwalk Subdivision
Existing Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
                          Signal=Uncontrol/Rights=Include
               Initial Vol:     39         1021        0
                    Lanes:       0    1      1     0   0

                    Signal=Stop                                     Signal=Stop
Initial Vol:  Lanes: Rights=Include      Vol Cnt Date:   n/a        Rights=Include   Lanes:  Initial Vol:
                                      Cycle Time (sec):   100
    11          0                                                                      0          0
                                       Loss Time (sec):     0
                0                                                                      0
     0          1!                        Critical V/C:  0.148                         0          0
                0                    Avg Crit Del (sec/veh):   1.1                     0
    74          0                       Avg Delay (sec/veh):   1.1                     0          0
                                                   LOS:     C

                    Lanes:       1    0      2     0   0
               Initial Vol:     49          930        0
                          Signal=Uncontrol/Rights=Include
```

```
Street Name:         Long Beach Blvd                  Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      49  930     0     0 1021    39    11    0    74     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   49  930     0     0 1021    39    11    0    74     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   49  930     0     0 1021    39    11    0    74     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    49  930     0     0 1021    39    11    0    74     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   49  930     0     0 1021    39    11    0    74     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1060 xxxx xxxxx  xxxx xxxx xxxxx  1604 2069   530  xxxx xxxx xxxxx
Potent Cap.:  665 xxxx xxxxx  xxxx xxxx xxxxx    98   55   499  xxxx xxxx xxxxx
Move Cap.:    665 xxxx xxxxx  xxxx xxxx xxxxx    93   51   499  xxxx xxxx xxxxx
Volume/Cap:  0.07 xxxx  xxxx  xxxx xxxx  xxxx  0.12 0.00  0.15  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.2 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 10.8 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  318 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.1 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 20.4 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             20.4             xxxxxx
ApproachLOS:          *                *                C                *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   49  930     0     0 1021    39    11    0    74     0    0     0
ApproachDel:    xxxxxx           xxxxxx             20.4          xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.5]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=85]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2124]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   49  930     0     0 1021    39    11    0    74     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:            2039
Minor Approach Volume:          85
Minor Approach Volume Threshold: 39 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
AM Peak

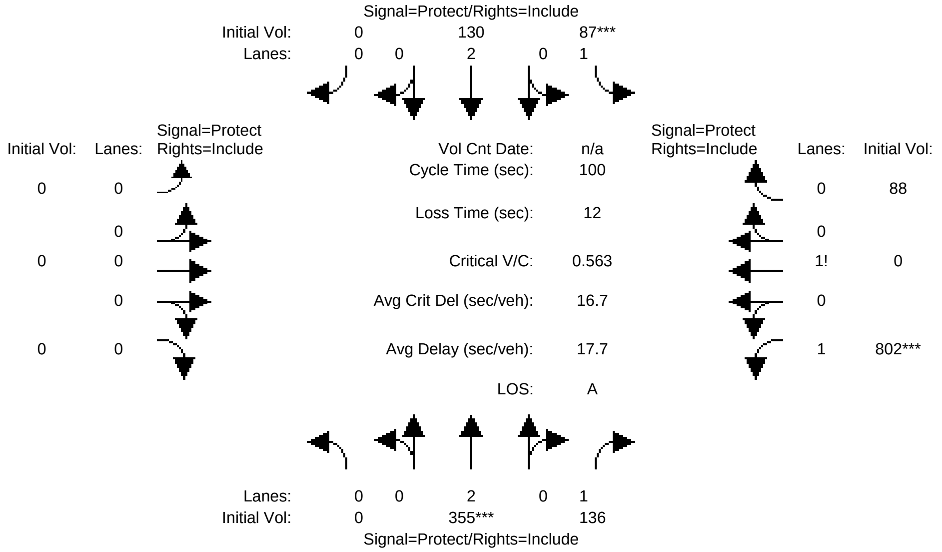
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	17.7	0.563	16.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	E	37.6	0.994	46.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	C	7.3	0.704	8.3	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	E	32.9	0.935	37.3	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	0.6	0.081	0.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Horizon Year (2015) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps



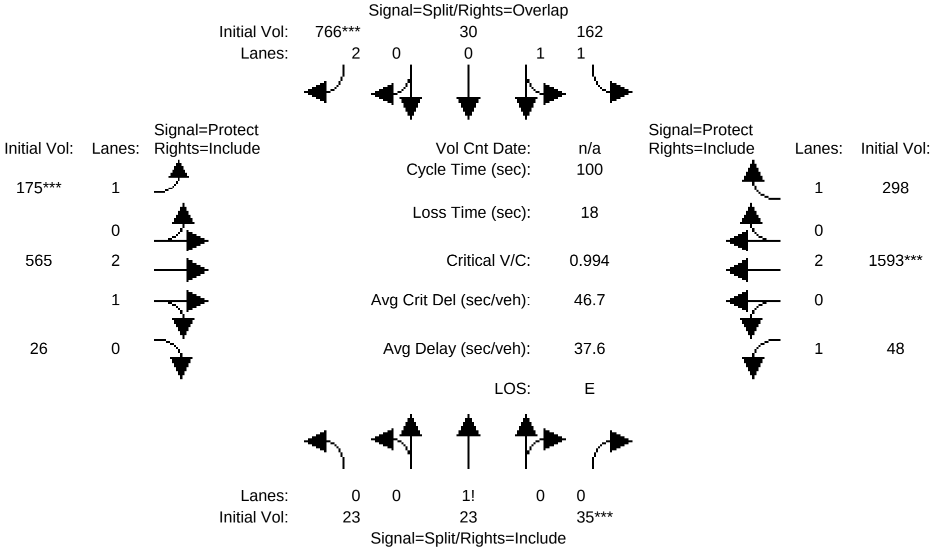
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 12
Critical V/C: 0.563
Avg Crit Del (sec/veh): 16.7
Avg Delay (sec/veh): 17.7
LOS: A

```
Street Name:            Susana Rd                      I-710 SB Ramps
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  355   136    87  130     0     0    0     0   802    0    88
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  355   136    87  130     0     0    0     0   802    0    88
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Approved Pr:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  355   136    87  130     0     0    0     0   802    0    88
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  355   136    87  130     0     0    0     0   802    0    88
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0  355   136    87  130     0     0    0     0   802    0    88
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:    0  355   136    87  130     0     0    0     0   802    0    88
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 2.00  1.00  1.00 2.00  0.00  0.00 0.00  0.00  1.80 0.00  0.20
Final Sat.:     0 3200  1600  1600 3200     0     0    0     0  2884    0   316
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.11  0.09  0.05 0.04  0.00  0.00 0.00  0.00  0.28 0.00  0.28
Crit Moves:       ****        ****                              ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd

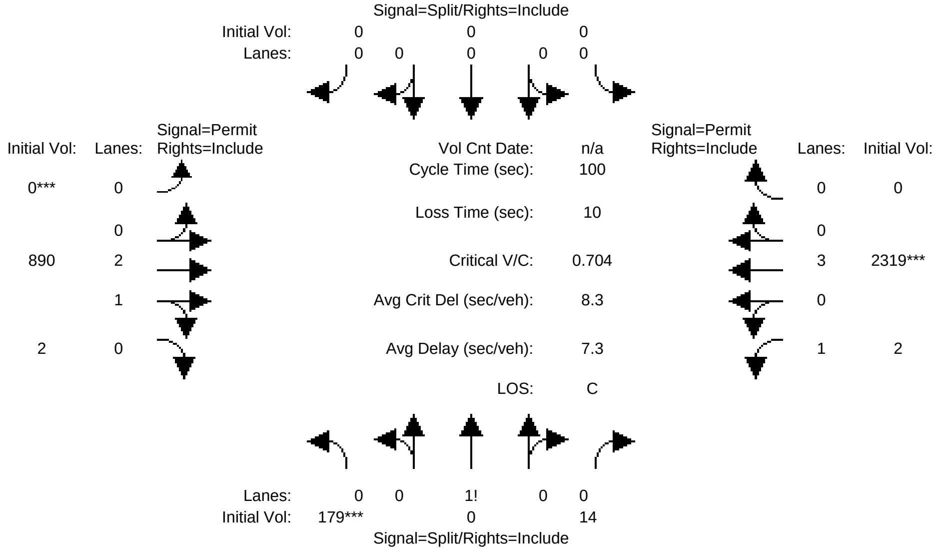


```
Street Name:            Susana Rd                       Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      23   23    35   162   30   766   175  565    26    48 1593   298
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   23   23    35   162   30   766   175  565    26    48 1593   298
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Approved Pr:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   23   23    35   162   30   766   175  565    26    48 1593   298
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    23   23    35   162   30   766   175  565    26    48 1593   298
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   23   23    35   162   30   766   175  565    26    48 1593   298
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   23   23    35   162   30   766   175  565    26    48 1593   298
OvlAdjVol:                                451
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  0.90  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.28 0.28  0.44  1.69 0.31  2.00  1.00 2.87  0.13  1.00 2.00  1.00
Final Sat.:   454  454   691  2700  500  2880  1600 4589   211  1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.05 0.05  0.05  0.06 0.06  0.27  0.11 0.12  0.12  0.03 0.50  0.19
OvlAdjV/S:                               0.16
Crit Moves:             ****             ****  ****                  ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd

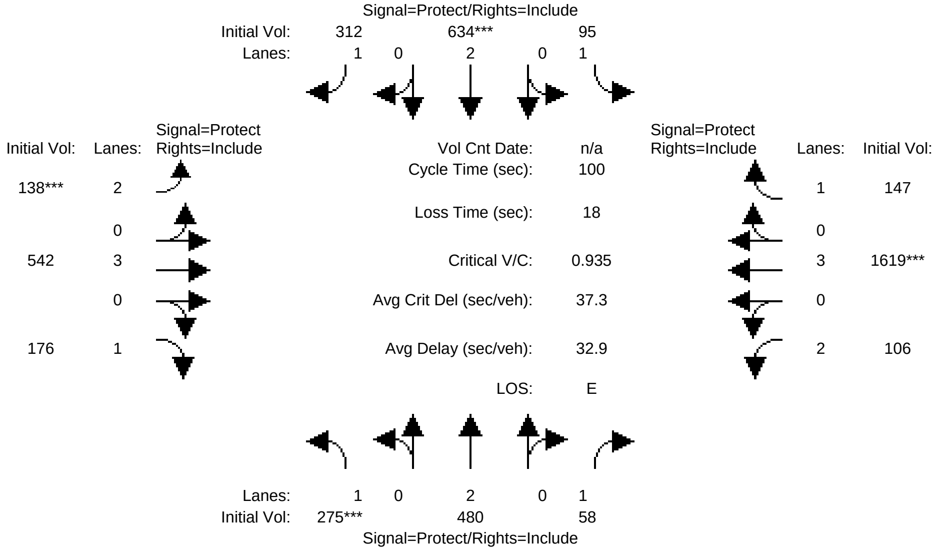


```
Street Name:            Daisy Ave                        Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:    0    0     0     0    0     0     0    0     0     0    0     0
Y+R:         4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    179    0    14     0    0     0     0  890     2     2 2319     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse: 179    0    14     0    0     0     0  890     2     2 2319     0
Added Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Approved Pr:   0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut: 179    0    14     0    0     0     0  890     2     2 2319     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:  179    0    14     0    0     0     0  890     2     2 2319     0
Reduct Vol:    0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol: 179    0    14     0    0     0     0  890     2     2 2319     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume: 179    0    14     0    0     0     0  890     2     2 2319     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.93 0.00  0.07  0.00 0.00  0.00  0.00 2.99  0.01  1.00 3.00  0.00
Final Sat.:  1484    0   116     0    0     0     0 4789    11  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.12 0.00  0.12  0.00 0.00  0.00  0.00 0.19  0.19  0.00 0.48  0.00
Crit Moves:  ****                              ****                  ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd

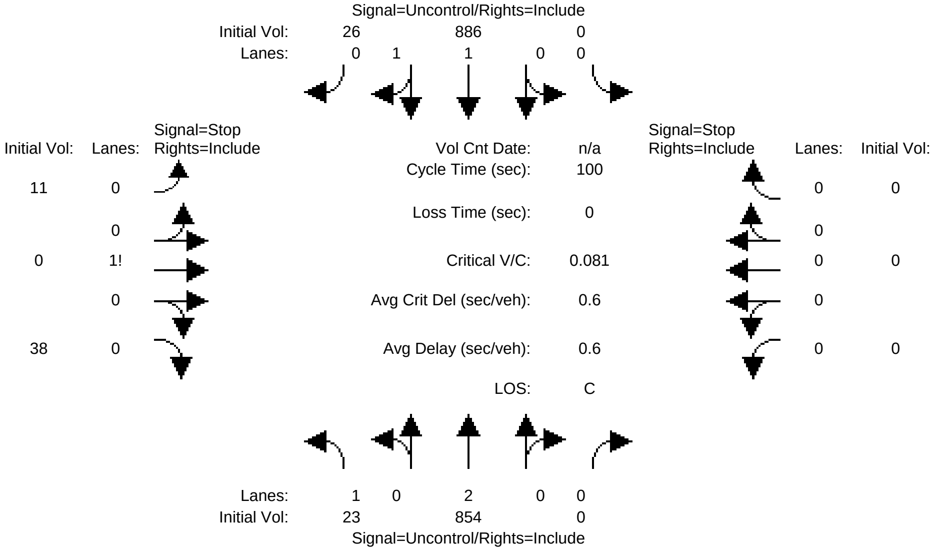


```
Street Name:         Long Beach Blvd                     Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:    0    0     0     0    0     0     0    0     0     0    0     0
Y+R:         4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     275  480    58    95  634   312   138  542   176   106 1619   147
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  275  480    58    95  634   312   138  542   176   106 1619   147
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Approved Pr:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  275  480    58    95  634   312   138  542   176   106 1619   147
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   275  480    58    95  634   312   138  542   176   106 1619   147
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  275  480    58    95  634   312   138  542   176   106 1619   147
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  275  480    58    95  634   312   138  542   176   106 1619   147
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.17 0.15  0.04  0.06 0.20  0.20  0.05 0.11  0.11  0.04 0.34  0.09
Crit Moves:  ****                  ****        ****                  ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



Signal=Uncontrol/Rights=Include
Initial Vol: 26 886 0
Lanes: 0 1 1 0 0

Signal=Stop
Rights=Include
Initial Vol: 11 0 38
Lanes: 0 0 1! 0 0

Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 0
Critical V/C: 0.081
Avg Crit Del (sec/veh): 0.6
Avg Delay (sec/veh): 0.6
LOS: C

