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MEMORANDUM

To:	Ninia Hammond, Integral Communities
From:	Brian Grover, Dudek
Subject:	Supplementary Environmental Analysis for North River Farms – College Boulevard Bridge Improvements and On-Site Fire Station
Date:	February 11, 2019
cc:	Andrew Talbert, Dudek
Attachment(s):	Attachment A: North River Farms, College Boulevard Bridge over the San Luis Rey River – prepared by Linscott, Law, & Greenspan, Engineers Attachment B: Structural Feasibility Study for Modifications to the College Blvd Bridge over the San Luis Rey River prepared by Moffatt & Nichol

Introduction and Background

This memorandum addresses the potential environmental effects associated with two distinct mitigation measures proposed for the North River Farms Planned Development (PD) Plan (proposed project). The proposed project consists of development of a planned residential, mixed-use sustainable community on approximately 176.6 acres of land located in the northeastern portion of the City of Oceanside (City). The Draft Environmental Impact Report (EIR) was circulated for public review from July 27, 2018, through September 17, 2018, in accordance with the 45-day comment period required under Section 15105(a) of the California Environmental Quality Act (CEQA) Guidelines, and formally extended by one additional week. Since public review of the Draft EIR, two additional mitigation measures have been proposed in the Final EIR to reduce or avoid significant project effects, as described below.

Fire Station

As required by mitigation measure MM-PUB-1, the proposed project would provide a temporary fire station located within the project site or the South Morro Hills area, such that it would be located within a 5-minute response time to the entire project site. The fire station would be sized to provide housing accommodations for three (3) personnel, which would include a minimum of 1,000 square feet of residential facilities (including bedrooms, bathrooms, and a kitchen), and storage accommodations for a fire service apparatus (such as a covered parking area). At the time of preparation of this memorandum, a site located within the project's Village Core was assumed to contain the temporary fire station. The on-site location is reasonably foreseeable because the PD Plan allows for a public safety use within the Village Core. Development in another location, such as off-site in the South Morro Hills area, may result in potential effects beyond those discussed in the Final EIR. However, because no such site is identified at this time, development off-site is speculative and would be subject to further review and approval by the City consistent with applicable laws, including CEQA. As off-site development of the fire station is speculative, further analysis cannot occur at this stage.

APPENDIX T13

College Bridge and Fire Station
Memorandum

College Boulevard Bridge Improvements

College Boulevard crosses the San Luis Rey River in an east-west direction between N. River Road and Adams Street. It currently carries four lanes of traffic, two bike lanes and one sidewalk on the north side. Improvements to the existing bridge and immediately surrounding roadways would increase the capacity this segment of College Boulevard by approximately 10,000 ADT, as provided in mitigation measure MM-TR-15.

With implementation of mitigation measure MM-TR-15 (refer to Final EIR Section 4.17), the College Boulevard Bridge, which crosses the San Luis Rey River southwest of the project site, would be improved to increase travel lanes within the existing bridge while still accommodating bicycles and pedestrians. The bridge, as currently built, carries four lanes of traffic, two bike lanes and one sidewalk on the north side. Proposed improvements include the following:

- Modification of the existing College Boulevard Bridge to accommodate six (6), 11-foot lanes of traffic on the existing concrete deck. The barrier and sidewalk on the north side of the bridge would be removed; the barrier would be replaced with a new type. The existing center barrier would be removed and replaced with a raised center median.
- Bicycles and pedestrians would be accommodated by two new 8-foot pathways cantilevered from each side of the bridge. The cantilevered pathways would be affixed to the existing concrete deck without disturbing the San Luis Rey River below.
- The roadway between Adams Street and the eastern limits of the College Boulevard Bridge is a four-lane roadway with 5-foot sidewalks along both sides. The proposed project would include the addition of two 11-foot lanes between Adams Street and the eastern limits of the College Boulevard Bridge. The improvements would be completed within the existing right-of-way by restriping the roadway and reducing the width of the existing median. The dedicated northbound right-turn lane to Adams Street would be converted to a mixed-flow lane consisting of a through-lane and right-turn lane.
- The N. River Road/College Boulevard intersection would be restriped as follows:
    - The northbound right-turn lane would be extended to match the widening of the bridge.
    - An additional 12-foot northbound through lane would be provided on N. River Road for a total of three northbound through lanes.
    - One northbound lane would be a shared through/left-turn lane, and the other two would be right-turn only onto N. River Road.
- In addition, the curb-to-curb width on College Boulevard would be 86 feet, to match the curb-to-curb width as part of the proposed bridge widening. A new sidewalk would also be provided along the eastern portion of the N. River Road intersection, to create a connection to the 8-foot-wide pathway planned along the eastern edge of the bridge.
- The City owns and maintains the San Luis Rey River Bike Trail, a Class II bicycle trail along the eastern bank of the San Luis Rey River. The trail traverses College Boulevard below the bridge along the eastern bridge abutment. The width of the eastbound bicycle facilities would be reduced to 5 feet to allow for room for the travel lanes. The existing width of the bicycle facilities for westbound bicyclists would also be reduced to 5 feet between Adams Street and Mance Buchanon Park. The proposed improvements would include a connection between the cantilevered pathway and the San Luis Rey River Bike Trail.

Environmental Analysis

The following analysis discusses the potential environmental impacts of the temporary fire station and the College Boulevard Bridge mitigation measures. It is assumed that all other mitigation measures, regulatory requirements, and conditions required of the project would also apply to the fire station and College Boulevard Bridge improvements. As shown below, these mitigation measures would not result in any new, significant, or more severe environmental effects beyond those analyzed in the Draft EIR.

Aesthetics

Fire Station

The proposed fire station would be located within the Village Core in an area previously analyzed for potential aesthetic and visual impacts associated with the proposed project within the Draft EIR. The identification of a specific lot to be designated as a fire station instead of a residential or commercial use would not substantially alter the anticipated visual change resulting from project development. The proposed fire station would be constructed in accordance with the regulations, development criteria, design standards, and other requirements of the PD Plan and applicable sections of the City's municipal code. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Construction of the proposed bridge improvements would require the temporary siting of equipment on the bridge, within the College Boulevard right-of-way, and surrounding disturbed and developed areas. This equipment would be visible during the duration of construction. While visible, construction would be temporary, and construction equipment would vacate the right-of-way and disturbed areas upon completion. Therefore no new, significant construction impacts beyond those analyzed in the EIR would occur. Once construction is completed, the most distinctly visible portion of this improvement would consist of the proposed 8-foot cantilever pathways to be affixed to the north and south sides of the existing College Boulevard Bridge. The scale of the two additional pathways would be in line with the existing barriers, with no substantial changes in height or massing of the bridge. The design would be in-kind with the existing bridge structure and appearance. Once constructed, the proposed improvements would appear similar to the existing bridge. Any lighting proposed under these improvements would be similar to existing and would comply with the City's lighting requirements. Therefore, no new, significant impacts beyond those analyzed in the EIR would occur.

Agriculture and Forestry Resources

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The proposed improvements would not be located within designated farmland, forestland, or Williamson Act contract land. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Air Quality

Fire Station

The inclusion of a fire station within the Village Core would not result in a substantial difference in proposed land uses of the proposed project. As such, the expected air quality emissions during construction and operation of the fire station would be similar to the assumed land uses within the Village Core. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Based on timing (prior to the issuance of the 142nd building permit), it is likely that construction of the proposed bridge improvements would occur during Phase 2 of overall project construction. It is not known at this time whether construction of this improvement would overlap with other project construction. Based on the expected maximum daily emissions of project construction (provided in Table 4.3-7 of the EIR) relative to the San Diego Air Pollution Control District's threshold, it is not expected that construction of the proposed bridge improvements would exceed any daily emissions threshold, even with construction overlap, given the likely phase of construction (prior to architectural coatings of proposed buildings). Therefore, no new impacts beyond those analyzed in the EIR would occur.

Biological Resources

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. Operation of the fire station would also result in similar potential indirect effects as the proposed project. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Construction of the bridge improvements would be located entirely within previously disturbed or developed areas. The vegetation under the bridge would not be directly impacted by construction of the bridge improvements. Once completed, the bridge improvements would be entirely accommodated on, or affixed to, the existing concrete bridge deck. There are mature trees along the western edge of the bridge, but they are over 20 feet away from the edge of the proposed cantilevered pathways. Further, all minimization measures required by Section 5.2.8 of the Oceanside Subarea Plan and applicable to the proposed project and mitigation measures, would apply to the bridge improvements. As such, no direct impacts to biological resources are reasonably foreseeable or anticipated to occur. Further, in the unlikely event that the widening may result in impacts to riparian vegetation, or any other portion of the San Luis Rey River, the project applicant and the City would be required to notify the Resource Agencies (CDFW, RWQCB, ACOE and USFWS) and comply with any applicable licensing, permit, and mitigation requirements. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Indirect impacts to biological resources are not expected to occur. The widening of the bridge would result in 8 feet of shading on either side of the bridge but the effect is expected to be negligible compared to existing conditions. Therefore, no new, significant impacts to biological resources beyond those analyzed in the EIR would occur.

Cultural Resources

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Any ground disturbing activities related to bridge improvements would be located within previously disturbed and developed areas where the likelihood of encountering archaeological resources is low. In the unlikely event that unexpected resources are encountered during construction, mitigation measures required of the project as identified in the EIR would apply. Additionally, the bridge was constructed in 1983; therefore, it is not of eligible age to potentially be considered a historic resource. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Energy Consumption

Fire Station

The inclusion of a fire station within the Village Core would not result in a substantial difference in proposed land uses of the proposed project. As such, the expected energy use during construction and operation of the fire station would be similar to the assumed land uses (e.g., residential or commercial) within the Village Core. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Construction of the proposed bridge improvements would require consumption of fuels and temporary use of electric power. However, similar to the previously analyzed project, energy use during construction of the bridge would not wasteful of inefficient. Construction would be required to comply with CARB's Airborne Toxics Control Measure, which restricts heavy-duty diesel vehicle idling time to 5 minutes. Therefore, no new significant impacts beyond those analyzed in the EIR would occur.