Signal=Stop
Rights=Include
Lanes: 0 0 0 0 0
Initial Vol: 0 0 0

Lanes: 1 0 2 0 0
Initial Vol: 23 854 0
Signal=Uncontrol/Rights=Include

```
Street Name:          Long Beach Blvd                  Arbor St/48th St
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      23  854     0     0  886    26    11    0    38     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   23  854     0     0  886    26    11    0    38     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Approved Pr:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   23  854     0     0  886    26    11    0    38     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    23  854     0     0  886    26    11    0    38     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   23  854     0     0  886    26    11    0    38     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  912 xxxx xxxxx  xxxx xxxx xxxxx  1372 1799   456  xxxx xxxx xxxxx
Potent Cap.:  755 xxxx xxxxx  xxxx xxxx xxxxx   140   81   557  xxxx xxxx xxxxx
Move Cap.:    755 xxxx xxxxx  xxxx xxxx xxxxx   136   78   557  xxxx xxxx xxxxx
Volume/Cap:  0.03 xxxx  xxxx  xxxx xxxx  xxxx  0.08 0.00  0.07  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:  9.9 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  329 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.5 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 17.8 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              17.8            xxxxxx
ApproachLOS:          *                *                 C                 *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   23  854     0     0  886    26    11    0    38     0    0     0
ApproachDel:    xxxxxx           xxxxxx              17.8          xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.2]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=49]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1838]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   23  854     0     0  886    26    11    0    38     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             1789
Minor Approach Volume:           49
Minor Approach Volume Threshold: 84 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
PM Peak

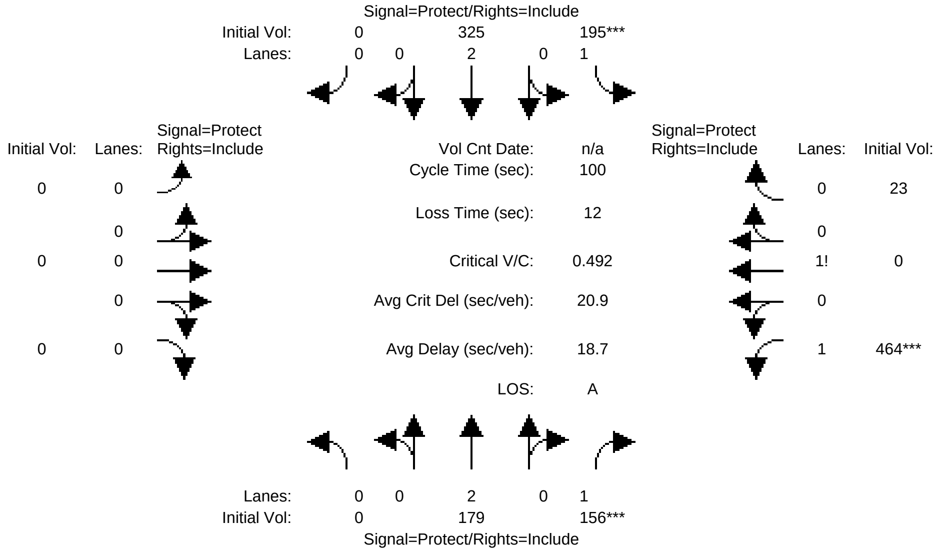
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	18.7	0.492	20.9	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	D	25.0	0.872	24.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	B	3.4	0.669	3.9	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	E	32.6	0.951	36.5	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	1.1	0.159	1.1	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Horizon Year (2015) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps



```
                              Signal=Protect/Rights=Include
                Initial Vol:      0         325         195***
                      Lanes:      0    0     2     0     1

                 Signal=Protect                                    Signal=Protect
Initial Vol:  Lanes:  Rights=Include        Vol Cnt Date:    n/a   Rights=Include   Lanes:  Initial Vol:
                                          Cycle Time (sec):  100
      0         0                                                                     0        23
                                          Loss Time (sec):    12
                0                                                                     0
      0         0                           Critical V/C:  0.492                      1!        0
                0                      Avg Crit Del (sec/veh):  20.9                  0
      0         0                         Avg Delay (sec/veh):  18.7                  1       464***
                                                      LOS:     A

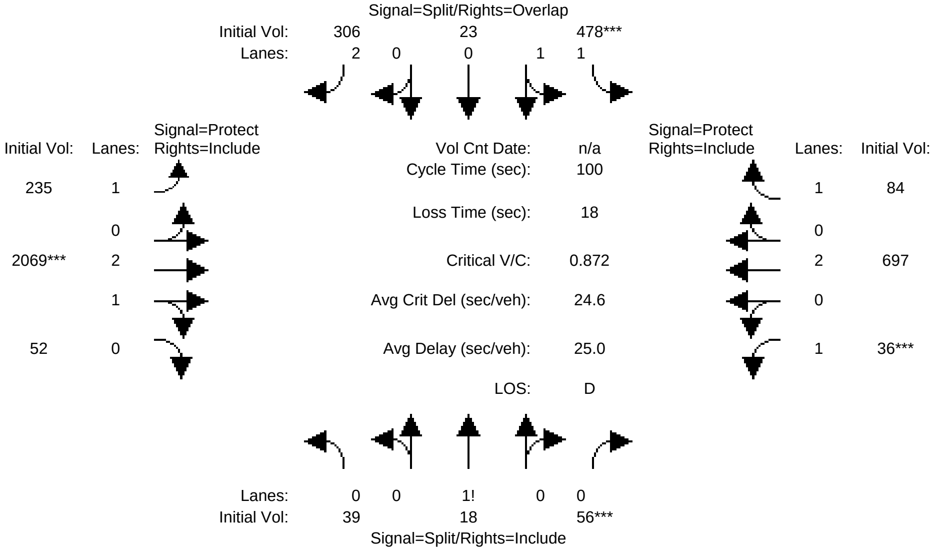
                      Lanes:      0    0     2     0     1
                Initial Vol:      0         179         156***
                              Signal=Protect/Rights=Include
```

```
Street Name:                Susana Rd                          I-710 SB Ramps
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  179   156   195  325     0     0    0     0   464    0    23
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  179   156   195  325     0     0    0     0   464    0    23
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  179   156   195  325     0     0    0     0   464    0    23
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  179   156   195  325     0     0    0     0   464    0    23
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0  179   156   195  325     0     0    0     0   464    0    23
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:    0  179   156   195  325     0     0    0     0   464    0    23
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 2.00  1.00  1.00 2.00  0.00  0.00 0.00  0.00  1.91 0.00  0.09
Final Sat.:     0 3200  1600  1600 3200     0     0    0     0  3049    0   151
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.06  0.10  0.12 0.10  0.00  0.00 0.00  0.00  0.15 0.00  0.15
Crit Moves:             ****  ****                              ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd



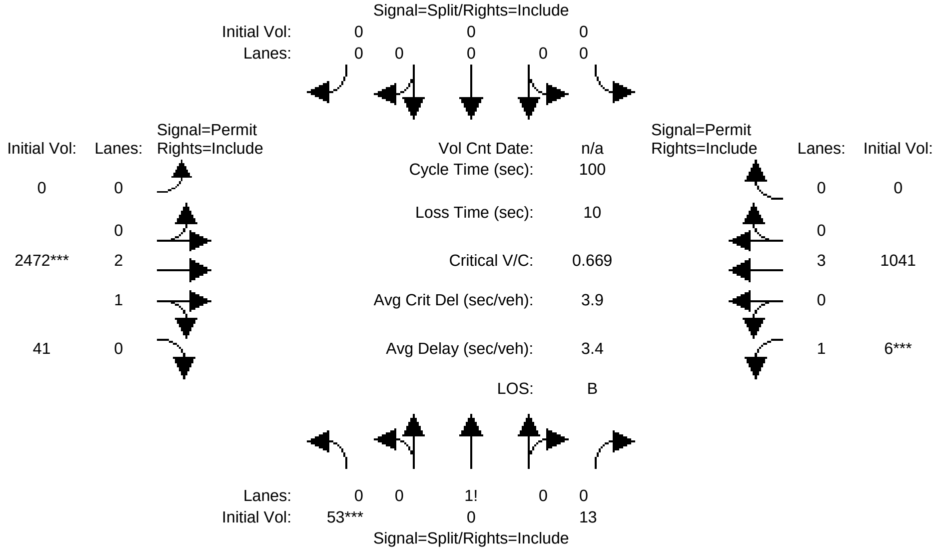
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 0.872
Avg Crit Del (sec/veh): 24.6
Avg Delay (sec/veh): 25.0
LOS: D

```
Street Name:            Susana Rd                        Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      39   18    56   478   23   306   235 2069    52    36  697    84
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   39   18    56   478   23   306   235 2069    52    36  697    84
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   39   18    56   478   23   306   235 2069    52    36  697    84
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    39   18    56   478   23   306   235 2069    52    36  697    84
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   39   18    56   478   23   306   235 2069    52    36  697    84
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   39   18    56   478   23   306   235 2069    52    36  697    84
OvlAdjVol:                                  0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  0.90  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.34 0.16  0.50  1.91 0.09  2.00  1.00 2.93  0.07  1.00 2.00  1.00
Final Sat.:   552  255   793  3053  147  2880  1600 4682   118  1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07 0.07  0.07  0.16 0.16  0.11  0.15 0.44  0.44  0.02 0.22  0.05
OvlAdjV/S:                               0.00
Crit Moves:             ****  ****                  ****        ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd

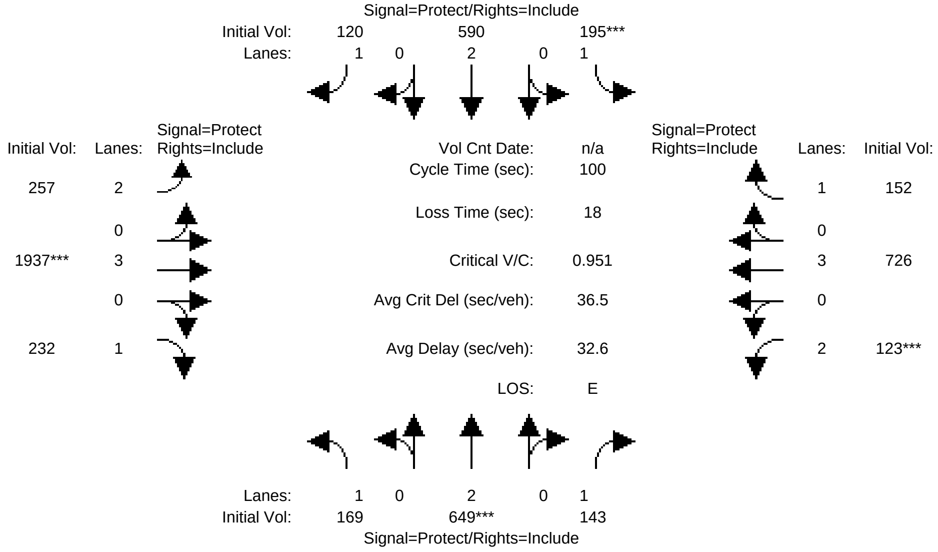


```
Street Name:            Daisy Ave                        Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:    0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      53    0    13     0    0     0     0 2472    41     6 1041     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   53    0    13     0    0     0     0 2472    41     6 1041     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   53    0    13     0    0     0     0 2472    41     6 1041     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    53    0    13     0    0     0     0 2472    41     6 1041     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   53    0    13     0    0     0     0 2472    41     6 1041     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   53    0    13     0    0     0     0 2472    41     6 1041     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.80 0.00  0.20  0.00 0.00  0.00  0.00 2.95  0.05  1.00 3.00  0.00
Final Sat.:  1285    0   315     0    0     0     0 4722    78  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.04 0.00  0.04  0.00 0.00  0.00  0.00 0.52  0.52  0.00 0.22  0.00
Crit Moves:  ****                                   ****        ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd



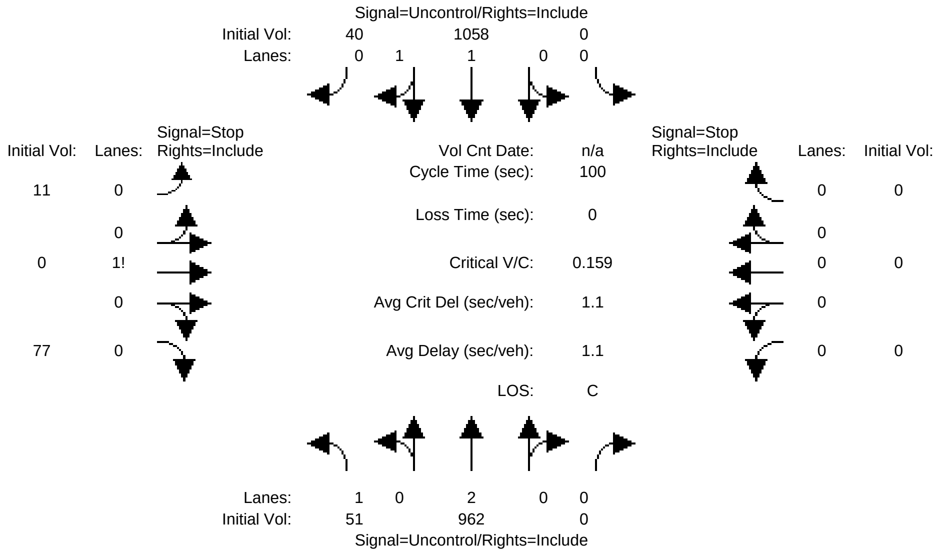
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 0.951
Avg Crit Del (sec/veh): 36.5
Avg Delay (sec/veh): 32.6
LOS: E

```
Street Name:         Long Beach Blvd                     Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     169  649   143   195  590   120   257 1937   232   123  726   152
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  169  649   143   195  590   120   257 1937   232   123  726   152
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  169  649   143   195  590   120   257 1937   232   123  726   152
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   169  649   143   195  590   120   257 1937   232   123  726   152
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  169  649   143   195  590   120   257 1937   232   123  726   152
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  169  649   143   195  590   120   257 1937   232   123  726   152
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.11 0.20  0.09  0.12 0.18  0.08  0.09 0.40  0.15  0.04 0.15  0.10
Crit Moves:       ****        ****                  ****        ****
```

Riverwalk Subdivision
Horizon Year (2015) Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
Street Name:         Long Beach Blvd                   Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      51  962     0     0 1058    40    11    0    77     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   51  962     0     0 1058    40    11    0    77     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   51  962     0     0 1058    40    11    0    77     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    51  962     0     0 1058    40    11    0    77     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   51  962     0     0 1058    40    11    0    77     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1098 xxxx xxxxx  xxxx xxxx xxxxx  1661 2142   549  xxxx xxxx xxxxx
Potent Cap.:  643 xxxx xxxxx  xxxx xxxx xxxxx    90   49   485  xxxx xxxx xxxxx
Move Cap.:    643 xxxx xxxxx  xxxx xxxx xxxxx    85   45   485  xxxx xxxx xxxxx
Volume/Cap:  0.08 xxxx  xxxx  xxxx xxxx  xxxx  0.13 0.00  0.16  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.3 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 11.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  304 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.2 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 21.6 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:    xxxxxx            xxxxxx             21.6            xxxxxx
ApproachLOS:         *                *                C                *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   51  962     0     0 1058    40    11    0    77     0    0     0
ApproachDel:    xxxxxx           xxxxxx             21.6           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.5]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=88]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2199]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   51  962     0     0 1058    40    11    0    77     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:            2111
Minor Approach Volume:          88
Minor Approach Volume Threshold: 27 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
AM Peak