Geology and Soils

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. Mitigation measures required of the proposed project would also apply to the fire station. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The proposed bridge improvements would be located within an existing developed roadway right-of-way and on an existing bridge. Similar to the requirements of mitigation measure MM-GEO-1, as part of the design process, prior to any construction, additional site specific geotechnical and engineering analyses would be conducted to ensure stability of

underlying soils and footings/foundations for the proposed improvements. The improvements are not expected to increase geologic risk or hazard. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Greenhouse Gas Emissions

Fire Station

The inclusion of a fire station within the Village Core would not result in a substantial difference in proposed land uses (e.g., residential or commercial) of the proposed project. Vehicle trips, and associated greenhouse gas (GHG) emissions, were assumed and analyzed for proposed land uses. The fire station would not result in GHG emissions that substantially vary from that analyzed for the proposed project. Further, the applicant would be required to implement mitigation measures MM-GHG-1 through MM-GHG-3 for the project, including relative to the fire station use. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Construction of the proposed bridge improvements would result in the emission of GHGs from construction equipment operation. While this improvement would result in an incremental increase in GHG emissions, it would still be subject to mitigation measure MM-GHG-3, which requires 100% offset of construction GHG emissions. Once completed, improved traffic flow resulting from the bridge improvements is likely to incrementally reduce GHG emissions associated with mobile sources. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Hazards and Hazardous Materials

Fire Station

Construction and operation of the proposed fire station would require the transport, use, and disposal of hazardous materials as previously described for the proposed project. The inclusion of the fire station would not substantially increase the transport, use, or disposal of such materials. As explained in the EIR, the transport, use, and disposal of such materials would be subject to compliance with proper best management practices (BMPs), stormwater pollution prevention plans (SWPPPs), hazardous materials–handling protocols, and relevant federal, state, and local health and safety laws, which would be implemented to ensure safe storage, handling, transport, use, and disposal of all hazardous materials during construction and operation. Further, the inclusion of the fire station would provide a significant beneficial impact to emergency response and fire hazard. Therefore, no new significant, adverse impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Construction of the proposed bridge improvements would require the transport, use, and disposal of hazardous materials as previously described for the proposed project. As explained in the EIR, the transport, use, and disposal of such materials would be subject to compliance with proper best management practices (BMPs), stormwater pollution prevention plans (SWPPPs), hazardous materials–handling protocols, and relevant federal, state, and local health and safety laws, which would be implemented to ensure safe storage, handling, transport, use, and disposal of all hazardous materials during construction and operation. Additionally, the additional capacity provided

by the bridge improvements would provide a significant beneficial impact by providing additional roadway capacity during emergency situations, improving emergency evacuation. Therefore, no new significant, adverse impacts beyond those analyzed in the EIR would occur.

Hydrology and Water Quality

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. The previously analyzed hydrology and water quality impacts would apply to the inclusion of a fire station within the Village Core. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The proposed bridge improvements would incrementally increase hardscape along the roadway alignment. However, existing drainage along the bridge and immediately surrounding roadway portions would be maintained and would have sufficient capacity to fully address any incremental increase in runoff from the cantilevered pathways. Standard construction best management practices for stormwater protection would also be required of this improvement. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Land Use and Planning

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. A fire station land use would be compatible and similar to surrounding proposed development within the project site. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The City's 2030 Master Transportation Roadway Plan (Appendix E to the City's General Plan Circulation Element) identifies the College Avenue Bridge as 6-lanes. The proposed improvements would be consistent with the City's long-term roadway planning. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Mineral Resources

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The proposed bridge improvements would be located within an existing developed roadway right-of-way and on an existing bridge. For similar reasons described in the EIR, any potential mineral resource extraction would likely be

incompatible with the adjacency to sensitive biological resources (San Luis Rey River) and surrounding residential development. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Noise

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site, the construction of which was analyzed for potential noise impacts. Applicable construction noise mitigation measures would apply to the proposed fire station. While operation of the proposed fire station may result in noise due to fire apparatus operation, such noise would be infrequent, only in emergency situations, and would be anticipated from emergency vehicles responding from any location. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

Construction of the proposed bridge improvements would generate noise for a temporary period. Distances from bridge construction to the nearest sensitive receptors are expected to be similar to that analyzed for the proposed project. Additionally, construction noise mitigation measures identified for the proposed project would also apply to bridge construction. Operation of the proposed bridge improvements would not alter the anticipated buildout average daily traffic (ADT) along this roadway. As such, operational traffic noise is not anticipated to exceed that previously analyzed in the EIR. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Population and Housing

Fire Station

The proposed fire station would not substantially alter the project's potential for growth inducement. With inclusion of the fire station, the proposed project is still anticipated to result in substantial unplanned growth at the project site. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The proposed bridge improvements would not introduce direct growth to the area. Additionally, these improvements would be consistent with the City's long-term roadway planning per the General Plan Circulation Element. Expansion of roadway infrastructure would not be located in a previously undeveloped area, in a manner that could spur additional growth. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Public Services

Fire Station

The proposed fire station would not result in a substantial difference in demand for public services such as police, schools, parks, or other public facilities compared to the previously assumed uses within the Village Core. The

proposed fire station would reduce a previously identified significant and unavoidable impact related to emergency fire response deficiencies. Additionally, provision of a fire station within the project site would better serve the surrounding areas. Therefore, previously identified significant impacts would be reduced to a level below significance, and no new impacts would occur.

College Boulevard Bridge Improvements

The proposed bridge improvements would not result in any increase in demand for public services such as police, fire, schools, parks, or other public facilities. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Recreation

Fire Station

The proposed fire station would not result in a substantial difference in demand for recreational facilities compared to the previously assumed uses within the Village Core. It would also not include any new proposed parks or recreational facilities. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The proposed fire station would not result in an increase in demand for recreational facilities. It would also not include any new proposed parks or recreational facilities. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Traffic and Circulation

Fire Station

The inclusion of a fire station within the Village Core would not substantially affect project trip generation or distribution. The inclusion of a fire station would not result in a substantial difference in associated vehicle trips or distribution compared to the previously analyzed proposed land uses (e.g., residential or commercial) within the Village Core. As such, no new potential impacts to the circulation network would occur. The provision of a fire station within the project site would increase emergency access to the site and surrounding areas. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

College Boulevard crosses the San Luis Rey River in an east-west direction between N. River Road and Adams Street. It currently carries four lanes of traffic, two bike lanes and one sidewalk on the north side. Improvements to the existing bridge and immediately surrounding roadways would increase the capacity this segment of College Boulevard by approximately 10,000 ADT, as provided in mitigation measure MM-TR-15. The proposed project would add approximately 3,886 ADT to College Boulevard between N. River Road and Adams Street (including the bridge) during cumulative scenarios. As such, MM-TRA-15 would mitigate this impact to less-than-significant once completed. However, the identified impact would occur at an earlier equivalent dwelling unit than the 142nd, identified in mitigation measure MM-TRA-15 as the deadline for completion of the bridge improvements. The bridge

improvements identified in MM-TRA-15 are therefore not guaranteed to be completed at the time of initial impact. The identified impact at College Boulevard, from N. River Road to Adams Street, would remain significant and unavoidable in the short-term, until completion of bridge improvements. Therefore, the bridge improvements would mitigate project impacts. No new impacts beyond those analyzed in the EIR would occur.

Tribal Cultural Resources

Fire Station

The proposed fire station would be located within the previously analyzed development footprint of the project site. Applicable mitigation measures would be required of construction of the fire station. Therefore, no new impacts beyond those analyzed in the EIR would occur.

College Boulevard Bridge Improvements

The proposed bridge improvements would be located within an existing developed roadway right-of-way and on an existing bridge. Accordingly, no impacts to tribal cultural resources are anticipated. Further, as discussed in the Section 4.18 of the EIR, while some tribes requested to consultation, all but one failed to respond to the City's ongoing outreach attempts. Thus, meaningful consultation only occurred with the San Luis Rey Band of Mission Indians. Consultation with tribal representatives has not identified or provided information regarding any tribal cultural resources as defined by AB 52. Outside of the AB 52 consultation process, the San Luis Rey Band of Mission Indians and the Rincon Band of Luiseño Indians (through provision of a comment letter during the public scoping process, refer to Appendix A of the EIR) provided input regarding suggested mitigation measures for unanticipated discovery of cultural resources. While no tribal cultural resources that may be affected by the project have been identified, mitigation measure MM-TCR-1 is incorporated in the event of unanticipated discovery of unknown tribal cultural resources, which would also be required of construction of proposed bridge improvements. Therefore, no new impacts beyond those analyzed in the EIR would occur.

Utilities and Services Systems

Fire Station

The proposed fire station would not result in a substantial difference in demand for utilities such as water, wastewater, and solid waste compared to the previously assumed uses within the Village Core. Emergency use of water would be similar irrespective of the nearest fire station location. Fire hydrant flow requirements on site would not change. Therefore, no new impacts would occur.

College Boulevard Bridge Improvements

Construction of the proposed bridge improvements would result in a temporary and incremental increase in demand for water and generation of solid waste. The demand for water during construction would be temporary, would cease upon completion of the proposed improvements, and would not require any new water facilities or new or expanded entitlements. Applicable City requirements for separation of recyclables and reducing waste during construction would also apply to the proposed bridge improvements. Operation of the proposed bridge improvements would not result in an increase in demand for any public utility. Drainage is discussed above. Therefore, no new impacts would occur.

Attachment A

North River Farms, College Boulevard Bridge over the San Luis Rey River – prepared by Linscott, Law, & Greenspan, Engineers

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February 13, 2019

Ms. Ninia Hammond
Integral Communities
2235 Encinitas Blvd, Suite 216
Encinitas, CA 92024

Subject: **North River Farms, College Boulevard Bridge over the San Luis Rey River**

Dear Ms. Hammond:

Linscott, Law & Greenspan, Engineers (LLG) completed a traffic study for the North River Farms project, dated July 23, 2018. A significant cumulative impact was calculated on the 4 lane portion of College Boulevard between North River Road and Adams Street (which includes the bridge over the San Luis Rey River). Partial mitigation of conducting a Traffic Signal Optimization Study was recommended since no improvement plans have been identified for this portion of College Boulevard in the City's Thoroughfare and Traffic Signal Fee Program.

Since the preparation of the traffic study, it has been determined that 2 additional lanes can be added to the bridge. The additional lanes would add 10,000 ADT of capacity to College Boulevard, according to City standards for a 6 lane Major Arterial (increase from 40,000 to 50,000 ADT of capacity). The traffic study shows that the project would add 3886 ADT of traffic to College Boulevard on the bridge and therefore the improvement would fully mitigate the College Boulevard significant impact. ***Table A*** shows the pre and post mitigation operations and shows the improvement in the Volume to Capacity (V/C) Ratio to better than pre-project conditions.

LINSCOTT LAW & GREENSPAN engineers

The bridge improvement will allow two 800 foot long right-turn lanes on College Boulevard at North River Road. Today, the number 2 (curb) right-turn lane is only 50 feet long which renders it of little value since many drivers cannot reach that lane due to the queues in the other right-turn lane extending past the short right-turn lane. The 6 lane bridge improvement will alleviate this issue. ***Table B*** shows the post mitigation operations at the North River Road / College Boulevard intersection and the improvement in delays that result from the mitigation. ***Attachment A*** contains the Synchro analysis sheets. Therefore, the bridge improvements also mitigate the impact at the North River Road / College Boulevard intersection.

Please call me if you have any questions.

Sincerely,
Linscott, Law & Greenspan, Engineers

John Boarman, P.E.
Principal
California Registration: C50033

JB:wcs
cc: File

TABLE A
POST-MITIGATION ANALYSIS
COLLEGE BOULEVARD FROM NORTH RIVER ROAD TO ADAMS STREET

Scenario	Capacity [a]	Pre-Mitigation Operations							Post Mitigation					
		Without Project			With Project									
		ADT [b]	V/C [c]	LOS [d]	Additional Project Traffic	ADT	V/C	LOS	Added Capacity Due to Mitigation	Capacity	V/C	V/C Reduction as a Result of Mitigation	LOS	Mitigated to Below a Level of Significance
Existing	40,000	45,980	1.150	F	3886	49,866	1.247	F	10,000	50,000	0.997	0.250	E	Yes
Near-Term	40,000	47,390	1.185	F	3886	51,276	1.282	F	10,000	50,000	1.020	0.262	F	Yes
Year 2035 (Without Melrose Drive Extension)	40,000	45,100	1.128	F	3886	48,986	1.225	F	10,000	50,000	0.980	0.245	E	Yes

Footnotes:

a. Capacities based on City of Oceanside Roadway Classification & LOS table (See *Appendix B*). Future classifications taken from the City of Oceanside Master Transportation Roadway Plan.
b. Average Daily Traffic.
c. Level of Service.
d. Volume to Capacity ratio.

TABLE B
POST-MITIGATION ANALYSIS
NORTH RIVER ROAD / COLLEGE BOULEVARD INTERSECTION

Scenario	Peak Hour	Pre-Mitigation Operations				Post Mitigation	
		Without Project		With Project			
		Delay [a]	LOS [b]	Delay [a]	LOS [b]	Delay [a]	LOS [b]
Existing	AM	65.6	E	100.3	F	64.3	E
	PM	103.5	F	167.9	F	79.3	E
Near-Term	AM	65.6	E	100.3	F	64.3	E
	PM	103.5	F	167.9	F	79.3	E
Year 2035 (Master Transportation Roadway Plan)	AM	59.3	E	82.1	F	57.6	E
	PM	85.4	F	124.2	F	68.4	E
Year 2035 (Without Melrose Drive Extension)	AM	76.4	E	115.1	F	77.8	E
	PM	108.3	F	166.7	F	87.8	F

Footnotes:

a. Average delay expressed in seconds per vehicle.
b. Level of Service.

SIGNALIZED

DELAY/LOS THRESHOLDS

Delay	LOS
0.0 ≤ 10.0	A
10.1 to 20.0	B
20.1 to 35.0	C
35.1 to 55.0	D
55.1 to 80.0	E
≥ 80.1	F

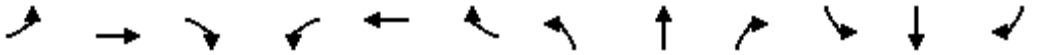
ATTACHMENT A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	29	3	325	22	880	16	196	475	915	308	27
Future Volume (veh/h)	17	29	3	325	22	880	16	196	475	915	308	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	18	32	3	353	24	957	17	213	516	995	335	29
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	96	9	385	26	829	32	953	784	1020	1938	867
Arrive On Green	0.06	0.06	0.06	0.23	0.23	0.23	0.02	0.27	0.27	0.30	0.55	0.55
Sat Flow, veh/h	1774	1672	157	1666	113	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	18	0	35	377	0	957	17	213	516	995	335	29
Grp Sat Flow(s),veh/h/ln	1774	0	1829	1779	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	5.8	30.6	35.3	5.8	1.0
Cycle Q Clear(g_c), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	5.8	30.6	35.3	5.8	1.0
Prop In Lane	1.00		0.09	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	105	412	0	829	32	953	784	1020	1938	867
V/C Ratio(X)	0.18	0.00	0.33	0.92	0.00	1.15	0.54	0.22	0.66	0.98	0.17	0.03
Avail Cap(c_a), veh/h	475	0	490	412	0	829	82	977	795	1020	1938	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.3	0.0	55.8	46.2	0.0	29.2	60.0	35.0	23.0	42.9	13.9	12.9
Incr Delay (d2), s/veh	0.8	0.0	1.9	24.9	0.0	83.1	13.3	0.1	2.0	22.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.2	15.4	0.0	23.5	0.7	2.8	17.9	19.9	2.8	0.5
LnGrp Delay(d),s/veh	56.1	0.0	57.7	71.1	0.0	112.4	73.3	35.1	25.0	65.4	14.0	12.9
LnGrp LOS	E		E	E		F	E	D	C	E	B	B
Approach Vol, veh/h		53			1334			746			1359	
Approach Delay, s/veh		57.2			100.7			29.0			51.6	
Approach LOS		E			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	41.0	37.7		11.6	6.7	72.0		33.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	36.5	34.0		33.0	5.7	64.8		28.5
Max Q Clear Time (g_c+I1), s	37.3	32.6		4.3	3.2	7.8		30.5
Green Ext Time (p_c), s	0.0	0.5		0.2	0.0	2.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	65.6
HCM 2010 LOS	E