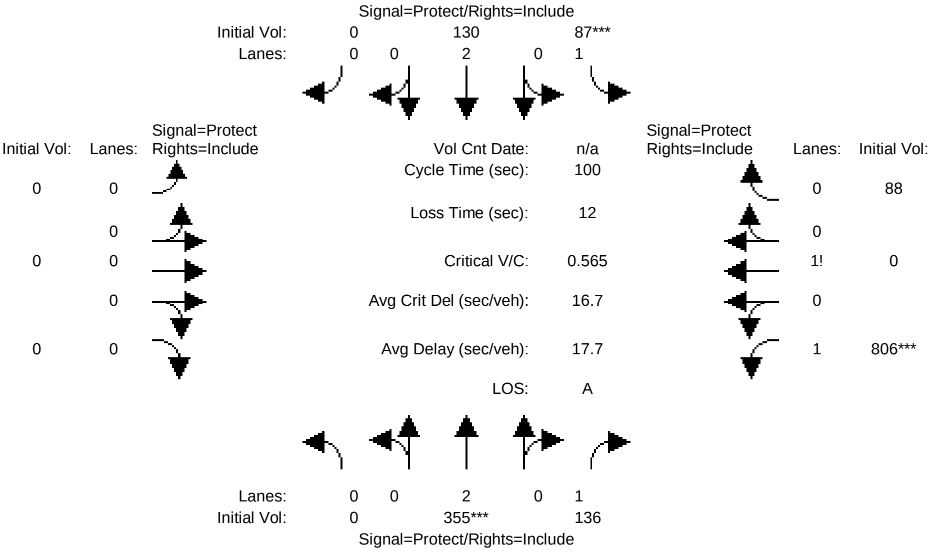
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	17.7	0.565	16.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	E	37.8	0.996	47.0	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	C	9.4	0.740	10.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	E	33.1	0.937	37.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	0.7	0.097	0.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps



```
                    Signal=Protect/Rights=Include
          Initial Vol:     0          130          87***
          Lanes:           0    0      2       0    1

              Signal=Protect                              Signal=Protect
Initial Vol: Lanes: Rights=Include   Vol Cnt Date:      n/a   Rights=Include   Lanes:  Initial Vol:
                                     Cycle Time (sec):  100
   0          0                                                                  0        88
                                     Loss Time (sec):   12
              0                                                                  0
   0          0                      Critical V/C:      0.565                   1!         0
              0                      Avg Crit Del (sec/veh): 16.7               0
   0          0                      Avg Delay (sec/veh):    17.7               1       806***
                                     LOS:               A

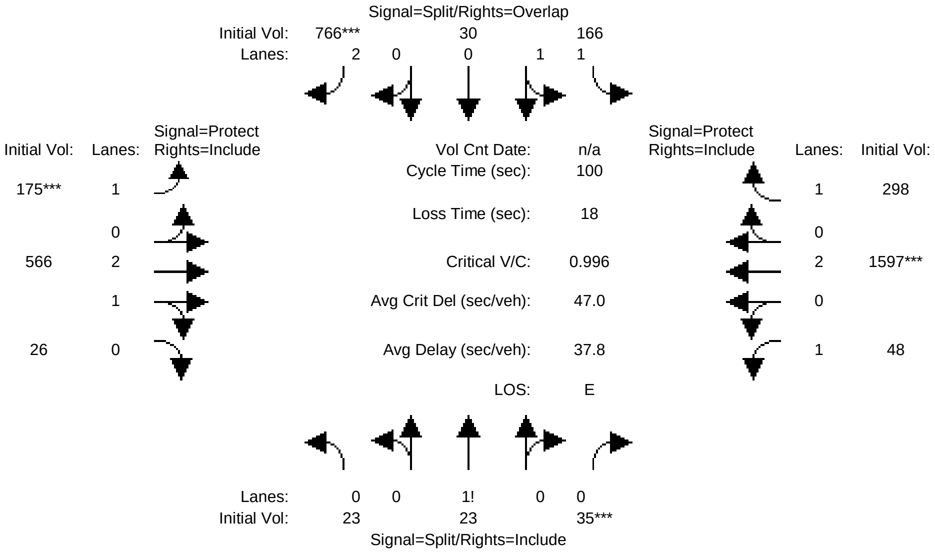
          Lanes:           0    0      2       0    1
          Initial Vol:     0         355***        136
                    Signal=Protect/Rights=Include
```

```
Street Name:              Susana Rd                         I-710 SB Ramps
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  355   136    87  130     0     0    0     0   806    0    88
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  355   136    87  130     0     0    0     0   806    0    88
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  355   136    87  130     0     0    0     0   806    0    88
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  355   136    87  130     0     0    0     0   806    0    88
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0  355   136    87  130     0     0    0     0   806    0    88
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:    0  355   136    87  130     0     0    0     0   806    0    88
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 2.00  1.00  1.00 2.00  0.00  0.00 0.00  0.00  1.80 0.00  0.20
Final Sat.:     0 3200  1600  1600 3200     0     0    0     0  2885    0   315
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.11  0.09  0.05 0.04  0.00  0.00 0.00  0.00  0.28 0.00  0.28
Crit Moves:       ****        ****                                ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd

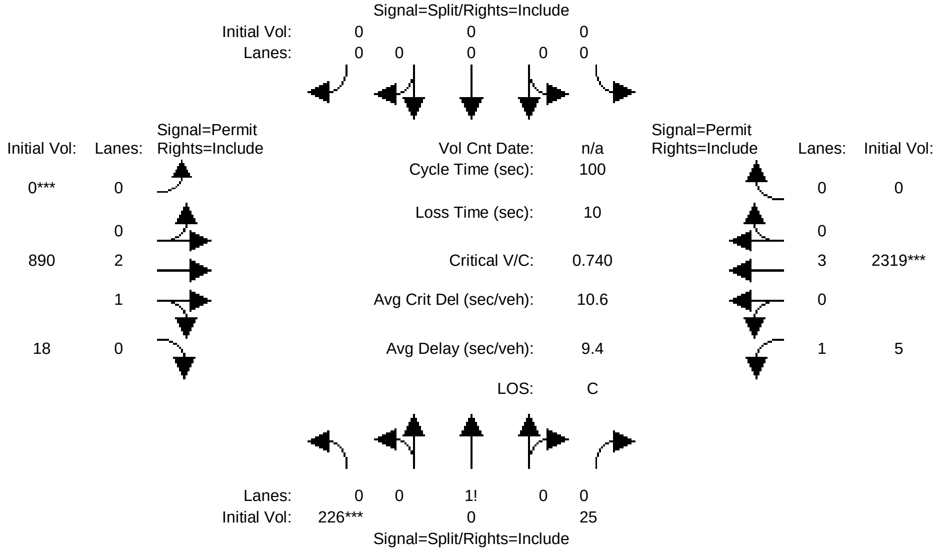


```
Street Name:              Susana Rd                          Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      23   23    35  166   30   766  175  566    26   48 1597   298
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   23   23    35  166   30   766  175  566    26   48 1597   298
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   23   23    35  166   30   766  175  566    26   48 1597   298
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:    23   23    35  166   30   766  175  566    26   48 1597   298
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   23   23    35  166   30   766  175  566    26   48 1597   298
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:   23   23    35  166   30   766  175  566    26   48 1597   298
OvlAdjVol:                                451
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  0.90 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.28 0.28  0.44 1.69 0.31  2.00 1.00 2.87  0.13 1.00 2.00  1.00
Final Sat.:   454  454   691 2710  490  2880 1600 4589   211 1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.05 0.05  0.05 0.06 0.06  0.27 0.11 0.12  0.12 0.03 0.50  0.19
OvlAdjV/S:                                0.16
Crit Moves:             ****              **** ****                  ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd



```
                           Signal=Split/Rights=Include
                  Initial Vol:    0          0          0
                       Lanes:     0    0     0     0    0

                Signal=Permit                                        Signal=Permit
Initial Vol:  Lanes:  Rights=Include      Vol Cnt Date:     n/a      Rights=Include    Lanes:  Initial Vol:
                                    Cycle Time (sec):       100
   0***         0                                                                        0        0
                                      Loss Time (sec):       10
                0                                                                        0
   890          2                         Critical V/C:     0.740                        3      2319***
                1                    Avg Crit Del (sec/veh):  10.6                       0
   18           0                       Avg Delay (sec/veh):   9.4                       1        5
                                                    LOS:       C

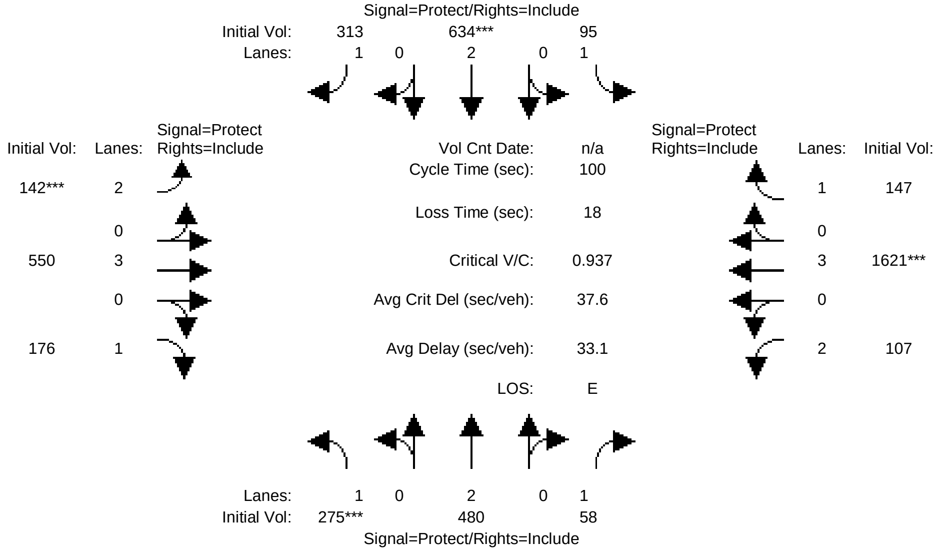
                       Lanes:     0    0     1!    0    0
                  Initial Vol:  226***       0          25
                           Signal=Split/Rights=Include
```

```
Street Name:              Daisy Ave                          Del Amo Blvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     226    0    25     0    0     0     0  890    18     5 2319     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  226    0    25     0    0     0     0  890    18     5 2319     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  226    0    25     0    0     0     0  890    18     5 2319     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   226    0    25     0    0     0     0  890    18     5 2319     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  226    0    25     0    0     0     0  890    18     5 2319     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  226    0    25     0    0     0     0  890    18     5 2319     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.90 0.00  0.10  0.00 0.00  0.00  0.00 2.94  0.06  1.00 3.00  0.00
Final Sat.:  1441    0   159     0    0     0     0 4705    95  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.16 0.00  0.16  0.00 0.00  0.00  0.00 0.19  0.19  0.00 0.48  0.00
Crit Moves:  ****                              ****                   ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd



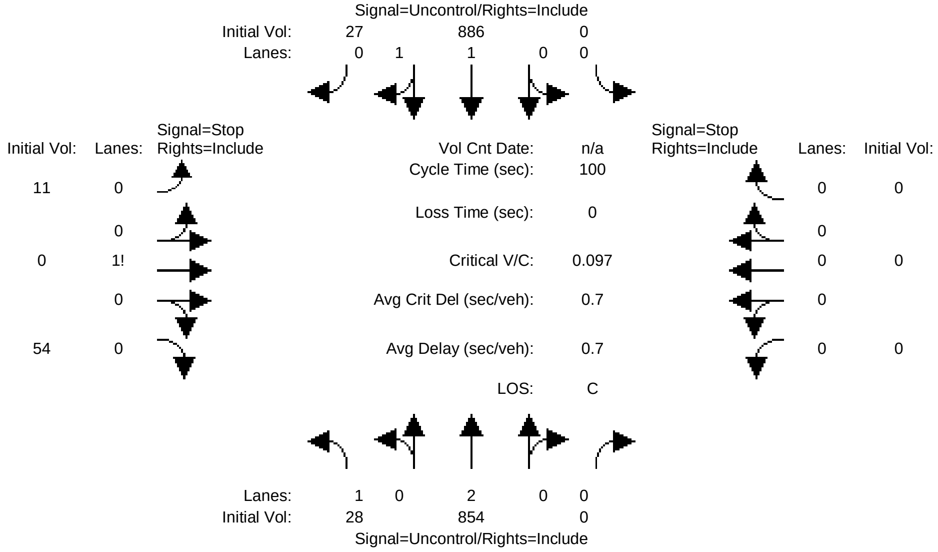
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 0.937
Avg Crit Del (sec/veh): 37.6
Avg Delay (sec/veh): 33.1
LOS: E

```
Street Name:          Long Beach Blvd                    Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     275  480    58    95  634   313   142  550   176   107 1621   147
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  275  480    58    95  634   313   142  550   176   107 1621   147
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  275  480    58    95  634   313   142  550   176   107 1621   147
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   275  480    58    95  634   313   142  550   176   107 1621   147
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  275  480    58    95  634   313   142  550   176   107 1621   147
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  275  480    58    95  634   313   142  550   176   107 1621   147
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.17 0.15  0.04  0.06 0.20  0.20  0.05 0.11  0.11  0.04 0.34  0.09
Crit Moves:  ****                  ****        ****                  ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
Street Name:         Long Beach Blvd                  Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      28  854     0     0  886    27    11    0    54     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   28  854     0     0  886    27    11    0    54     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   28  854     0     0  886    27    11    0    54     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    28  854     0     0  886    27    11    0    54     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   28  854     0     0  886    27    11    0    54     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  913 xxxx xxxxx  xxxx xxxx xxxxx  1383 1810   457  xxxx xxxx xxxxx
Potent Cap.:  755 xxxx xxxxx  xxxx xxxx xxxxx   137   80   557  xxxx xxxx xxxxx
Move Cap.:    755 xxxx xxxxx  xxxx xxxx xxxxx   133   77   557  xxxx xxxx xxxxx
Volume/Cap:  0.04 xxxx  xxxx  xxxx xxxx  xxxx  0.08 0.00  0.10  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 10.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    A    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  362 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.6 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 17.1 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             17.1            xxxxxx
ApproachLOS:         *                *                C                *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   28  854     0     0  886    27    11    0    54     0    0     0
ApproachDel:    xxxxxx           xxxxxx             17.1           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.3]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=65]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=1860]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   28  854     0     0  886    27    11    0    54     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             1795
Minor Approach Volume:           65
Minor Approach Volume Threshold: 83 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
PM Peak