Notes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	27	17	401	24	1033	18	397	431	1035	295	33
Future Volume (veh/h)	26	27	17	401	24	1033	18	397	431	1035	295	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	28	29	18	436	26	1123	20	432	468	1125	321	36
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	60	37	426	25	845	36	893	794	988	1837	822
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.25	0.25	0.29	0.52	0.52
Sat Flow, veh/h	1774	1054	654	1679	100	1540	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	28	0	47	462	0	1123	20	432	468	1125	321	36
Grp Sat Flow(s),veh/h/ln	1774	0	1709	1779	0	770	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	12.5	25.6	34.5	5.8	1.3
Cycle Q Clear(g_c), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	12.5	25.6	34.5	5.8	1.3
Prop In Lane	1.00		0.38	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	98	451	0	845	36	893	794	988	1837	822
V/C Ratio(X)	0.28	0.00	0.48	1.02	0.00	1.33	0.56	0.48	0.59	1.14	0.17	0.04
Avail Cap(c_a), veh/h	487	0	469	451	0	845	87	1001	842	988	1843	825
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.3	0.0	54.9	44.9	0.0	27.8	58.3	38.3	21.0	42.9	15.3	14.2
Incr Delay (d2), s/veh	1.5	0.0	3.6	48.5	0.0	156.1	12.8	0.4	1.0	75.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.6	21.0	0.0	32.2	0.8	6.2	15.7	26.6	2.8	0.6
LnGrp Delay(d),s/veh	55.7	0.0	58.5	93.4	0.0	183.9	71.1	38.7	22.0	117.8	15.3	14.3
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		75			1585			920			1482	
Approach Delay, s/veh		57.5			157.5			30.9			93.1	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	34.8		11.4	6.9	66.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.9	62.6		30.5
Max Q Clear Time (g_c+I1), s	36.5	27.6		5.2	3.3	7.8		32.5
Green Ext Time (p_c), s	0.0	2.6		0.3	0.0	2.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	103.5
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Future Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	18	32	3	353	24	1047	17	240	516	1210	399	29
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	96	9	385	26	829	32	953	784	1019	1938	867
Arrive On Green	0.06	0.06	0.06	0.23	0.23	0.23	0.02	0.27	0.27	0.30	0.55	0.55
Sat Flow, veh/h	1774	1672	157	1666	113	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	18	0	35	377	0	1047	17	240	516	1210	399	29
Grp Sat Flow(s),veh/h/ln	1774	0	1829	1779	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Cycle Q Clear(g_c), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Prop In Lane	1.00		0.09	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	0	105	412	0	829	32	953	784	1019	1938	867
V/C Ratio(X)	0.18	0.00	0.33	0.92	0.00	1.26	0.54	0.25	0.66	1.19	0.21	0.03
Avail Cap(c_a), veh/h	475	0	490	412	0	829	82	976	795	1019	1938	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.3	0.0	55.8	46.2	0.0	29.3	60.0	35.3	23.0	43.4	14.2	12.8
Incr Delay (d2), s/veh	0.8	0.0	1.9	25.0	0.0	128.2	13.3	0.1	2.0	94.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.2	15.4	0.0	28.7	0.7	3.2	17.9	30.6	3.4	0.5
LnGrp Delay(d),s/veh	56.2	0.0	57.7	71.2	0.0	157.4	73.3	35.4	25.0	137.6	14.3	12.9
LnGrp LOS	E		E	E		F	E	D	C	F	B	B
Approach Vol, veh/h		53			1424			773			1638	
Approach Delay, s/veh		57.2			134.6			29.3			105.3	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	41.0	37.7		11.6	6.7	72.0		33.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	36.5	34.0		33.0	5.7	64.8		28.5
Max Q Clear Time (g_c+I1), s	38.5	32.6		4.3	3.2	9.1		30.5
Green Ext Time (p_c), s	0.0	0.6		0.2	0.0	3.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	100.3
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Future Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	28	29	18	436	26	1399	20	514	468	1264	362	36
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	60	37	425	25	843	36	898	796	986	1840	823
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.25	0.25	0.29	0.52	0.52
Sat Flow, veh/h	1774	1054	654	1679	100	1540	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	28	0	47	462	0	1399	20	514	468	1264	362	36
Grp Sat Flow(s),veh/h/ln	1774	0	1709	1779	0	770	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Cycle Q Clear(g_c), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Prop In Lane	1.00		0.38	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	98	450	0	843	36	898	796	986	1840	823
V/C Ratio(X)	0.28	0.00	0.48	1.03	0.00	1.66	0.56	0.57	0.59	1.28	0.20	0.04
Avail Cap(c_a), veh/h	486	0	468	450	0	843	87	999	840	986	1840	823
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.4	0.0	55.1	45.0	0.0	28.0	58.5	39.2	20.9	43.0	15.5	14.2
Incr Delay (d2), s/veh	1.5	0.0	3.6	49.2	0.0	301.8	12.8	0.6	1.0	134.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.6	21.0	0.0	49.2	0.8	7.6	15.7	34.8	3.2	0.6
LnGrp Delay(d),s/veh	55.9	0.0	58.7	94.2	0.0	329.8	71.3	39.9	21.9	177.9	15.5	14.2
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		75			1861			1002			1662	
Approach Delay, s/veh		57.6			271.3			32.1			139.0	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	35.1		11.4	6.9	67.1		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.9	62.6		30.5
Max Q Clear Time (g_c+I1), s	36.5	27.6		5.2	3.3	8.6		32.5
Green Ext Time (p_c), s	0.0	2.9		0.3	0.0	2.8		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		167.9
HCM 2010 LOS		F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Future Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	18	32	3	353	24	1047	17	240	516	1210	399	29
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	96	9	385	26	1459	32	953	784	1019	1938	867
Arrive On Green	0.06	0.06	0.06	0.23	0.23	0.23	0.02	0.27	0.27	0.30	0.55	0.55
Sat Flow, veh/h	1774	1672	157	1666	113	2738	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	18	0	35	377	0	1047	17	240	516	1210	399	29
Grp Sat Flow(s),veh/h/ln	1774	0	1829	1779	0	1369	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Cycle Q Clear(g_c), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Prop In Lane	1.00		0.09	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	0	105	412	0	1459	32	953	784	1019	1938	867
V/C Ratio(X)	0.18	0.00	0.33	0.92	0.00	0.72	0.54	0.25	0.66	1.19	0.21	0.03
Avail Cap(c_a), veh/h	475	0	490	412	0	1459	82	976	795	1019	1938	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.3	0.0	55.8	46.2	0.0	22.3	60.0	35.3	23.0	43.4	14.2	12.8
Incr Delay (d2), s/veh	0.8	0.0	1.9	25.0	0.0	1.7	13.3	0.1	2.0	94.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.2	15.4	0.0	13.9	0.7	3.2	17.9	30.6	3.4	0.5
LnGrp Delay(d),s/veh	56.2	0.0	57.7	71.2	0.0	24.0	73.3	35.4	25.0	137.6	14.3	12.9
LnGrp LOS	E		E	E		C	E	D	C	F	B	B
Approach Vol, veh/h		53			1424			773			1638	
Approach Delay, s/veh		57.2			36.5			29.3			105.3	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	41.0	37.7		11.6	6.7	72.0		33.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	36.5	34.0		33.0	5.7	64.8		28.5
Max Q Clear Time (g_c+I1), s	38.5	32.6		4.3	3.2	9.1		30.5
Green Ext Time (p_c), s	0.0	0.6		0.2	0.0	3.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	64.3
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Future Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	28	29	18	436	26	1399	20	514	468	1264	362	36
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	60	37	425	25	1484	36	898	796	986	1840	823
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.25	0.25	0.29	0.52	0.52
Sat Flow, veh/h	1774	1054	654	1679	100	2710	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	28	0	47	462	0	1399	20	514	468	1264	362	36
Grp Sat Flow(s),veh/h/ln	1774	0	1709	1779	0	1355	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Cycle Q Clear(g_c), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Prop In Lane	1.00		0.38	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	98	450	0	1484	36	898	796	986	1840	823
V/C Ratio(X)	0.28	0.00	0.48	1.03	0.00	0.94	0.56	0.57	0.59	1.28	0.20	0.04
Avail Cap(c_a), veh/h	486	0	468	450	0	1484	87	999	840	986	1840	823
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.4	0.0	55.1	45.0	0.0	26.2	58.5	39.2	20.9	43.0	15.5	14.2
Incr Delay (d2), s/veh	1.5	0.0	3.6	49.2	0.0	12.3	12.8	0.6	1.0	134.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.6	21.0	0.0	24.2	0.8	7.6	15.7	34.8	3.2	0.6
LnGrp Delay(d),s/veh	55.9	0.0	58.7	94.2	0.0	38.5	71.3	39.9	21.9	177.9	15.5	14.2
LnGrp LOS	E		E	F		D	E	D	C	F	B	B
Approach Vol, veh/h		75			1861			1002			1662	
Approach Delay, s/veh		57.6			52.3			32.1			139.0	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	35.1		11.4	6.9	67.1		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.9	62.6		30.5
Max Q Clear Time (g_c+I1), s	36.5	27.6		5.2	3.3	8.6		32.5
Green Ext Time (p_c), s	0.0	2.9		0.3	0.0	2.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	79.3
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	29	3	325	22	880	16	196	475	915	308	27
Future Volume (veh/h)	17	29	3	325	22	880	16	196	475	915	308	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	18	32	3	353	24	957	17	213	516	995	335	29
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	96	9	385	26	829	32	953	784	1020	1938	867
Arrive On Green	0.06	0.06	0.06	0.23	0.23	0.23	0.02	0.27	0.27	0.30	0.55	0.55
Sat Flow, veh/h	1774	1672	157	1666	113	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	18	0	35	377	0	957	17	213	516	995	335	29
Grp Sat Flow(s),veh/h/ln	1774	0	1829	1779	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	5.8	30.6	35.3	5.8	1.0
Cycle Q Clear(g_c), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	5.8	30.6	35.3	5.8	1.0
Prop In Lane	1.00		0.09	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	105	412	0	829	32	953	784	1020	1938	867
V/C Ratio(X)	0.18	0.00	0.33	0.92	0.00	1.15	0.54	0.22	0.66	0.98	0.17	0.03
Avail Cap(c_a), veh/h	475	0	490	412	0	829	82	977	795	1020	1938	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.3	0.0	55.8	46.2	0.0	29.2	60.0	35.0	23.0	42.9	13.9	12.9
Incr Delay (d2), s/veh	0.8	0.0	1.9	24.9	0.0	83.1	13.3	0.1	2.0	22.4	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.2	15.4	0.0	23.5	0.7	2.8	17.9	19.9	2.8	0.5
LnGrp Delay(d),s/veh	56.1	0.0	57.7	71.1	0.0	112.4	73.3	35.1	25.0	65.4	14.0	12.9
LnGrp LOS	E		E	E		F	E	D	C	E	B	B
Approach Vol, veh/h		53			1334			746			1359	
Approach Delay, s/veh		57.2			100.7			29.0			51.6	
Approach LOS		E			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	41.0	37.7		11.6	6.7	72.0		33.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	36.5	34.0		33.0	5.7	64.8		28.5
Max Q Clear Time (g_c+I1), s	37.3	32.6		4.3	3.2	7.8		30.5
Green Ext Time (p_c), s	0.0	0.5		0.2	0.0	2.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	65.6
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	27	17	401	24	1033	18	397	431	1035	295	33
Future Volume (veh/h)	26	27	17	401	24	1033	18	397	431	1035	295	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	28	29	18	436	26	1123	20	432	468	1125	321	36
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	60	37	426	25	845	36	893	794	988	1837	822
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.25	0.25	0.29	0.52	0.52
Sat Flow, veh/h	1774	1054	654	1679	100	1540	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	28	0	47	462	0	1123	20	432	468	1125	321	36
Grp Sat Flow(s),veh/h/ln	1774	0	1709	1779	0	770	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	12.5	25.6	34.5	5.8	1.3
Cycle Q Clear(g_c), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	12.5	25.6	34.5	5.8	1.3
Prop In Lane	1.00		0.38	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	98	451	0	845	36	893	794	988	1837	822
V/C Ratio(X)	0.28	0.00	0.48	1.02	0.00	1.33	0.56	0.48	0.59	1.14	0.17	0.04
Avail Cap(c_a), veh/h	487	0	469	451	0	845	87	1001	842	988	1843	825
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.3	0.0	54.9	44.9	0.0	27.8	58.3	38.3	21.0	42.9	15.3	14.2
Incr Delay (d2), s/veh	1.5	0.0	3.6	48.5	0.0	156.1	12.8	0.4	1.0	75.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.6	21.0	0.0	32.2	0.8	6.2	15.7	26.6	2.8	0.6
LnGrp Delay(d),s/veh	55.7	0.0	58.5	93.4	0.0	183.9	71.1	38.7	22.0	117.8	15.3	14.3
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		75			1585			920			1482	
Approach Delay, s/veh		57.5			157.5			30.9			93.1	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	34.8		11.4	6.9	66.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.9	62.6		30.5
Max Q Clear Time (g_c+I1), s	36.5	27.6		5.2	3.3	7.8		32.5
Green Ext Time (p_c), s	0.0	2.6		0.3	0.0	2.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	103.5
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Future Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	18	32	3	353	24	1047	17	240	516	1210	399	29
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	96	9	385	26	829	32	953	784	1019	1938	867
Arrive On Green	0.06	0.06	0.06	0.23	0.23	0.23	0.02	0.27	0.27	0.30	0.55	0.55
Sat Flow, veh/h	1774	1672	157	1666	113	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	18	0	35	377	0	1047	17	240	516	1210	399	29
Grp Sat Flow(s),veh/h/ln	1774	0	1829	1779	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Cycle Q Clear(g_c), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Prop In Lane	1.00		0.09	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	0	105	412	0	829	32	953	784	1019	1938	867
V/C Ratio(X)	0.18	0.00	0.33	0.92	0.00	1.26	0.54	0.25	0.66	1.19	0.21	0.03
Avail Cap(c_a), veh/h	475	0	490	412	0	829	82	976	795	1019	1938	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.3	0.0	55.8	46.2	0.0	29.3	60.0	35.3	23.0	43.4	14.2	12.8
Incr Delay (d2), s/veh	0.8	0.0	1.9	25.0	0.0	128.2	13.3	0.1	2.0	94.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.2	15.4	0.0	28.7	0.7	3.2	17.9	30.6	3.4	0.5
LnGrp Delay(d),s/veh	56.2	0.0	57.7	71.2	0.0	157.4	73.3	35.4	25.0	137.6	14.3	12.9
LnGrp LOS	E		E	E		F	E	D	C	F	B	B
Approach Vol, veh/h		53			1424			773			1638	
Approach Delay, s/veh		57.2			134.6			29.3			105.3	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	41.0	37.7		11.6	6.7	72.0		33.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	36.5	34.0		33.0	5.7	64.8		28.5
Max Q Clear Time (g_c+I1), s	38.5	32.6		4.3	3.2	9.1		30.5
Green Ext Time (p_c), s	0.0	0.6		0.2	0.0	3.1		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		100.3
HCM 2010 LOS		F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Future Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	28	29	18	436	26	1399	20	514	468	1264	362	36
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	60	37	425	25	843	36	898	796	986	1840	823
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.25	0.25	0.29	0.52	0.52
Sat Flow, veh/h	1774	1054	654	1679	100	1540	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	28	0	47	462	0	1399	20	514	468	1264	362	36
Grp Sat Flow(s),veh/h/ln	1774	0	1709	1779	0	770	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Cycle Q Clear(g_c), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Prop In Lane	1.00		0.38	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	98	450	0	843	36	898	796	986	1840	823
V/C Ratio(X)	0.28	0.00	0.48	1.03	0.00	1.66	0.56	0.57	0.59	1.28	0.20	0.04
Avail Cap(c_a), veh/h	486	0	468	450	0	843	87	999	840	986	1840	823
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.4	0.0	55.1	45.0	0.0	28.0	58.5	39.2	20.9	43.0	15.5	14.2
Incr Delay (d2), s/veh	1.5	0.0	3.6	49.2	0.0	301.8	12.8	0.6	1.0	134.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.6	21.0	0.0	49.2	0.8	7.6	15.7	34.8	3.2	0.6
LnGrp Delay(d),s/veh	55.9	0.0	58.7	94.2	0.0	329.8	71.3	39.9	21.9	177.9	15.5	14.2
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		75			1861			1002			1662	
Approach Delay, s/veh		57.6			271.3			32.1			139.0	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	35.1		11.4	6.9	67.1		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.9	62.6		30.5
Max Q Clear Time (g_c+I1), s	36.5	27.6		5.2	3.3	8.6		32.5
Green Ext Time (p_c), s	0.0	2.9		0.3	0.0	2.8		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		167.9
HCM 2010 LOS		F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Future Volume (veh/h)	17	29	3	325	22	963	16	221	475	1113	367	27
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	18	32	3	353	24	1047	17	240	516	1210	399	29
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	96	9	385	26	1459	32	953	784	1019	1938	867
Arrive On Green	0.06	0.06	0.06	0.23	0.23	0.23	0.02	0.27	0.27	0.30	0.55	0.55
Sat Flow, veh/h	1774	1672	157	1666	113	2738	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	18	0	35	377	0	1047	17	240	516	1210	399	29
Grp Sat Flow(s),veh/h/ln	1774	0	1829	1779	0	1369	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Cycle Q Clear(g_c), s	1.2	0.0	2.3	25.5	0.0	28.5	1.2	6.6	30.6	36.5	7.1	1.0
Prop In Lane	1.00		0.09	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	0	105	412	0	1459	32	953	784	1019	1938	867
V/C Ratio(X)	0.18	0.00	0.33	0.92	0.00	0.72	0.54	0.25	0.66	1.19	0.21	0.03
Avail Cap(c_a), veh/h	475	0	490	412	0	1459	82	976	795	1019	1938	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.3	0.0	55.8	46.2	0.0	22.3	60.0	35.3	23.0	43.4	14.2	12.8
Incr Delay (d2), s/veh	0.8	0.0	1.9	25.0	0.0	1.7	13.3	0.1	2.0	94.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	1.2	15.4	0.0	13.9	0.7	3.2	17.9	30.6	3.4	0.5
LnGrp Delay(d),s/veh	56.2	0.0	57.7	71.2	0.0	24.0	73.3	35.4	25.0	137.6	14.3	12.9
LnGrp LOS	E		E	E		C	E	D	C	F	B	B
Approach Vol, veh/h		53			1424			773			1638	
Approach Delay, s/veh		57.2			36.5			29.3			105.3	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	41.0	37.7		11.6	6.7	72.0		33.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	36.5	34.0		33.0	5.7	64.8		28.5
Max Q Clear Time (g_c+I1), s	38.5	32.6		4.3	3.2	9.1		30.5
Green Ext Time (p_c), s	0.0	0.6		0.2	0.0	3.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	64.3
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Future Volume (veh/h)	26	27	17	401	24	1287	18	473	431	1163	333	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	28	29	18	436	26	1399	20	514	468	1264	362	36
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	60	37	425	25	1484	36	898	796	986	1840	823
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.25	0.25	0.29	0.52	0.52
Sat Flow, veh/h	1774	1054	654	1679	100	2710	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	28	0	47	462	0	1399	20	514	468	1264	362	36
Grp Sat Flow(s),veh/h/ln	1774	0	1709	1779	0	1355	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Cycle Q Clear(g_c), s	1.8	0.0	3.2	30.5	0.0	30.5	1.3	15.3	25.6	34.5	6.6	1.3
Prop In Lane	1.00		0.38	0.94		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	98	450	0	1484	36	898	796	986	1840	823
V/C Ratio(X)	0.28	0.00	0.48	1.03	0.00	0.94	0.56	0.57	0.59	1.28	0.20	0.04
Avail Cap(c_a), veh/h	486	0	468	450	0	1484	87	999	840	986	1840	823
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	54.4	0.0	55.1	45.0	0.0	26.2	58.5	39.2	20.9	43.0	15.5	14.2
Incr Delay (d2), s/veh	1.5	0.0	3.6	49.2	0.0	12.3	12.8	0.6	1.0	134.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	1.6	21.0	0.0	24.2	0.8	7.6	15.7	34.8	3.2	0.6
LnGrp Delay(d),s/veh	55.9	0.0	58.7	94.2	0.0	38.5	71.3	39.9	21.9	177.9	15.5	14.2
LnGrp LOS	E		E	F		D	E	D	C	F	B	B
Approach Vol, veh/h		75			1861			1002			1662	
Approach Delay, s/veh		57.6			52.3			32.1			139.0	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	35.1		11.4	6.9	67.1		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.9	62.6		30.5
Max Q Clear Time (g_c+I1), s	36.5	27.6		5.2	3.3	8.6		32.5
Green Ext Time (p_c), s	0.0	2.9		0.3	0.0	2.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	79.3
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	30	5	360	20	830	15	230	530	865	370	25
Future Volume (veh/h)	15	30	5	360	20	830	15	230	530	865	370	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	16	33	5	391	22	902	16	250	576	940	402	27
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	90	14	414	23	823	30	970	815	957	1893	847
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.27	0.27	0.28	0.53	0.53
Sat Flow, veh/h	1774	1573	238	1684	95	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	16	0	38	413	0	902	16	250	576	940	402	27
Grp Sat Flow(s),veh/h/ln	1774	0	1812	1779	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.1	0.0	2.5	28.3	0.0	30.5	1.1	6.8	34.0	33.7	7.4	1.0
Cycle Q Clear(g_c), s	1.1	0.0	2.5	28.3	0.0	30.5	1.1	6.8	34.0	33.7	7.4	1.0
Prop In Lane	1.00		0.13	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	104	437	0	823	30	970	815	957	1893	847
V/C Ratio(X)	0.16	0.00	0.37	0.94	0.00	1.10	0.53	0.26	0.71	0.98	0.21	0.03
Avail Cap(c_a), veh/h	472	0	482	437	0	823	80	970	815	957	1893	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	56.3	46.0	0.0	29.7	60.5	35.2	22.5	44.5	15.1	13.7
Incr Delay (d2), s/veh	0.7	0.0	2.2	29.5	0.0	61.1	13.5	0.1	2.8	24.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.3	17.5	0.0	20.9	0.7	3.4	20.3	19.4	3.6	0.4
LnGrp Delay(d),s/veh	56.4	0.0	58.5	75.4	0.0	90.8	74.0	35.3	25.3	69.3	15.2	13.7
LnGrp LOS	E		E	E		F	E	D	C	E	B	B
Approach Vol, veh/h		54			1315			842			1369	
Approach Delay, s/veh		57.9			86.0			29.2			52.3	
Approach LOS		E			F			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	38.5		11.6	6.6	70.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.6	62.9		30.5
Max Q Clear Time (g_c+I1), s	35.7	36.0		4.5	3.1	9.4		32.5
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	3.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	59.3
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	25	15	445	25	975	20	490	480	980	380	35
Future Volume (veh/h)	25	25	15	445	25	975	20	490	480	980	380	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	27	27	16	484	27	1060	22	533	522	1065	413	38
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	57	34	471	26	875	37	894	836	963	1811	810
Arrive On Green	0.05	0.05	0.05	0.28	0.28	0.28	0.02	0.25	0.25	0.28	0.51	0.51
Sat Flow, veh/h	1774	1074	637	1685	94	1542	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	27	0	43	511	0	1060	22	533	522	1065	413	38
Grp Sat Flow(s),veh/h/ln	1774	0	1711	1779	0	771	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	17.8	31.6	37.5	8.6	1.6
Cycle Q Clear(g_c), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	17.8	31.6	37.5	8.6	1.6
Prop In Lane	1.00		0.37	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	95	0	91	498	0	875	37	894	836	963	1811	810
V/C Ratio(X)	0.28	0.00	0.47	1.03	0.00	1.21	0.59	0.60	0.62	1.11	0.23	0.05
Avail Cap(c_a), veh/h	437	0	421	498	0	875	82	898	838	963	1811	810
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.0	0.0	61.6	48.3	0.0	29.8	65.1	44.1	22.0	48.3	18.1	16.4
Incr Delay (d2), s/veh	1.6	0.0	3.7	47.4	0.0	106.0	14.3	1.1	1.5	62.5	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.6	24.9	0.0	28.9	1.0	8.8	19.6	26.2	4.3	0.7
LnGrp Delay(d),s/veh	62.6	0.0	65.3	95.6	0.0	135.8	79.3	45.1	23.5	110.8	18.2	16.4
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		70			1571			1077			1516	
Approach Delay, s/veh		64.3			122.7			35.3			83.2	
Approach LOS		E			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	42.0	38.4		11.7	7.3	73.1		42.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	37.5	34.0		33.0	6.2	65.3		37.5
Max Q Clear Time (g_c+I1), s	39.5	33.6		5.3	3.6	10.6		39.5
Green Ext Time (p_c), s	0.0	0.2		0.3	0.0	3.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	85.4
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	30	5	360	20	890	15	255	530	1008	429	25
Future Volume (veh/h)	15	30	5	360	20	890	15	255	530	1008	429	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	16	33	5	391	22	967	16	277	576	1096	466	27
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	90	14	414	23	823	30	970	815	957	1893	847
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.27	0.27	0.28	0.53	0.53
Sat Flow, veh/h	1774	1573	238	1684	95	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	16	0	38	413	0	967	16	277	576	1096	466	27
Grp Sat Flow(s),veh/h/ln	1774	0	1812	1779	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.1	0.0	2.5	28.3	0.0	30.5	1.1	7.7	34.0	34.5	8.8	1.0
Cycle Q Clear(g_c), s	1.1	0.0	2.5	28.3	0.0	30.5	1.1	7.7	34.0	34.5	8.8	1.0
Prop In Lane	1.00		0.13	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	104	437	0	823	30	970	815	957	1893	847
V/C Ratio(X)	0.16	0.00	0.37	0.94	0.00	1.18	0.53	0.29	0.71	1.15	0.25	0.03
Avail Cap(c_a), veh/h	472	0	482	437	0	823	80	970	815	957	1893	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	56.3	46.0	0.0	29.7	60.5	35.5	22.5	44.8	15.5	13.7
Incr Delay (d2), s/veh	0.7	0.0	2.2	29.5	0.0	91.6	13.5	0.2	2.8	77.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.3	17.5	0.0	24.4	0.7	3.8	20.3	26.7	4.3	0.4
LnGrp Delay(d),s/veh	56.4	0.0	58.5	75.4	0.0	121.3	74.0	35.6	25.3	122.7	15.5	13.7
LnGrp LOS	E		E	E		F	E	D	C	F	B	B
Approach Vol, veh/h		54			1380			869			1589	
Approach Delay, s/veh		57.9			107.6			29.5			89.4	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	38.5		11.6	6.6	70.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.6	62.9		30.5
Max Q Clear Time (g_c+I1), s	36.5	36.0		4.5	3.1	10.8		32.5
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	3.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	82.1
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	25	15	445	25	1158	20	566	480	1072	418	35
Future Volume (veh/h)	25	25	15	445	25	1158	20	566	480	1072	418	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	27	27	16	484	27	1259	22	615	522	1165	454	38
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	57	34	471	26	874	37	895	836	963	1811	810
Arrive On Green	0.05	0.05	0.05	0.28	0.28	0.28	0.02	0.25	0.25	0.28	0.51	0.51