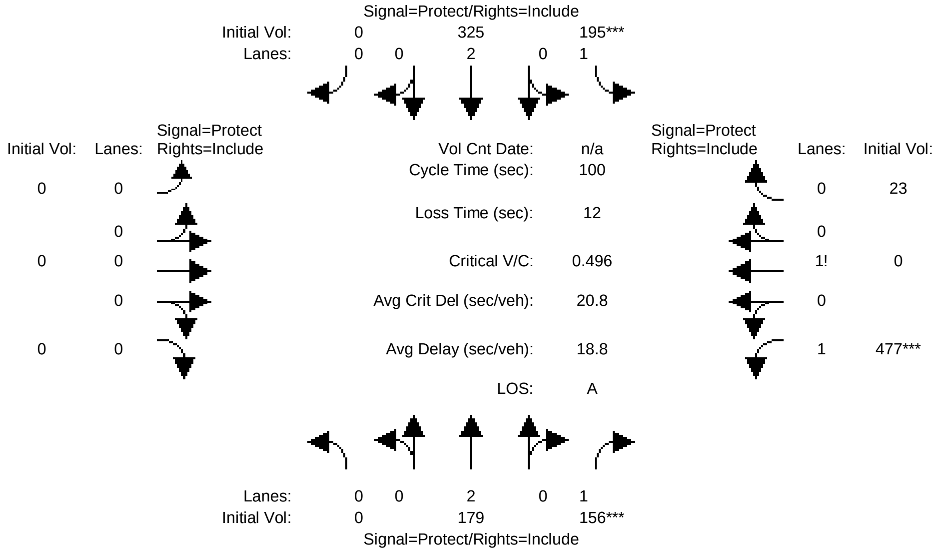
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	18.8	0.496	20.8	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	D	25.4	0.876	36.8	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	C	5.0	0.709	6.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	E	32.9	0.953	36.9	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	1.3	0.178	1.3	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps



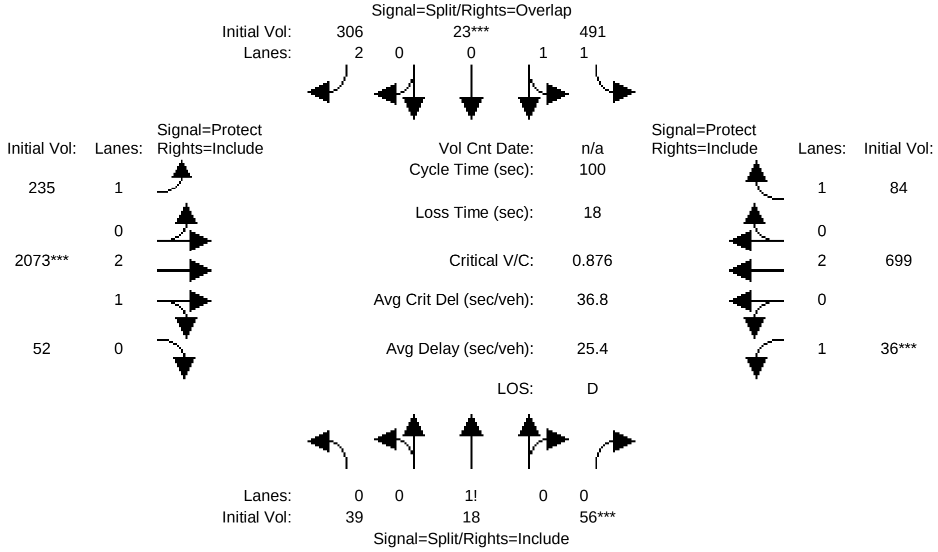
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 12
Critical V/C: 0.496
Avg Crit Del (sec/veh): 20.8
Avg Delay (sec/veh): 18.8
LOS: A

```
Street Name:             Susana Rd                        I-710 SB Ramps
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  179   156   195  325     0     0    0     0   477    0    23
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  179   156   195  325     0     0    0     0   477    0    23
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  179   156   195  325     0     0    0     0   477    0    23
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  179   156   195  325     0     0    0     0   477    0    23
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0  179   156   195  325     0     0    0     0   477    0    23
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:    0  179   156   195  325     0     0    0     0   477    0    23
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 2.00  1.00  1.00 2.00  0.00  0.00 0.00  0.00  1.91 0.00  0.09
Final Sat.:     0 3200  1600  1600 3200     0     0    0     0  3053    0   147
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.06  0.10  0.12 0.10  0.00  0.00 0.00  0.00  0.16 0.00  0.16
Crit Moves:             ****  ****                              ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd

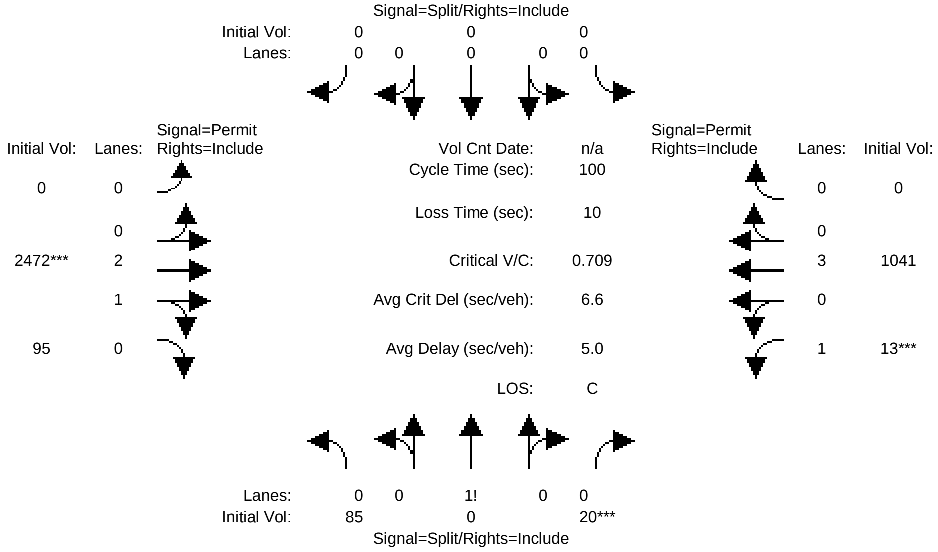


```
Street Name:               Susana Rd                          Del Amo Blvd
Approach:      North Bound       South Bound        East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      39   18    56   491   23   306   235 2073    52    36  699    84
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   39   18    56   491   23   306   235 2073    52    36  699    84
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   39   18    56   491   23   306   235 2073    52    36  699    84
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    39   18    56   491   23   306   235 2073    52    36  699    84
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   39   18    56   491   23   306   235 2073    52    36  699    84
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   39   18    56   491   23   306   235 2073    52    36  699    84
OvlAdjVol:                                  0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  0.90  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.34 0.16  0.50  1.91 0.09  2.00  1.00 2.93  0.07  1.00 2.00  1.00
Final Sat.:   552  255   793  3057  143  2880  1600 4683   117  1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07 0.07  0.07  0.16 0.16  0.11  0.15 0.44  0.44  0.02 0.22  0.05
OvlAdjV/S:                               0.00
Crit Moves:             ****       ****              ****        ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd

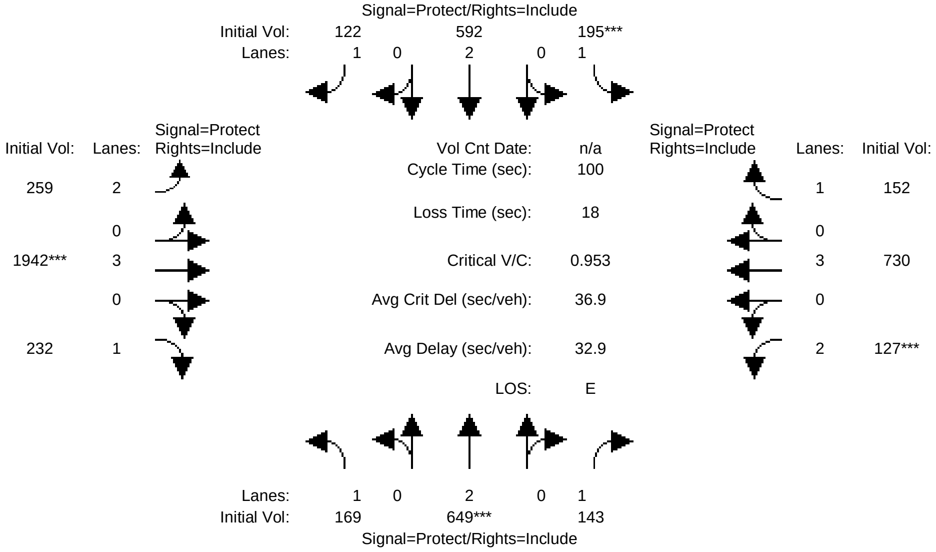


```
Street Name:            Daisy Ave                        Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      85    0    20     0    0     0     0 2472    95    13 1041     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   85    0    20     0    0     0     0 2472    95    13 1041     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   85    0    20     0    0     0     0 2472    95    13 1041     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    85    0    20     0    0     0     0 2472    95    13 1041     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   85    0    20     0    0     0     0 2472    95    13 1041     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   85    0    20     0    0     0     0 2472    95    13 1041     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.81 0.00  0.19  0.00 0.00  0.00  0.00 2.89  0.11  1.00 3.00  0.00
Final Sat.:  1295    0   305     0    0     0     0 4622   178  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07 0.00  0.07  0.00 0.00  0.00  0.00 0.53  0.53  0.01 0.22  0.00
Crit Moves:             ****                        ****        ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd

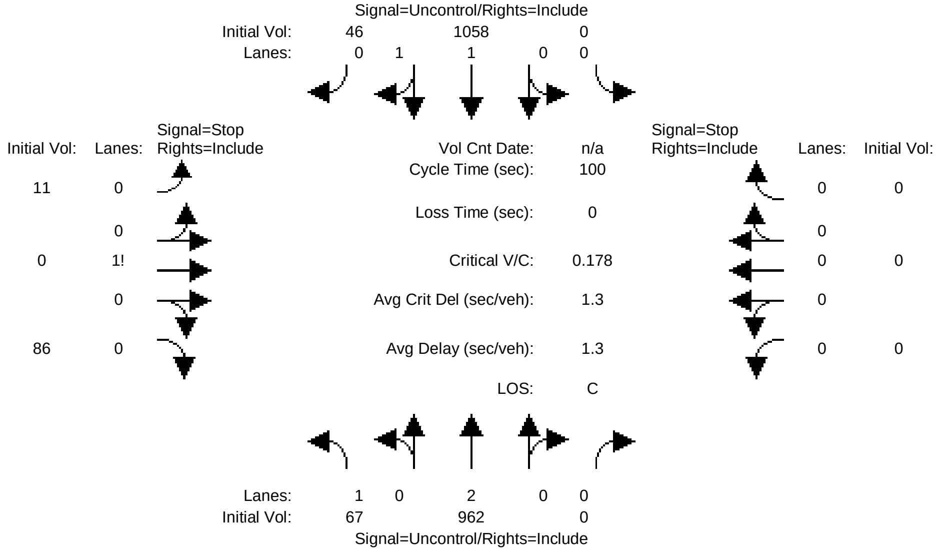


```
Street Name:          Long Beach Blvd                     Del Amo Blvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     169  649   143   195  592   122   259 1942   232   127  730   152
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  169  649   143   195  592   122   259 1942   232   127  730   152
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  169  649   143   195  592   122   259 1942   232   127  730   152
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   169  649   143   195  592   122   259 1942   232   127  730   152
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  169  649   143   195  592   122   259 1942   232   127  730   152
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  169  649   143   195  592   122   259 1942   232   127  730   152
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.11 0.20  0.09  0.12 0.19  0.08  0.09 0.40  0.15  0.04 0.15  0.10
Crit Moves:       ****        ****                   ****        ****
```

Riverwalk Subdivision
Horizon Year (2015) Plus Project Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
                        Signal=Uncontrol/Rights=Include
            Initial Vol:     46        1058        0
                 Lanes:    0    1        1      0    0

               Signal=Stop                                      Signal=Stop
Initial Vol: Lanes: Rights=Include      Vol Cnt Date:    n/a    Rights=Include   Lanes:  Initial Vol:
                                    Cycle Time (sec):    100
    11        0                                                                    0        0
                                     Loss Time (sec):      0
              0                                                                    0
     0       1!                         Critical V/C:  0.178                       0        0
              0                 Avg Crit Del (sec/veh):    1.3                     0
    86        0                    Avg Delay (sec/veh):    1.3                     0        0
                                                  LOS:      C

                 Lanes:    1    0        2      0    0
            Initial Vol:     67        962         0
                        Signal=Uncontrol/Rights=Include
```

```
Street Name:          Long Beach Blvd                 Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      67  962     0     0 1058    46    11    0    86     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   67  962     0     0 1058    46    11    0    86     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   67  962     0     0 1058    46    11    0    86     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    67  962     0     0 1058    46    11    0    86     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   67  962     0     0 1058    46    11    0    86     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1104 xxxx xxxxx  xxxx xxxx xxxxx  1696 2177   552  xxxx xxxx xxxxx
Potent Cap.:  640 xxxx xxxxx  xxxx xxxx xxxxx    85   47   483  xxxx xxxx xxxxx
Move Cap.:    640 xxxx xxxxx  xxxx xxxx xxxxx    78   42   483  xxxx xxxx xxxxx
Volume/Cap:  0.10 xxxx  xxxx  xxxx xxxx  xxxx  0.14 0.00  0.18  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.3 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 11.3 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  305 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.3 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 22.2 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              22.2            xxxxxx
ApproachLOS:          *                *                 C                 *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   67  962     0     0 1058    46    11    0   86     0    0     0
ApproachDel:    xxxxxx           xxxxxx             22.2           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.6]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=97]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2230]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   67  962     0     0 1058    46    11    0   86     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             2133
Minor Approach Volume:           97
Minor Approach Volume Threshold: 24 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
AM Peak

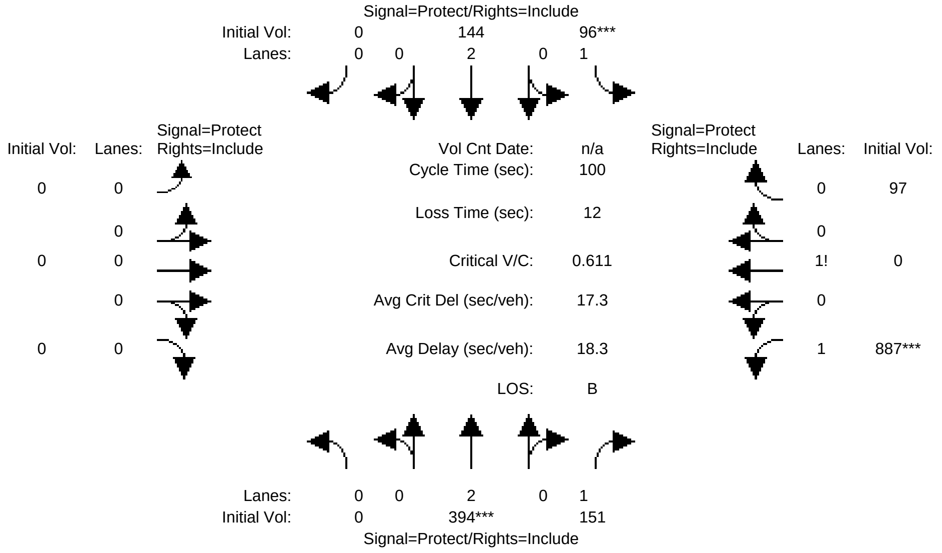
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	B	18.3	0.611	17.3	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	F	64.6	1.082	86.1	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	C	8.2	0.770	9.5	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	F	45.5	1.017	56.1	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	0.7	0.120	0.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Cumulative Year (2030) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps



```
                       Signal=Protect/Rights=Include
            Initial Vol:     0           144           96***
                 Lanes:      0     0       2       0     1