Sat Flow, veh/h	1774	1074	637	1685	94	1542	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	27	0	43	511	0	1259	22	615	522	1165	454	38
Grp Sat Flow(s),veh/h/ln	1774	0	1711	1779	0	771	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	21.1	31.6	37.5	9.6	1.6
Cycle Q Clear(g_c), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	21.1	31.6	37.5	9.6	1.6
Prop In Lane	1.00		0.37	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	95	0	91	498	0	874	37	895	836	963	1811	810
V/C Ratio(X)	0.28	0.00	0.47	1.03	0.00	1.44	0.59	0.69	0.62	1.21	0.25	0.05
Avail Cap(c_a), veh/h	437	0	421	498	0	874	82	898	838	963	1811	810
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.0	0.0	61.6	48.3	0.0	29.8	65.1	45.3	22.0	48.3	18.3	16.4
Incr Delay (d2), s/veh	1.6	0.0	3.7	47.4	0.0	204.4	14.3	2.2	1.5	104.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.6	24.9	0.0	40.9	1.0	10.6	19.6	31.7	4.7	0.7
LnGrp Delay(d),s/veh	62.6	0.0	65.3	95.7	0.0	234.2	79.3	47.5	23.5	152.5	18.4	16.4
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		70			1770			1159			1657	
Approach Delay, s/veh		64.3			194.2			37.3			112.6	
Approach LOS		E			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	42.0	38.4		11.7	7.3	73.1		42.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	37.5	34.0		33.0	6.2	65.3		37.5
Max Q Clear Time (g_c+I1), s	39.5	33.6		5.3	3.6	11.6		39.5
Green Ext Time (p_c), s	0.0	0.2		0.3	0.0	3.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	124.2
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	30	5	360	20	890	15	255	530	1008	429	25
Future Volume (veh/h)	15	30	5	360	20	890	15	255	530	1008	429	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	16	33	5	391	22	967	16	277	576	1096	466	27
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	90	14	414	23	1448	30	970	815	957	1893	847
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.27	0.27	0.28	0.53	0.53
Sat Flow, veh/h	1774	1573	238	1684	95	2739	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	16	0	38	413	0	967	16	277	576	1096	466	27
Grp Sat Flow(s),veh/h/ln	1774	0	1812	1779	0	1370	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.1	0.0	2.5	28.3	0.0	30.5	1.1	7.7	34.0	34.5	8.8	1.0
Cycle Q Clear(g_c), s	1.1	0.0	2.5	28.3	0.0	30.5	1.1	7.7	34.0	34.5	8.8	1.0
Prop In Lane	1.00		0.13	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	104	437	0	1448	30	970	815	957	1893	847
V/C Ratio(X)	0.16	0.00	0.37	0.94	0.00	0.67	0.53	0.29	0.71	1.15	0.25	0.03
Avail Cap(c_a), veh/h	472	0	482	437	0	1448	80	970	815	957	1893	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	56.3	46.0	0.0	21.8	60.5	35.5	22.5	44.8	15.5	13.7
Incr Delay (d2), s/veh	0.7	0.0	2.2	29.5	0.0	1.2	13.5	0.2	2.8	77.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.3	17.5	0.0	12.3	0.7	3.8	20.3	26.7	4.3	0.4
LnGrp Delay(d),s/veh	56.4	0.0	58.5	75.4	0.0	22.9	74.0	35.6	25.3	122.7	15.5	13.7
LnGrp LOS	E		E	E		C	E	D	C	F	B	B
Approach Vol, veh/h		54			1380			869			1589	
Approach Delay, s/veh		57.9			38.7			29.5			89.4	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	38.5		11.6	6.6	70.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.6	62.9		30.5
Max Q Clear Time (g_c+I1), s	36.5	36.0		4.5	3.1	10.8		32.5
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	3.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	57.6
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	25	15	445	25	1158	20	566	480	1072	418	35
Future Volume (veh/h)	25	25	15	445	25	1158	20	566	480	1072	418	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	27	27	16	484	27	1259	22	615	522	1165	454	38
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	57	34	471	26	1539	37	895	836	963	1811	810
Arrive On Green	0.05	0.05	0.05	0.28	0.28	0.28	0.02	0.25	0.25	0.28	0.51	0.51
Sat Flow, veh/h	1774	1074	637	1685	94	2715	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	27	0	43	511	0	1259	22	615	522	1165	454	38
Grp Sat Flow(s),veh/h/ln	1774	0	1711	1779	0	1357	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	21.1	31.6	37.5	9.6	1.6
Cycle Q Clear(g_c), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	21.1	31.6	37.5	9.6	1.6
Prop In Lane	1.00		0.37	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	95	0	91	498	0	1539	37	895	836	963	1811	810
V/C Ratio(X)	0.28	0.00	0.47	1.03	0.00	0.82	0.59	0.69	0.62	1.21	0.25	0.05
Avail Cap(c_a), veh/h	437	0	421	498	0	1539	82	898	838	963	1811	810
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.0	0.0	61.6	48.3	0.0	24.2	65.1	45.3	22.0	48.3	18.3	16.4
Incr Delay (d2), s/veh	1.6	0.0	3.7	47.4	0.0	3.6	14.3	2.2	1.5	104.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.6	24.9	0.0	19.7	1.0	10.6	19.6	31.7	4.7	0.7
LnGrp Delay(d),s/veh	62.6	0.0	65.3	95.7	0.0	27.8	79.3	47.5	23.5	152.5	18.4	16.4
LnGrp LOS	E		E	F		C	E	D	C	F	B	B
Approach Vol, veh/h		70			1770			1159			1657	
Approach Delay, s/veh		64.3			47.4			37.3			112.6	
Approach LOS		E			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	42.0	38.4		11.7	7.3	73.1		42.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	37.5	34.0		33.0	6.2	65.3		37.5
Max Q Clear Time (g_c+I1), s	39.5	33.6		5.3	3.6	11.6		39.5
Green Ext Time (p_c), s	0.0	0.2		0.3	0.0	3.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	68.4
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	30	5	380	20	900	15	245	560	935	395	25
Future Volume (veh/h)	15	30	5	380	20	900	15	245	560	935	395	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	16	33	5	413	22	978	16	266	609	1016	429	27
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	90	14	415	22	823	30	970	815	957	1893	847
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.27	0.27	0.28	0.53	0.53
Sat Flow, veh/h	1774	1573	238	1688	90	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	16	0	38	435	0	978	16	266	609	1016	429	27
Grp Sat Flow(s),veh/h/ln	1774	0	1812	1778	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.1	0.0	2.5	30.3	0.0	30.5	1.1	7.3	34.0	34.5	8.0	1.0
Cycle Q Clear(g_c), s	1.1	0.0	2.5	30.3	0.0	30.5	1.1	7.3	34.0	34.5	8.0	1.0
Prop In Lane	1.00		0.13	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	104	437	0	823	30	970	815	957	1893	847
V/C Ratio(X)	0.16	0.00	0.37	1.00	0.00	1.19	0.53	0.27	0.75	1.06	0.23	0.03
Avail Cap(c_a), veh/h	472	0	482	437	0	823	80	970	815	957	1893	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	56.3	46.7	0.0	29.7	60.5	35.4	22.5	44.8	15.3	13.7
Incr Delay (d2), s/veh	0.7	0.0	2.2	41.8	0.0	97.1	13.5	0.2	3.8	47.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.3	19.9	0.0	25.0	0.7	3.6	21.7	22.6	3.9	0.4
LnGrp Delay(d),s/veh	56.4	0.0	58.5	88.5	0.0	126.7	74.0	35.5	26.3	91.8	15.3	13.7
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		54			1413			891			1472	
Approach Delay, s/veh		57.9			115.0			29.9			68.1	
Approach LOS		E			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	38.5		11.6	6.6	70.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.6	62.9		30.5
Max Q Clear Time (g_c+I1), s	36.5	36.0		4.5	3.1	10.0		32.5
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	3.3		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	76.4
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	25	15	470	25	1055	20	520	510	1060	405	35
Future Volume (veh/h)	25	25	15	470	25	1055	20	520	510	1060	405	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	27	27	16	511	27	1147	22	565	554	1152	440	38
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	57	34	472	25	874	37	897	837	962	1812	811
Arrive On Green	0.05	0.05	0.05	0.28	0.28	0.28	0.02	0.25	0.25	0.28	0.51	0.51
Sat Flow, veh/h	1774	1074	637	1689	89	1542	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	27	0	43	538	0	1147	22	565	554	1152	440	38
Grp Sat Flow(s),veh/h/ln	1774	0	1711	1778	0	771	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	19.0	34.0	37.5	9.3	1.6
Cycle Q Clear(g_c), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	19.0	34.0	37.5	9.3	1.6
Prop In Lane	1.00		0.37	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	95	0	91	497	0	874	37	897	837	962	1812	811
V/C Ratio(X)	0.28	0.00	0.47	1.08	0.00	1.31	0.59	0.63	0.66	1.20	0.24	0.05
Avail Cap(c_a), veh/h	436	0	421	497	0	874	82	897	837	962	1812	811
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.0	0.0	61.7	48.3	0.0	29.8	65.1	44.5	22.6	48.3	18.2	16.4
Incr Delay (d2), s/veh	1.6	0.0	3.7	64.4	0.0	149.0	14.3	1.4	2.0	99.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.6	27.3	0.0	34.1	1.0	9.5	20.9	31.0	4.5	0.7
LnGrp Delay(d),s/veh	62.7	0.0	65.4	112.8	0.0	178.8	79.4	45.9	24.5	147.4	18.3	16.4
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		70			1685			1141			1630	
Approach Delay, s/veh		64.3			157.7			36.2			109.5	
Approach LOS		E			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	42.0	38.5		11.7	7.3	73.2		42.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	37.5	34.0		33.0	6.2	65.3		37.5
Max Q Clear Time (g_c+I1), s	39.5	36.0		5.3	3.6	11.3		39.5
Green Ext Time (p_c), s	0.0	0.0		0.3	0.0	3.4		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	108.3
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	30	5	380	20	983	15	270	560	1133	454	25
Future Volume (veh/h)	15	30	5	380	20	983	15	270	560	1133	454	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	16	33	5	413	22	1068	16	293	609	1232	493	27
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	90	14	415	22	823	30	970	815	957	1893	847
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.27	0.27	0.28	0.53	0.53
Sat Flow, veh/h	1774	1573	238	1688	90	1556	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	16	0	38	435	0	1068	16	293	609	1232	493	27
Grp Sat Flow(s),veh/h/ln	1774	0	1812	1778	0	778	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.1	0.0	2.5	30.3	0.0	30.5	1.1	8.1	34.0	34.5	9.3	1.0
Cycle Q Clear(g_c), s	1.1	0.0	2.5	30.3	0.0	30.5	1.1	8.1	34.0	34.5	9.3	1.0
Prop In Lane	1.00		0.13	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	104	437	0	823	30	970	815	957	1893	847
V/C Ratio(X)	0.16	0.00	0.37	1.00	0.00	1.30	0.53	0.30	0.75	1.29	0.26	0.03
Avail Cap(c_a), veh/h	472	0	482	437	0	823	80	970	815	957	1893	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	56.3	46.7	0.0	29.7	60.5	35.7	22.5	44.8	15.6	13.7
Incr Delay (d2), s/veh	0.7	0.0	2.2	41.8	0.0	143.2	13.5	0.2	3.8	137.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.3	19.9	0.0	30.3	0.7	4.0	21.7	34.6	4.5	0.4
LnGrp Delay(d),s/veh	56.4	0.0	58.5	88.5	0.0	172.8	74.0	35.8	26.3	182.2	15.7	13.7
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		54			1503			918			1752	
Approach Delay, s/veh		57.9			148.4			30.2			132.7	
Approach LOS		E			F			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	38.5		11.6	6.6	70.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.6	62.9		30.5
Max Q Clear Time (g_c+I1), s	36.5	36.0		4.5	3.1	11.3		32.5
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	3.9		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		115.1
HCM 2010 LOS		F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	25	15	470	25	1309	20	596	510	1188	443	35
Future Volume (veh/h)	25	25	15	470	25	1309	20	596	510	1188	443	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	27	27	16	511	27	1423	22	648	554	1291	482	38
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	57	34	472	25	874	37	897	837	962	1812	811
Arrive On Green	0.05	0.05	0.05	0.28	0.28	0.28	0.02	0.25	0.25	0.28	0.51	0.51
Sat Flow, veh/h	1774	1074	637	1689	89	1542	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	27	0	43	538	0	1423	22	648	554	1291	482	38
Grp Sat Flow(s),veh/h/ln	1774	0	1711	1778	0	771	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	22.4	34.0	37.5	10.3	1.6
Cycle Q Clear(g_c), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	22.4	34.0	37.5	10.3	1.6
Prop In Lane	1.00		0.37	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	95	0	91	497	0	874	37	897	837	962	1812	811
V/C Ratio(X)	0.28	0.00	0.47	1.08	0.00	1.63	0.59	0.72	0.66	1.34	0.27	0.05
Avail Cap(c_a), veh/h	436	0	421	497	0	874	82	897	837	962	1812	811
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.0	0.0	61.7	48.3	0.0	29.8	65.1	45.8	22.6	48.3	18.5	16.4
Incr Delay (d2), s/veh	1.6	0.0	3.7	64.4	0.0	288.2	14.3	2.9	2.0	160.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.6	27.3	0.0	51.0	1.0	11.3	20.9	39.3	5.0	0.7
LnGrp Delay(d),s/veh	62.7	0.0	65.4	112.8	0.0	318.0	79.4	48.7	24.5	209.3	18.6	16.4
LnGrp LOS	E		E	F		F	E	D	C	F	B	B
Approach Vol, veh/h		70			1961			1224			1811	
Approach Delay, s/veh		64.3			261.7			38.3			154.5	
Approach LOS		E			F			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	42.0	38.5		11.7	7.3	73.2		42.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	37.5	34.0		33.0	6.2	65.3		37.5
Max Q Clear Time (g_c+I1), s	39.5	36.0		5.3	3.6	12.3		39.5
Green Ext Time (p_c), s	0.0	0.0		0.3	0.0	3.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	166.7
HCM 2010 LOS	F