                 Signal=Protect                                    Signal=Protect
Initial Vol:  Lanes:  Rights=Include     Vol Cnt Date:    n/a      Rights=Include   Lanes:  Initial Vol:
                                       Cycle Time (sec):  100
    0           0                                                                    0        97
                                       Loss Time (sec):    12
                0                                                                    0
    0           0                          Critical V/C:  0.611                      1!        0
                0                  Avg Crit Del (sec/veh):  17.3                     0
    0           0                      Avg Delay (sec/veh):  18.3                    1       887***
                                                    LOS:    B

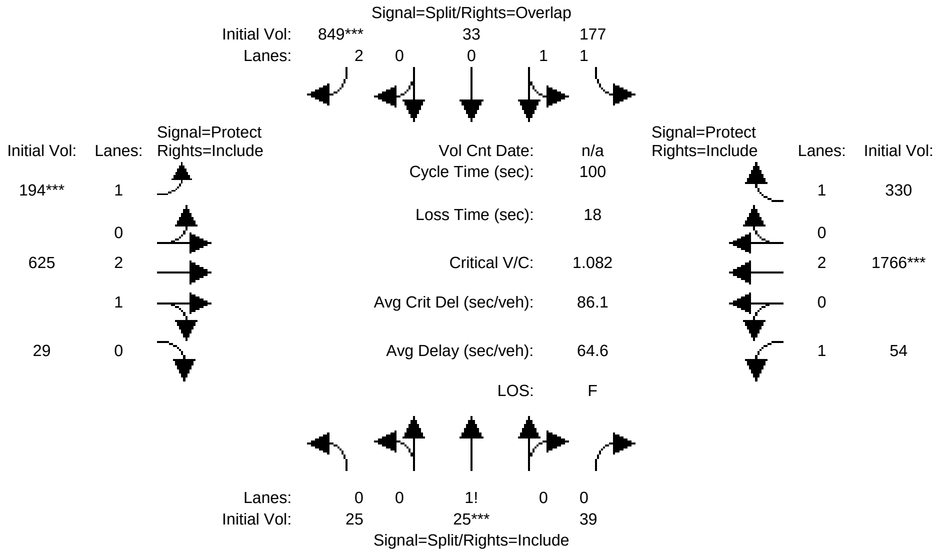
                 Lanes:      0     0       2       0     1
            Initial Vol:     0           394***         151
                       Signal=Protect/Rights=Include
```

```
Street Name:              Susana Rd                       I-710 SB Ramps
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  394   151    96  144     0     0    0     0   887    0    97
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  394   151    96  144     0     0    0     0   887    0    97
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  394   151    96  144     0     0    0     0   887    0    97
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  394   151    96  144     0     0    0     0   887    0    97
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0  394   151    96  144     0     0    0     0   887    0    97
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:    0  394   151    96  144     0     0    0     0   887    0    97
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 2.00  1.00  1.00 2.00  0.00  0.00 0.00  0.00  1.80 0.00  0.20
Final Sat.:     0 3200  1600  1600 3200     0     0    0     0  2885    0   315
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.12  0.09  0.06 0.05  0.00  0.00 0.00  0.00  0.31 0.00  0.31
Crit Moves:       ****        ****                                ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd

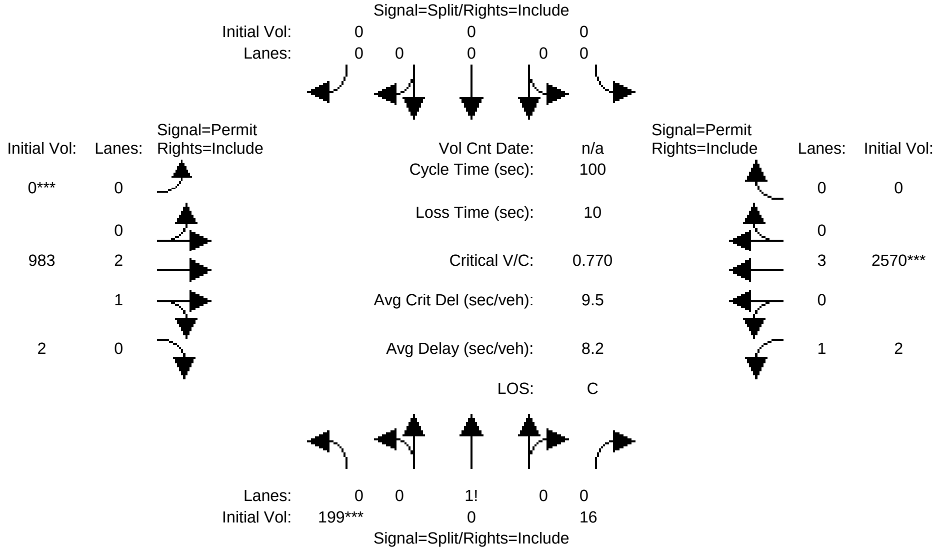


```
Street Name:              Susana Rd                          Del Amo Blvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      25   25    39  177   33   849  194  625    29   54 1766   330
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:   25   25    39  177   33   849  194  625    29   54 1766   330
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:   25   25    39  177   33   849  194  625    29   54 1766   330
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:    25   25    39  177   33   849  194  625    29   54 1766   330
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:   25   25    39  177   33   849  194  625    29   54 1766   330
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:   25   25    39  177   33   849  194  625    29   54 1766   330
OvlAdjVol:                                 500
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  0.90 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.28 0.28  0.44 1.69 0.31  2.00 1.00 2.87  0.13 1.00 2.00  1.00
Final Sat.:   449  449   701 2697  503  2880 1600 4587   213 1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.06 0.06  0.06 0.07 0.07  0.29 0.12 0.14  0.14 0.03 0.55  0.21
OvlAdjV/S:                              0.17
Crit Moves:       ****                  **** ****                   ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd

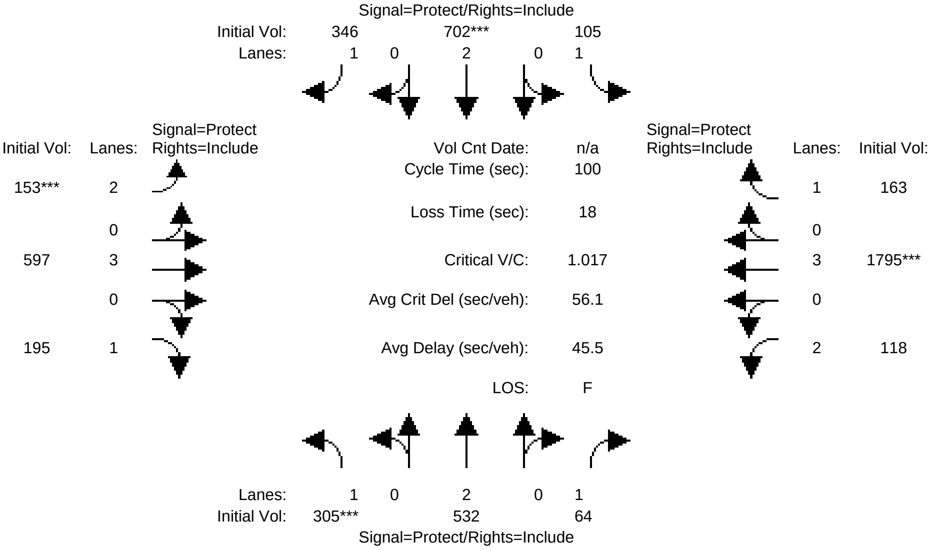


```
Street Name:              Daisy Ave                          Del Amo Blvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     199    0    16    0    0     0    0  983     2    2 2570     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:  199    0    16    0    0     0    0  983     2    2 2570     0
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:  199    0    16    0    0     0    0  983     2    2 2570     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:   199    0    16    0    0     0    0  983     2    2 2570     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:  199    0    16    0    0     0    0  983     2    2 2570     0
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:  199    0    16    0    0     0    0  983     2    2 2570     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.93 0.00  0.07 0.00 0.00  0.00 0.00 2.99  0.01 1.00 3.00  0.00
Final Sat.:  1481    0   119    0    0     0    0 4790    10 1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.13 0.00  0.13 0.00 0.00  0.00 0.00 0.21  0.21 0.00 0.54  0.00
Crit Moves:  ****                               ****                  ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd



```
                         Signal=Protect/Rights=Include
          Initial Vol:   346        702***        105
                Lanes:     1    0      2      0    1

                 Signal=Protect                                    Signal=Protect
Initial Vol:  Lanes:  Rights=Include      Vol Cnt Date:      n/a   Rights=Include    Lanes:  Initial Vol:
                                      Cycle Time (sec):      100
   153***       2                                                                       1        163
                                       Loss Time (sec):       18
                0                                                                       0
   597          3                         Critical V/C:    1.017                        3        1795***
                0                 Avg Crit Del (sec/veh):   56.1                        0
   195          1                    Avg Delay (sec/veh):   45.5                        2        118
                                                  LOS:        F

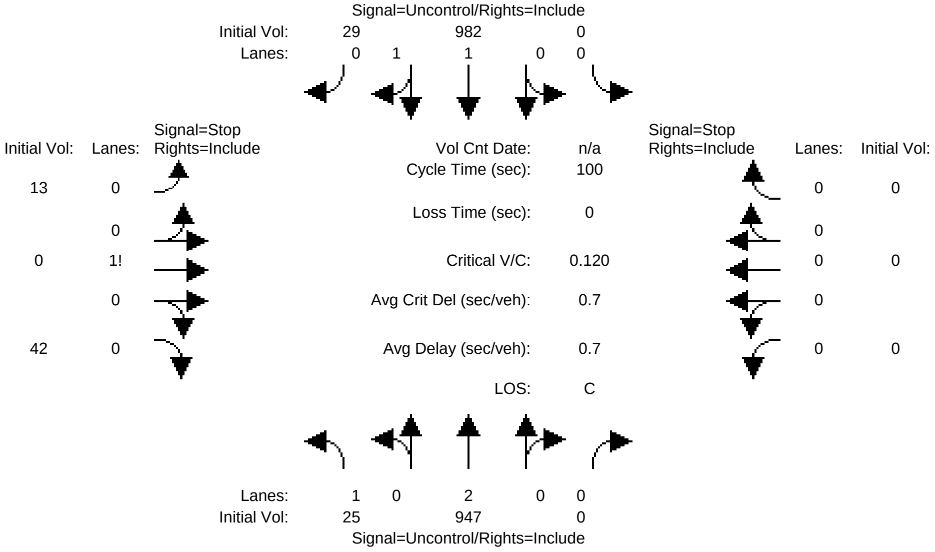
                Lanes:     1    0      2      0    1
          Initial Vol:   305***       532          64
                         Signal=Protect/Rights=Include
```

```
Street Name:         Long Beach Blvd                     Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     305  532    64   105  702   346   153  597   195   118 1795   163
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  305  532    64   105  702   346   153  597   195   118 1795   163
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  305  532    64   105  702   346   153  597   195   118 1795   163
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   305  532    64   105  702   346   153  597   195   118 1795   163
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  305  532    64   105  702   346   153  597   195   118 1795   163
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  305  532    64   105  702   346   153  597   195   118 1795   163
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.19 0.17  0.04  0.07 0.22  0.22  0.05 0.12  0.12  0.04 0.37  0.10
Crit Moves:  ****                  ****        ****                  ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
                         Signal=Uncontrol/Rights=Include
               Initial Vol:    29          982          0
                    Lanes:    0    1        1       0    0

                 Signal=Stop                                     Signal=Stop
Initial Vol:  Lanes:  Rights=Include         Vol Cnt Date:   n/a     Rights=Include   Lanes:  Initial Vol:
                                         Cycle Time (sec):   100
     13         0                                                                       0        0
                                          Loss Time (sec):     0
                0                                                                       0
      0        1!                            Critical V/C: 0.120                        0        0
                0                   Avg Crit Del (sec/veh):   0.7                       0
     42         0                        Avg Delay (sec/veh):  0.7                       0        0
                                                      LOS:     C

                    Lanes:    1    0        2       0    0
               Initial Vol:   25          947          0
                         Signal=Uncontrol/Rights=Include
```

```
Street Name:         Long Beach Blvd                  Arbor St/48th St
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:    L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      25  947     0     0  982    29    13    0    42     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   25  947     0     0  982    29    13    0    42     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   25  947     0     0  982    29    13    0    42     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    25  947     0     0  982    29    13    0    42     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   25  947     0     0  982    29    13    0    42     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1011 xxxx xxxxx  xxxx xxxx xxxxx  1520 1994   506  xxxx xxxx xxxxx
Potent Cap.:  694 xxxx xxxxx  xxxx xxxx xxxxx   112   61   517  xxxx xxxx xxxxx
Move Cap.:    694 xxxx xxxxx  xxxx xxxx xxxxx   108   59   517  xxxx xxxx xxxxx
Volume/Cap:  0.04 xxxx  xxxx  xxxx xxxx  xxxx  0.12 0.00  0.08  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 10.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  274 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.7 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 21.4 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx              21.4            xxxxxx
ApproachLOS:          *                *                 C                 *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   25  947     0     0  982    29    13    0    42     0    0     0
ApproachDel:    xxxxxx           xxxxxx              21.4           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.3]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=55]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2038]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   25  947     0     0  982    29    13    0    42     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             1983
Minor Approach Volume:           55
Minor Approach Volume Threshold: 49 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
PM Peak

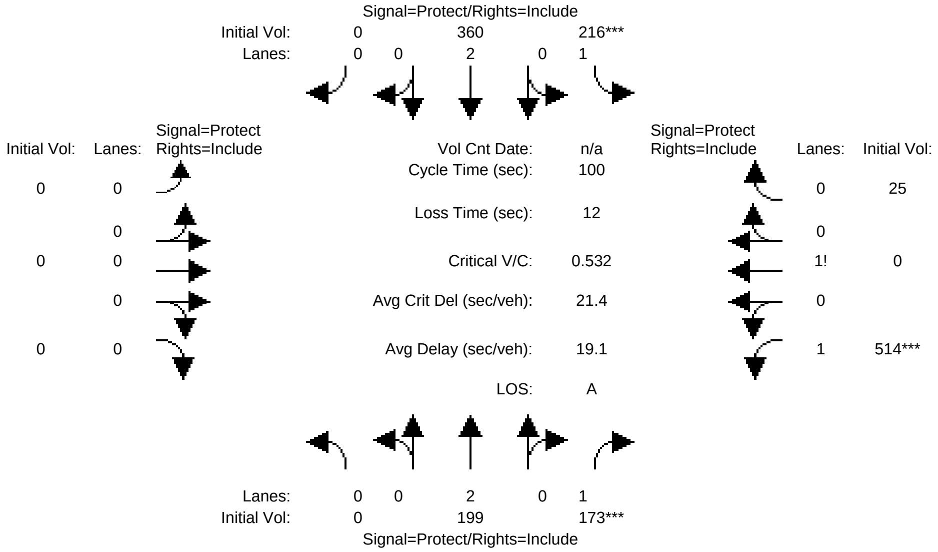
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	19.1	0.532	21.4	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	E	30.3	0.945	49.1	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	C	3.9	0.730	5.2	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	F	46.7	1.034	59.3	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	D	1.5	0.207	1.5	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Cumulative Year (2030) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps

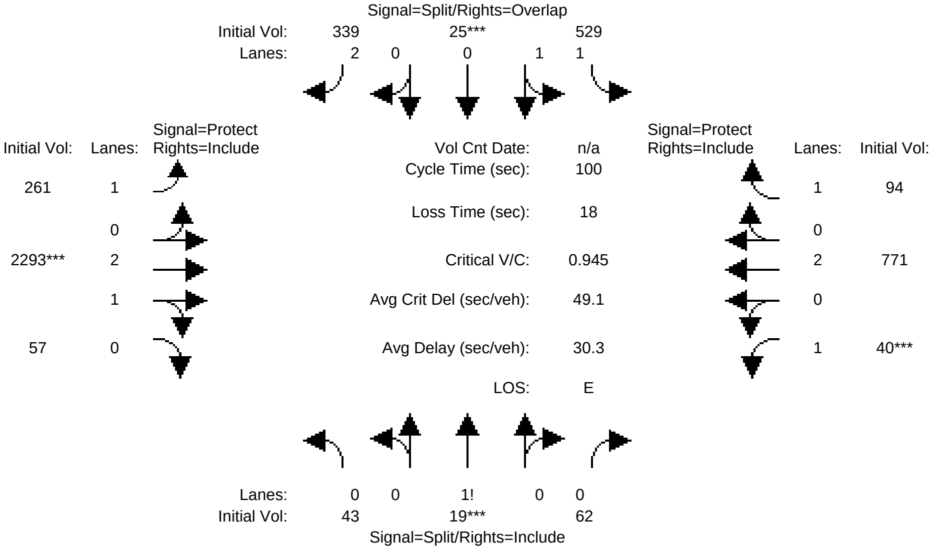


```
Street Name:              Susana Rd                        I-710 SB Ramps
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  199   173  216  360     0    0    0     0  514    0    25
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0  199   173  216  360     0    0    0     0  514    0    25
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    0  199   173  216  360     0    0    0     0  514    0    25
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     0  199   173  216  360     0    0    0     0  514    0    25
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0  199   173  216  360     0    0    0     0  514    0    25
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:    0  199   173  216  360     0    0    0     0  514    0    25
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.00 2.00  1.00 1.00 2.00  0.00 0.00 0.00  0.00 1.91 0.00  0.09
Final Sat.:     0 3200  1600 1600 3200     0    0    0     0 3052    0   148
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.06  0.11 0.14 0.11  0.00 0.00 0.00  0.00 0.17 0.00  0.17
Crit Moves:             ****  ****                              ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd



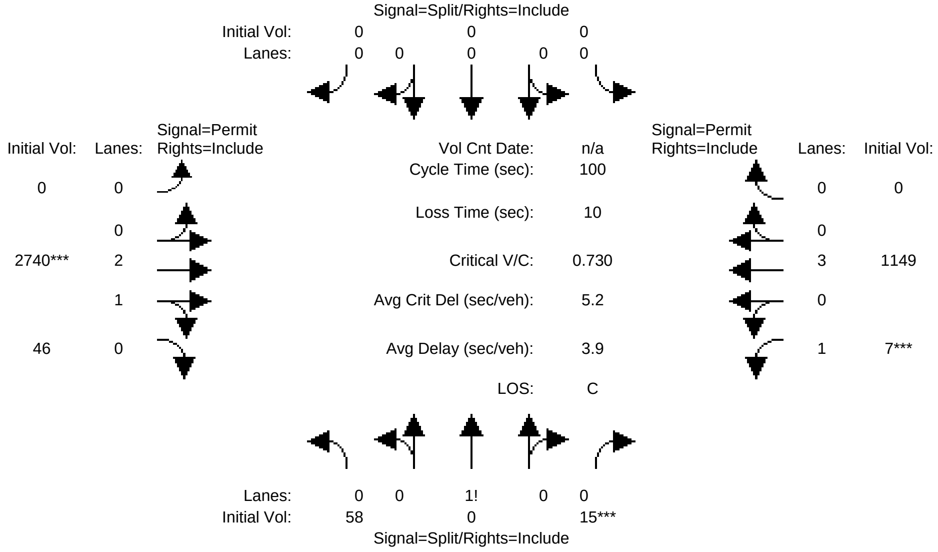
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 0.945
Avg Crit Del (sec/veh): 49.1
Avg Delay (sec/veh): 30.3
LOS: E

```
Street Name:            Susana Rd                         Del Amo Blvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      43   19    62   529   25   339   261 2293    57    40  771    94
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   43   19    62   529   25   339   261 2293    57    40  771    94
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   43   19    62   529   25   339   261 2293    57    40  771    94
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    43   19    62   529   25   339   261 2293    57    40  771    94
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   43   19    62   529   25   339   261 2293    57    40  771    94
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   43   19    62   529   25   339   261 2293    57    40  771    94
OvlAdjVol:                                  0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  0.90  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.35 0.15  0.50  1.91 0.09  2.00  1.00 2.93  0.07  1.00 2.00  1.00
Final Sat.:   555  245   800  3056  144  2880  1600 4684   116  1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.08 0.08  0.08  0.17 0.17  0.12  0.16 0.49  0.49  0.03 0.24  0.06
OvlAdjV/S:                                0.00
Crit Moves:       ****             ****             ****        ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd



```
                                   Signal=Split/Rights=Include
                   Initial Vol:      0          0          0
                        Lanes:      0     0     0     0    0

                  Signal=Permit                                          Signal=Permit
Initial Vol: Lanes: Rights=Include        Vol Cnt Date:     n/a          Rights=Include   Lanes:  Initial Vol:
                                      Cycle Time (sec):     100
     0          0                                                                            0         0

                0                      Loss Time (sec):      10                              0

  2740***       2                          Critical V/C:    0.730                            3      1149

                1                   Avg Crit Del (sec/veh):  5.2                             0

    46          0                      Avg Delay (sec/veh):  3.9                             1       7***

                                                    LOS:     C

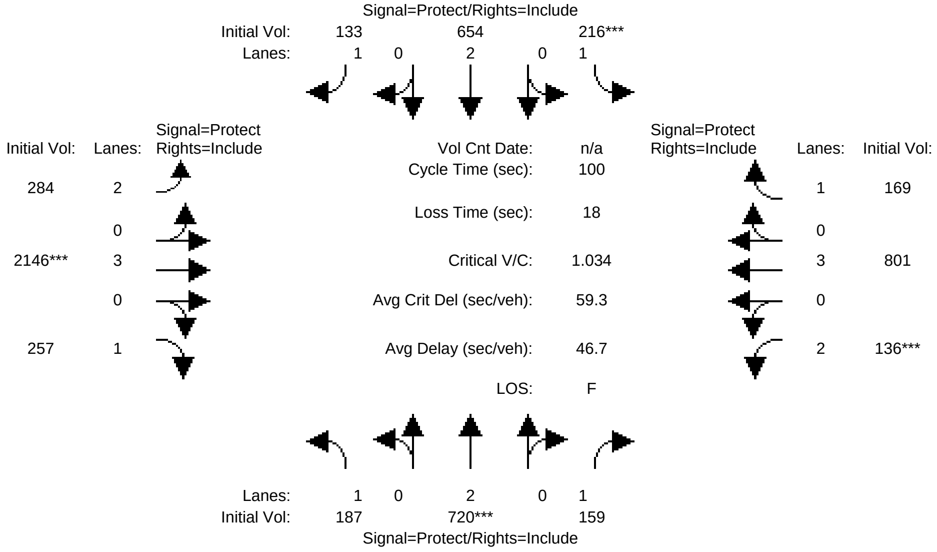
                        Lanes:      0     0     1!    0    0
                   Initial Vol:     58          0          15***
                                   Signal=Split/Rights=Include
```

```
Street Name:                Daisy Ave                          Del Amo Blvd
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      58    0    15     0    0     0     0 2740    46     7 1149     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   58    0    15     0    0     0     0 2740    46     7 1149     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   58    0    15     0    0     0     0 2740    46     7 1149     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    58    0    15     0    0     0     0 2740    46     7 1149     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   58    0    15     0    0     0     0 2740    46     7 1149     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   58    0    15     0    0     0     0 2740    46     7 1149     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.79 0.00  0.21  0.00 0.00  0.00  0.00 2.95  0.05  1.00 3.00  0.00
Final Sat.:  1271    0   329     0    0     0     0 4721    79  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.05 0.00  0.05  0.00 0.00  0.00  0.00 0.58  0.58  0.00 0.24  0.00
Crit Moves:             ****                        ****        ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd

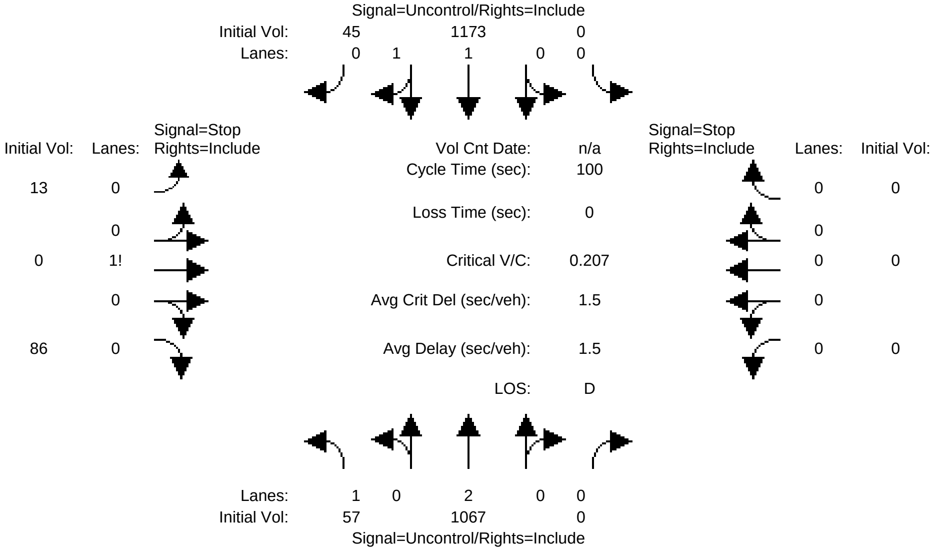


```
Street Name:          Long Beach Blvd                     Del Amo Blvd
Approach:      North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     187  720   159   216  654   133   284 2146   257   136  801   169
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  187  720   159   216  654   133   284 2146   257   136  801   169
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  187  720   159   216  654   133   284 2146   257   136  801   169
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   187  720   159   216  654   133   284 2146   257   136  801   169
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  187  720   159   216  654   133   284 2146   257   136  801   169
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  187  720   159   216  654   133   284 2146   257   136  801   169
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.12 0.23  0.10  0.14 0.20  0.08  0.10 0.45  0.16  0.05 0.17  0.11
Crit Moves:       ****        ****                   ****        ****
```

Riverwalk Subdivision
Cumulative Year (2030) Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
                    Signal=Uncontrol/Rights=Include
          Initial Vol:   45           1173          0
               Lanes:      0    1        1      0   0

                Signal=Stop                                      Signal=Stop
Initial Vol: Lanes: Rights=Include        Vol Cnt Date:     n/a   Rights=Include    Lanes:  Initial Vol:
                                       Cycle Time (sec):    100
   13          0                                                                     0         0
                                        Loss Time (sec):      0
               0                                                                     0
    0         1!                           Critical V/C:  0.207                      0         0
               0                   Avg Crit Del (sec/veh):    1.5                    0
   86          0                       Avg Delay (sec/veh):    1.5                   0         0
                                                   LOS:      D

               Lanes:      1    0        2      0   0
          Initial Vol:   57           1067          0
                    Signal=Uncontrol/Rights=Include
```

```
Street Name:         Long Beach Blvd                 Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      57 1067     0     0 1173    45    13    0    86     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   57 1067     0     0 1173    45    13    0    86     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   57 1067     0     0 1173    45    13    0    86     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    57 1067     0     0 1173    45    13    0    86     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   57 1067     0     0 1173    45    13    0    86     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1218 xxxx xxxxx  xxxx xxxx xxxxx  1843 2377   609  xxxx xxxx xxxxx
Potent Cap.:  580 xxxx xxxxx  xxxx xxxx xxxxx    68   35   443  xxxx xxxx xxxxx
Move Cap.:    580 xxxx xxxxx  xxxx xxxx xxxxx    63   32   443  xxxx xxxx xxxxx
Volume/Cap:  0.10 xxxx  xxxx  xxxx xxxx  xxxx  0.21 0.00  0.19  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.3 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 11.9 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  247 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  1.8 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 29.0 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    D     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             29.0            xxxxxx
ApproachLOS:          *                *                D                 *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   57 1067     0     0 1173    45    13    0    86     0    0     0
ApproachDel:    xxxxxx           xxxxxx             29.0           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.8]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=99]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2441]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   57 1067     0     0 1173    45    13    0    86     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             2342
Minor Approach Volume:           99
Minor Approach Volume Threshold: -8 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
AM Peak

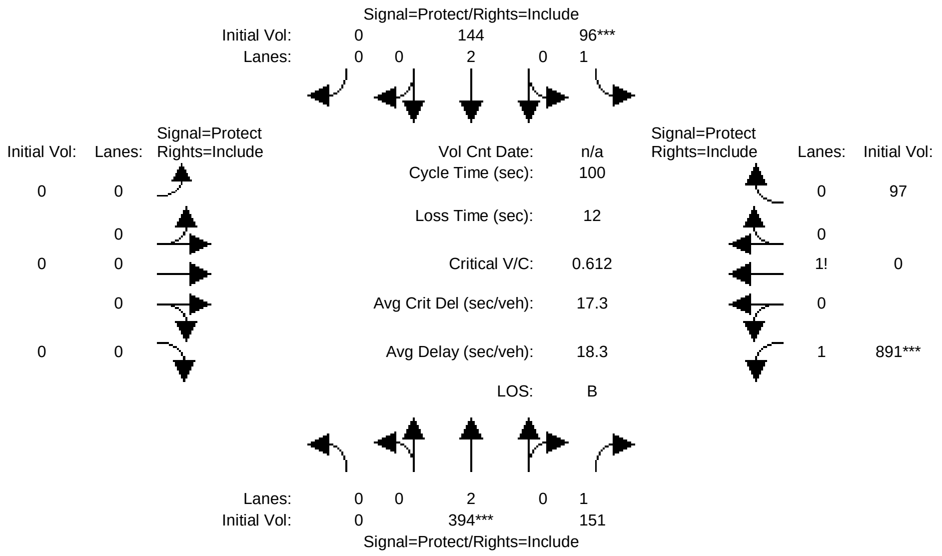
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