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	30	5	380	20	983	15	270	560	1133	454	25
Future Volume (veh/h)	15	30	5	380	20	983	15	270	560	1133	454	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	16	33	5	413	22	1068	16	293	609	1232	493	27
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	90	14	415	22	1448	30	970	815	957	1893	847
Arrive On Green	0.06	0.06	0.06	0.25	0.25	0.25	0.02	0.27	0.27	0.28	0.53	0.53
Sat Flow, veh/h	1774	1573	238	1688	90	2739	1774	3539	1553	3442	3539	1583
Grp Volume(v), veh/h	16	0	38	435	0	1068	16	293	609	1232	493	27
Grp Sat Flow(s),veh/h/ln	1774	0	1812	1778	0	1370	1774	1770	1553	1721	1770	1583
Q Serve(g_s), s	1.1	0.0	2.5	30.3	0.0	30.5	1.1	8.1	34.0	34.5	9.3	1.0
Cycle Q Clear(g_c), s	1.1	0.0	2.5	30.3	0.0	30.5	1.1	8.1	34.0	34.5	9.3	1.0
Prop In Lane	1.00		0.13	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	102	0	104	437	0	1448	30	970	815	957	1893	847
V/C Ratio(X)	0.16	0.00	0.37	1.00	0.00	0.74	0.53	0.30	0.75	1.29	0.26	0.03
Avail Cap(c_a), veh/h	472	0	482	437	0	1448	80	970	815	957	1893	847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.7	0.0	56.3	46.7	0.0	23.1	60.5	35.7	22.5	44.8	15.6	13.7
Incr Delay (d2), s/veh	0.7	0.0	2.2	41.8	0.0	2.0	13.5	0.2	3.8	137.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.3	19.9	0.0	14.5	0.7	4.0	21.7	34.6	4.5	0.4
LnGrp Delay(d),s/veh	56.4	0.0	58.5	88.5	0.0	25.1	74.0	35.8	26.3	182.2	15.7	13.7
LnGrp LOS	E		E	F		C	E	D	C	F	B	B
Approach Vol, veh/h		54			1503			918			1752	
Approach Delay, s/veh		57.9			43.4			30.2			132.7	
Approach LOS		E			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	39.0	38.5		11.6	6.6	70.9		35.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	34.5	34.0		33.0	5.6	62.9		30.5
Max Q Clear Time (g_c+I1), s	36.5	36.0		4.5	3.1	11.3		32.5
Green Ext Time (p_c), s	0.0	0.0		0.2	0.0	3.9		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	77.8
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	25	15	470	25	1309	20	596	510	1188	443	35
Future Volume (veh/h)	25	25	15	470	25	1309	20	596	510	1188	443	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.95	1.00		0.97	1.00		0.98	1.00		1.00
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	27	27	16	511	27	1423	22	648	554	1291	482	38
Adj No. of Lanes	1	1	0	0	1	2	1	2	1	2	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	95	57	34	472	25	1538	37	897	837	962	1812	811
Arrive On Green	0.05	0.05	0.05	0.28	0.28	0.28	0.02	0.25	0.25	0.28	0.51	0.51
Sat Flow, veh/h	1774	1074	637	1689	89	2714	1774	3539	1556	3442	3539	1583
Grp Volume(v), veh/h	27	0	43	538	0	1423	22	648	554	1291	482	38
Grp Sat Flow(s),veh/h/ln	1774	0	1711	1778	0	1357	1774	1770	1556	1721	1770	1583
Q Serve(g_s), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	22.4	34.0	37.5	10.3	1.6
Cycle Q Clear(g_c), s	2.0	0.0	3.3	37.5	0.0	37.5	1.6	22.4	34.0	37.5	10.3	1.6
Prop In Lane	1.00		0.37	0.95		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	95	0	91	497	0	1538	37	897	837	962	1812	811
V/C Ratio(X)	0.28	0.00	0.47	1.08	0.00	0.93	0.59	0.72	0.66	1.34	0.27	0.05
Avail Cap(c_a), veh/h	436	0	421	497	0	1538	82	897	837	962	1812	811
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.0	0.0	61.7	48.3	0.0	27.3	65.1	45.8	22.6	48.3	18.5	16.4
Incr Delay (d2), s/veh	1.6	0.0	3.7	64.4	0.0	9.9	14.3	2.9	2.0	160.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	1.6	27.3	0.0	26.1	1.0	11.3	20.9	39.3	5.0	0.7
LnGrp Delay(d),s/veh	62.7	0.0	65.4	112.8	0.0	37.2	79.4	48.7	24.5	209.3	18.6	16.4
LnGrp LOS	E		E	F		D	E	D	C	F	B	B
Approach Vol, veh/h		70			1961			1224			1811	
Approach Delay, s/veh		64.3			57.9			38.3			154.5	
Approach LOS		E			E			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	42.0	38.5		11.7	7.3	73.2		42.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	37.5	34.0		33.0	6.2	65.3		37.5
Max Q Clear Time (g_c+I1), s	39.5	36.0		5.3	3.6	12.3		39.5
Green Ext Time (p_c), s	0.0	0.0		0.3	0.0	3.8		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	87.8
HCM 2010 LOS	F