		Default Scenario				???				???						???			
Intersection		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	B	18.3	0.612	17.3	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	F	65.1	1.084	86.9	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	D	10.5	0.806	11.9	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	F	45.9	1.019	56.8	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	C	0.9	0.122	0.9	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps



```
                              Signal=Protect/Rights=Include
                  Initial Vol:     0        144       96***
                        Lanes:     0    0    2     0    1

                      Signal=Protect                              Signal=Protect
Initial Vol:  Lanes:  Rights=Include        Vol Cnt Date:   n/a   Rights=Include   Lanes:  Initial Vol:
                                        Cycle Time (sec):   100
     0          0                                                                    0        97
                0                        Loss Time (sec):   12                       0
     0          0                           Critical V/C:   0.612                    1!       0
                0                  Avg Crit Del (sec/veh):  17.3                     0
     0          0                       Avg Delay (sec/veh): 18.3                    1        891***
                                                     LOS:   B

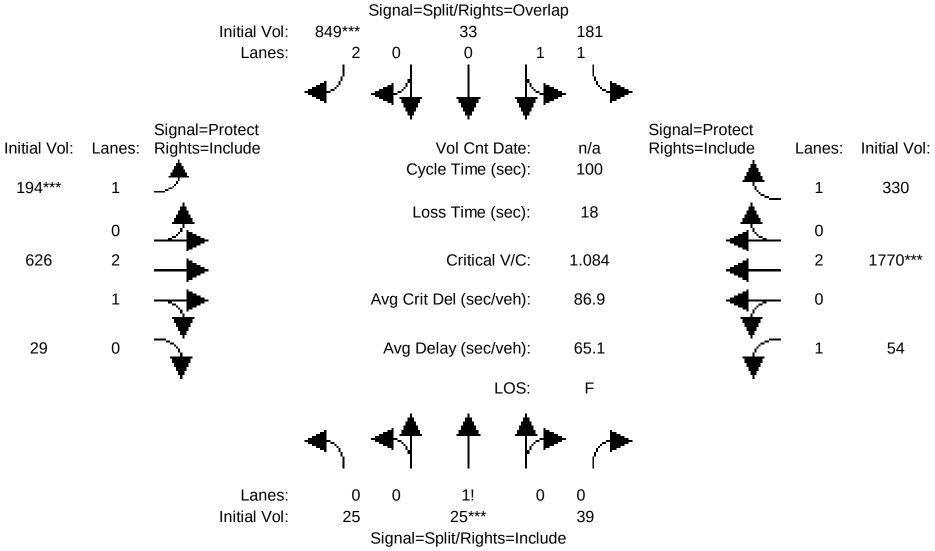
                        Lanes:     0    0    2     0    1
                  Initial Vol:     0        394***      151
                              Signal=Protect/Rights=Include
```

```
Street Name:              Susana Rd                        I-710 SB Ramps
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  394   151    96  144     0     0    0     0   891    0    97
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  394   151    96  144     0     0    0     0   891    0    97
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  394   151    96  144     0     0    0     0   891    0    97
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  394   151    96  144     0     0    0     0   891    0    97
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:    0  394   151    96  144     0     0    0     0   891    0    97
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:    0  394   151    96  144     0     0    0     0   891    0    97
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.00 2.00  1.00  1.00 2.00  0.00  0.00 0.00  0.00  1.80 0.00  0.20
Final Sat.:     0 3200  1600  1600 3200     0     0    0     0  2886    0   314
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.12  0.09  0.06 0.05  0.00  0.00 0.00  0.00  0.31 0.00  0.31
Crit Moves:       ****        ****                               ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd



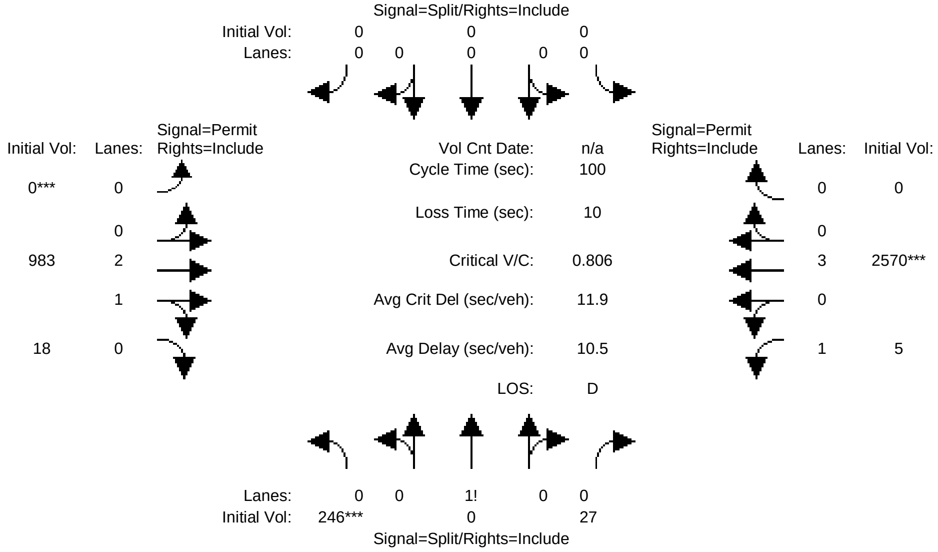
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 1.084
Avg Crit Del (sec/veh): 86.9
Avg Delay (sec/veh): 65.1
LOS: F

```
Street Name:            Susana Rd                        Del Amo Blvd
Approach:      North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      25   25    39   181   33   849   194  626    29    54 1770   330
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   25   25    39   181   33   849   194  626    29    54 1770   330
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   25   25    39   181   33   849   194  626    29    54 1770   330
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    25   25    39   181   33   849   194  626    29    54 1770   330
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   25   25    39   181   33   849   194  626    29    54 1770   330
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   25   25    39   181   33   849   194  626    29    54 1770   330
OvlAdjVol:                                500
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  0.90  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.28 0.28  0.44  1.69 0.31  2.00  1.00 2.87  0.13  1.00 2.00  1.00
Final Sat.:   449  449   701  2707  493  2880  1600 4587   213  1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.06 0.06  0.06  0.07 0.07  0.29  0.12 0.14  0.14  0.03 0.55  0.21
OvlAdjV/S:                               0.17
Crit Moves:       ****                   ****  ****                  ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd



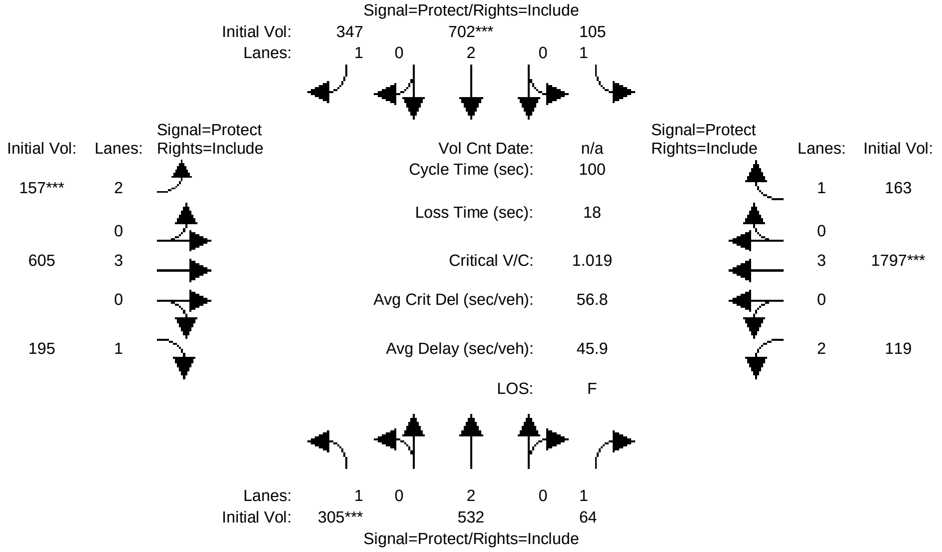
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 10
Critical V/C: 0.806
Avg Crit Del (sec/veh): 11.9
Avg Delay (sec/veh): 10.5
LOS: D

```
Street Name:            Daisy Ave                         Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     246    0    27     0    0     0     0  983    18     5 2570     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  246    0    27     0    0     0     0  983    18     5 2570     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  246    0    27     0    0     0     0  983    18     5 2570     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   246    0    27     0    0     0     0  983    18     5 2570     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  246    0    27     0    0     0     0  983    18     5 2570     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  246    0    27     0    0     0     0  983    18     5 2570     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.90 0.00  0.10  0.00 0.00  0.00  0.00 2.95  0.05  1.00 3.00  0.00
Final Sat.:  1442    0   158     0    0     0     0 4714    86  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.17 0.00  0.17  0.00 0.00  0.00  0.00 0.21  0.21  0.00 0.54  0.00
Crit Moves:  ****                              ****                   ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
AM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd

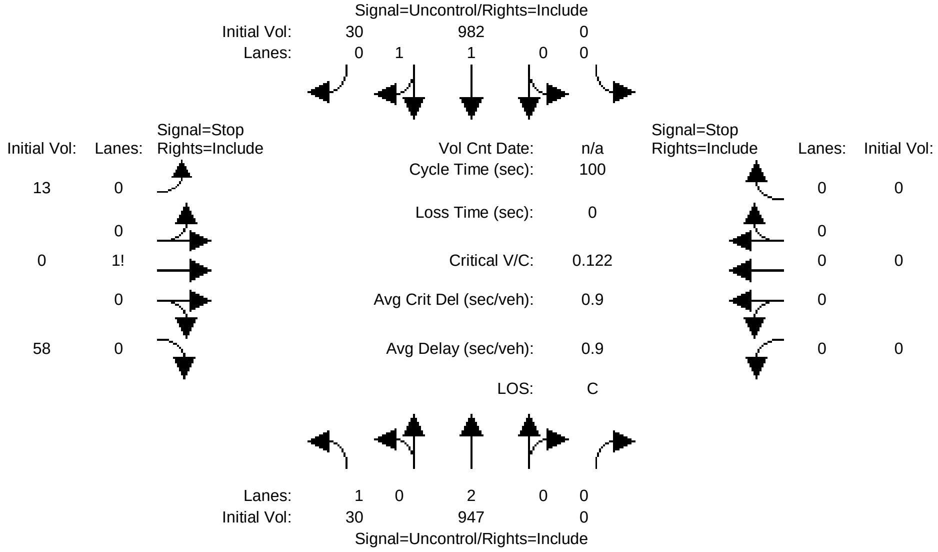


```
Street Name:          Long Beach Blvd                     Del Amo Blvd
Approach:       North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:    0    0     0    0    0     0    0    0     0    0    0     0
Y+R:         4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:    305  532    64  105  702   347  157  605   195  119 1797   163
Growth Adj: 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse: 305  532    64  105  702   347  157  605   195  119 1797   163
Added Vol:     0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:   0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut: 305  532    64  105  702   347  157  605   195  119 1797   163
User Adj:   1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:  305  532    64  105  702   347  157  605   195  119 1797   163
Reduct Vol:    0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol: 305  532    64  105  702   347  157  605   195  119 1797   163
PCE Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume: 305  532    64  105  702   347  157  605   195  119 1797   163
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:   1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment: 1.00 1.00  1.00 1.00 1.00  1.00 0.90 1.00  1.00 0.90 1.00  1.00
Lanes:      1.00 2.00  1.00 1.00 2.00  1.00 2.00 3.00  1.00 2.00 3.00  1.00
Final Sat.: 1600 3200  1600 1600 3200  1600 2880 4800  1600 2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:    0.19 0.17  0.04 0.07 0.22  0.22 0.05 0.13  0.12 0.04 0.37  0.10
Crit Moves: ****                 ****       ****                     ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
AM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



```
                      Signal=Uncontrol/Rights=Include
          Initial Vol:    30          982          0
               Lanes:      0    1      1      0    0

                Signal=Stop                                     Signal=Stop
Initial Vol:  Lanes:  Rights=Include   Vol Cnt Date:       n/a  Rights=Include  Lanes:  Initial Vol:
                                       Cycle Time (sec):   100
   13           0                                                                  0       0
                                       Loss Time (sec):      0
                0                                                                  0
    0           1!                     Critical V/C:     0.122                     0       0
                0                      Avg Crit Del (sec/veh): 0.9                 0
   58           0                      Avg Delay (sec/veh):  0.9                   0       0
                                       LOS:                  C

               Lanes:      1    0      2      0    0
          Initial Vol:    30          947          0
                      Signal=Uncontrol/Rights=Include
```

```
Street Name:         Long Beach Blvd                  Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      30  947     0     0  982    30    13    0    58     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   30  947     0     0  982    30    13    0    58     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   30  947     0     0  982    30    13    0    58     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    30  947     0     0  982    30    13    0    58     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   30  947     0     0  982    30    13    0    58     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1012 xxxx xxxxx  xxxx xxxx xxxxx  1531 2004   506  xxxx xxxx xxxxx
Potent Cap.:  693 xxxx xxxxx  xxxx xxxx xxxxx   110   60   517  xxxx xxxx xxxxx
Move Cap.:    693 xxxx xxxxx  xxxx xxxx xxxxx   106   58   517  xxxx xxxx xxxxx
Volume/Cap:  0.04 xxxx  xxxx  xxxx xxxx  xxxx  0.12 0.00  0.11  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 10.4 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  303 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.9 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 20.5 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             20.5             xxxxxx
ApproachLOS:          *                *                C                  *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   30  947     0     0  982    30    13    0    58     0    0     0
ApproachDel:    xxxxxx           xxxxxx             20.5           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.4]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=71]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2060]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   30  947     0     0  982    30    13    0    58     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             1989
Minor Approach Volume:           71
Minor Approach Volume Threshold: 48 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
PM Peak

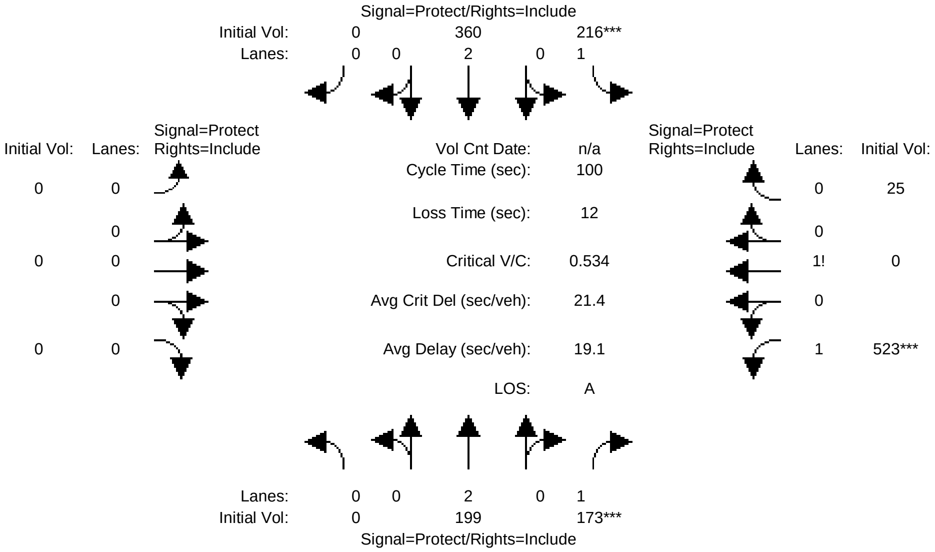
Summary Scenario Comparison Report (With Average Critical Delay)
Future Volume Alternative

Intersection		Default Scenario				???				???						???			
		LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit V/C Change	Avg Crit Del (sec)	Avg Crit Del Change	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)
#1	Susana Rd & I-710 SB Ramps	A	19.1	0.534	21.4	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#2	Susana Rd & Del Amo Blvd	E	30.8	0.949	50.2	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#3	Daisy Ave & Del Amo Blvd	C	5.7	0.768	6.6	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#4	Long Beach Blvd & Del Amo Blvd	F	47.4	1.037	60.4	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x
#5	Long Beach Blvd & Arbor St/48th St	D	1.7	0.223	1.7	?	xx.x	x.xxx	xx.x	?	xx.x	x.xxx	x.xxx	xx.x	xx.x	?	xx.x	x.xxx	xx.x

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #1: Susana Rd & I-710 SB Ramps

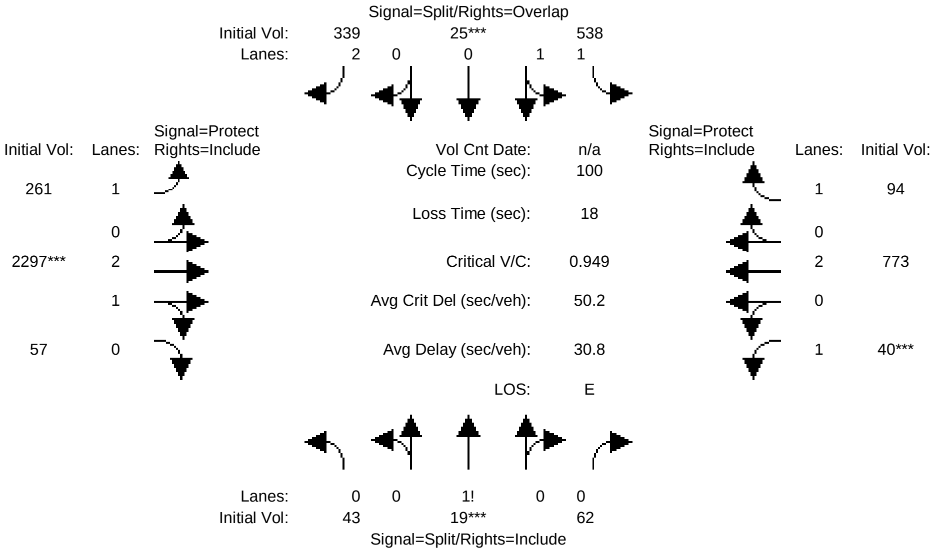


```
Street Name:              Susana Rd                        I-710 SB Ramps
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0    0    0     0    0    0     0    0    0     0
Y+R:          4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  199   173  216  360     0    0    0     0  523    0    25
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Initial Bse:    0  199   173  216  360     0    0    0     0  523    0    25
Added Vol:      0    0     0    0    0     0    0    0     0    0    0     0
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Fut:    0  199   173  216  360     0    0    0     0  523    0    25
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Volume:     0  199   173  216  360     0    0    0     0  523    0    25
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Reduced Vol:    0  199   173  216  360     0    0    0     0  523    0    25
PCE Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
FinalVolume:    0  199   173  216  360     0    0    0     0  523    0    25
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600 1600 1600  1600 1600 1600  1600 1600 1600  1600
Adjustment:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
Lanes:       0.00 2.00  1.00 1.00 2.00  0.00 0.00 0.00  0.00 1.91 0.00  0.09
Final Sat.:     0 3200  1600 1600 3200     0    0    0     0 3054    0   146
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.00 0.06  0.11 0.14 0.11  0.00 0.00 0.00  0.00 0.17 0.00  0.17
Crit Moves:             ****  ****                               ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #2: Susana Rd & Del Amo Blvd

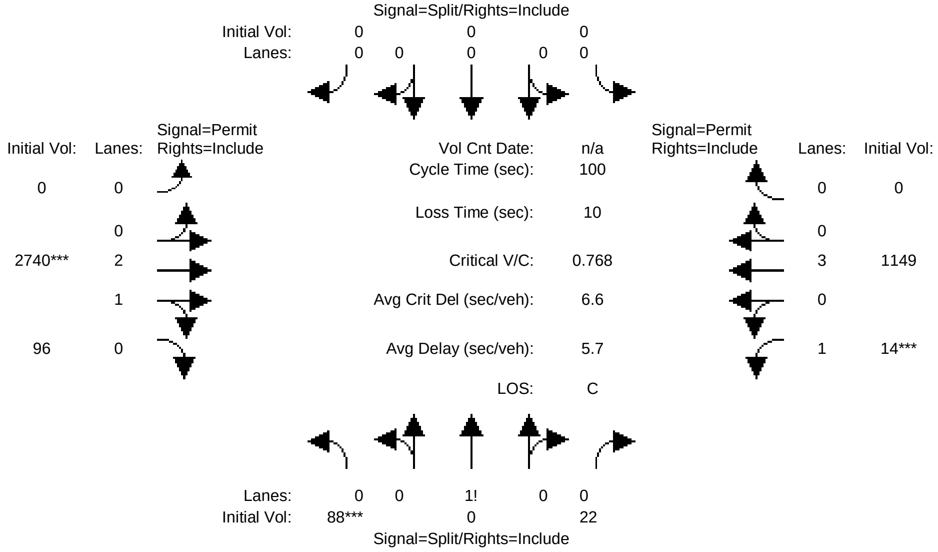


```
Street Name:            Susana Rd                        Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      43   19    62   538   25   339   261 2297    57    40  773    94
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   43   19    62   538   25   339   261 2297    57    40  773    94
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   43   19    62   538   25   339   261 2297    57    40  773    94
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    43   19    62   538   25   339   261 2297    57    40  773    94
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   43   19    62   538   25   339   261 2297    57    40  773    94
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   43   19    62   538   25   339   261 2297    57    40  773    94
OvlAdjVol:                                  0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  0.90  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.35 0.15  0.50  1.91 0.09  2.00  1.00 2.93  0.07  1.00 2.00  1.00
Final Sat.:   555  245   800  3058  142  2880  1600 4684   116  1600 3200  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.08 0.08  0.08  0.18 0.18  0.12  0.16 0.49  0.49  0.03 0.24  0.06
OvlAdjV/S:                               0.00
Crit Moves:       ****             ****             ****        ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #3: Daisy Ave & Del Amo Blvd

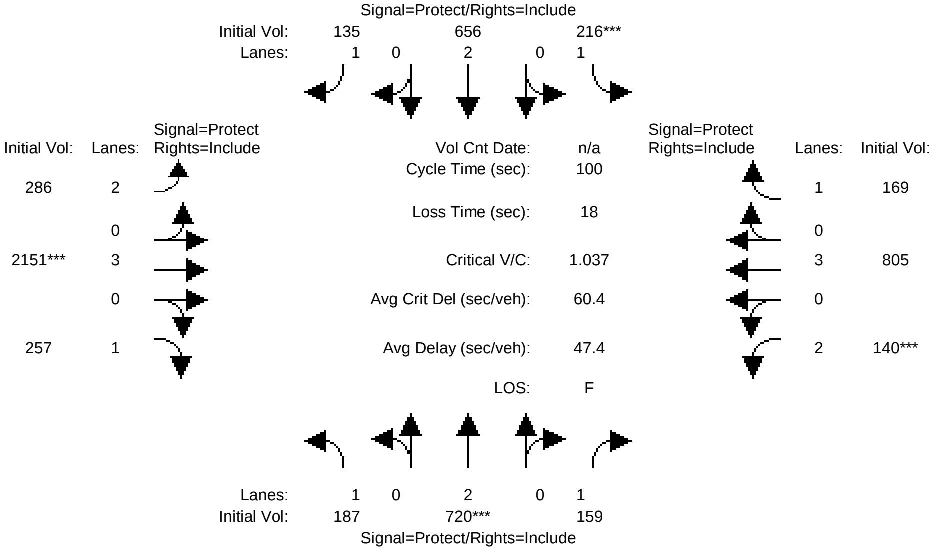


```
Street Name:             Daisy Ave                           Del Amo Blvd
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      88    0    22     0    0     0     0 2740    96    14 1149     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   88    0    22     0    0     0     0 2740    96    14 1149     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   88    0    22     0    0     0     0 2740    96    14 1149     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    88    0    22     0    0     0     0 2740    96    14 1149     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   88    0    22     0    0     0     0 2740    96    14 1149     0
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:   88    0    22     0    0     0     0 2740    96    14 1149     0
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.80 0.00  0.20  0.00 0.00  0.00  0.00 2.90  0.10  1.00 3.00  0.00
Final Sat.:  1280    0   320     0    0     0     0 4638   162  1600 4800     0
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.07 0.00  0.07  0.00 0.00  0.00  0.00 0.59  0.59  0.01 0.24  0.00
Crit Moves:  ****                                   ****        ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
PM Peak

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) (Future Volume Alternative)
Default Scenario

Intersection #4: Long Beach Blvd & Del Amo Blvd



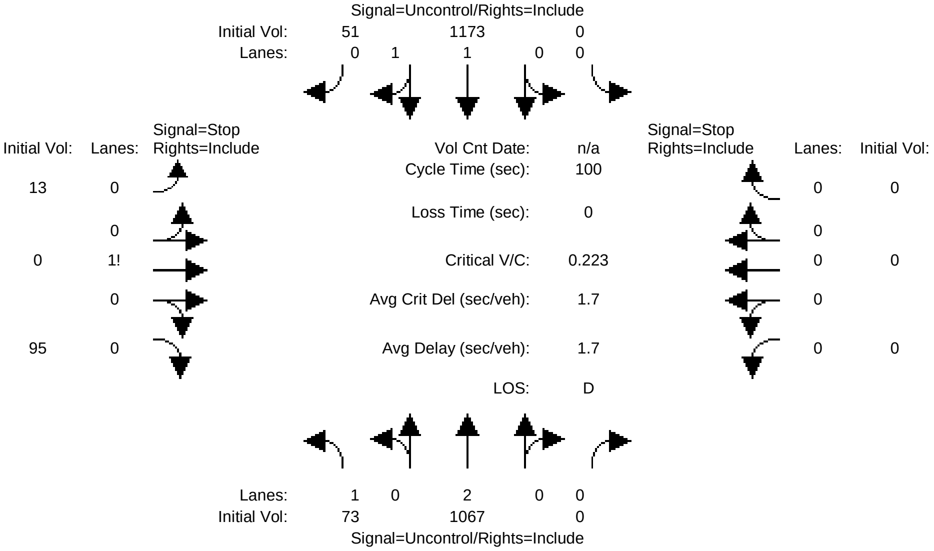
Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 18
Critical V/C: 1.037
Avg Crit Del (sec/veh): 60.4
Avg Delay (sec/veh): 47.4
LOS: F

```
Street Name:          Long Beach Blvd                      Del Amo Blvd
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Min. Green:     0    0     0     0    0     0     0    0     0     0    0     0
Y+R:          4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0   4.0  4.0   4.0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     187  720   159   216  656   135   286 2151   257   140  805   169
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:  187  720   159   216  656   135   286 2151   257   140  805   169
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:  187  720   159   216  656   135   286 2151   257   140  805   169
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:   187  720   159   216  656   135   286 2151   257   140  805   169
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  187  720   159   216  656   135   286 2151   257   140  805   169
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
FinalVolume:  187  720   159   216  656   135   286 2151   257   140  805   169
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:    1600 1600  1600  1600 1600  1600  1600 1600  1600  1600 1600  1600
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  0.90 1.00  1.00  0.90 1.00  1.00
Lanes:       1.00 2.00  1.00  1.00 2.00  1.00  2.00 3.00  1.00  2.00 3.00  1.00
Final Sat.:  1600 3200  1600  1600 3200  1600  2880 4800  1600  2880 4800  1600
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     0.12 0.23  0.10  0.14 0.21  0.08  0.10 0.45  0.16  0.05 0.17  0.11
Crit Moves:       ****        ****                   ****        ****
```

Riverwalk Subdivision
Cumulative Year (2030) Plus Project Conditions
PM Peak

Level Of Service Computation Report
2000 HCM Unsignalized (Future Volume Alternative)
Default Scenario

Intersection #5: Long Beach Blvd & Arbor St/48th St



Signal=Uncontrol/Rights=Include
Initial Vol: 51 1173 0
Lanes: 0 1 1 0 0

Initial Vol: Lanes: Signal=Stop Rights=Include
13 0
0
0 1!
0
95 0

Vol Cnt Date: n/a
Cycle Time (sec): 100
Loss Time (sec): 0
Critical V/C: 0.223
Avg Crit Del (sec/veh): 1.7
Avg Delay (sec/veh): 1.7
LOS: D

Signal=Stop Rights=Include Lanes: Initial Vol:
0 0
0
0 0
0
0 0

Lanes: 1 0 2 0 0
Initial Vol: 73 1067 0
Signal=Uncontrol/Rights=Include

```
Street Name:         Long Beach Blvd                    Arbor St/48th St
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      73 1067     0     0 1173    51    13    0    95     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:   73 1067     0     0 1173    51    13    0    95     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   73 1067     0     0 1173    51    13    0    95     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    73 1067     0     0 1173    51    13    0    95     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   73 1067     0     0 1173    51    13    0    95     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: 1224 xxxx xxxxx  xxxx xxxx xxxxx  1878 2412   612  xxxx xxxx xxxxx
Potent Cap.:  577 xxxx xxxxx  xxxx xxxx xxxxx    64   33   441  xxxx xxxx xxxxx
Move Cap.:    577 xxxx xxxxx  xxxx xxxx xxxxx    58   29   441  xxxx xxxx xxxxx
Volume/Cap:  0.13 xxxx  xxxx  xxxx xxxx  xxxx  0.22 0.00  0.22  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.4 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 12.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:    B    *     *     *    *     *     *    *     *     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  246 xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx  2.1 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx 30.6 xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    D     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             30.6           xxxxxx
ApproachLOS:         *                *                D                *
Note: Queue reported is the number of cars per lane.
                     Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant NOT Met
```

```
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   73 1067     0     0 1173    51    13     0    95     0    0     0
ApproachDel:    xxxxxx           xxxxxx             30.6           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop Sign]
Signal Warrant Rule #1: [vehicle-hours=0.9]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=108]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=2472]
   SUCCEED - Total volume greater than or equal to 650 for intersection
             with less than four approaches.
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 Long Beach Blvd & Arbor St/48th St
********************************************************************************
Future Volume Alternative: Peak Hour Warrant Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  2  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
Initial Vol:   73 1067     0     0 1173    51    13     0    95     0    0     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             2364
Minor Approach Volume:           108
Minor Approach Volume Threshold: -12 [less than minimum of 100]
--------------------------------------------------------------------------------
SIGNAL WARRANT DISCLAIMER
This peak hour signal warrant analysis should be considered solely as an
"indicator" of the likelihood of an unsignalized intersection warranting
a traffic signal in the future.  Intersections that exceed this warrant
are probably more likely to meet one or more of the other volume based
signal warrant (such as the 4-hour or 8-hour warrants).

The peak hour warrant analysis in this report is not intended to replace
a rigorous and complete traffic signal warrant analysis by the responsible
jurisdiction.  Consideration of the other signal warrants, which is beyond
the scope of this software, may yield different results.
```