Notes

Attachment B

Structural Feasibility Study for Modifications to the College Blvd Bridge over the San Luis Rey River prepared by Moffatt & Nichol

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February 20, 2019

The NRF Project Owner, LLC

C/o Integral Communities
2235 Encinitas Blvd, Suite 216
Encinitas, CA 92024
(760) 944-7511

Attn: Ms. Ninia Hammond

Subject: FINAL Report - Structural Feasibility Study for Modifications to the College Blvd Bridge over the San Luis Rey River (Br No. 57C0540), Oceanside, California

Dear Ms. Hammond:

In accordance with our scope of work, we performed a structural feasibility study for proposed modifications to the subject project. We submitted a DRAFT in October 2018. We updated this report based on discussions with the City of Oceanside and comments we received from you. This is the FINAL report.

Executive Summary

We performed a structural feasibility study for the NRF Project Owner, LLC (Client) to evaluate whether the College Blvd Bridge (Br No. 57C0540) can support six vehicular lanes on the existing concrete deck combined with two new 8' wide cantilever paths for bikes and pedestrians. Based on our calculations for the critical items we evaluated, the proposed modifications appear to be structurally feasible. This memo describes the scope and results of our study.

Background

The College Blvd Bridge crosses the San Luis Rey River in the eastern part of the City of Oceanside. At this location, the San Luis Rey River meanders and flows in a southerly direction, so the bridge crosses the river in an east-west orientation. The bridge is shown in the Google Earth image in Figure 1 below.

The bridge was built in 1983 and was originally called the Murray Rd Bridge. It carries four vehicular lanes, two bike lanes and two sidewalks, one on each side. It is 666'-0" long and 77'-9" wide. Note that the as-built plans show only one 7' wide sidewalk on the north side. However, in the current condition the bridge also has a 5' wide sidewalk on the south side. The Caltrans inspection reports from 2011 and early note the bridge with one 2.1 m (7') wide sidewalk. From 2013 on, the reports show one 1.5m (5') and one 2.1 m (7') sidewalk. We do not have as-built plans for the sidewalk addition.

The bridge is a cast-in-place, prestressed (CIP/PS) concrete box girder with four main spans of 116', and two end spans of 101'. It is supported by 2' thick concrete pier walls and seat abutments. The piers and abutments are supported on 70 ton driven piles.

The as-built plans state that the bridge was designed per the 1977 AASHTO LFD Bridge Design Specifications with amendments by Caltrans, and HS20-44 live loading and Permit Truck loading.

Figure 1, Aerial Photo of Bridge

The Caltrans bridge inspection report from July 6, 2015 shows the bridge has an inventory load rating of 32.4 metric tons, and a sufficiency rating of 80.0 out of 100. Per FHWA, an inventory rating of 32.4 metric tons is considered as "Equal to present desirable criteria."

We visited the bridge site on 11/7/2017 to observe existing conditions as part of a previous study. At that time, we did not see anything that would cause concern, or was inconsistent with the 2015 Caltrans inspection report.

Proposed Modifications

The bridge currently does not have enough lanes to accommodate current and projected future traffic demands. The client and the City of Oceanside would like to investigate if the bridge can be modified to carry six lanes of traffic on the concrete deck, and to relocate bicycles and pedestrians to separate paths. The bike and pedestrian paths would be cantilevered from the bridge. A sketch of the proposed bridge modifications is shown in Figure 2 below.

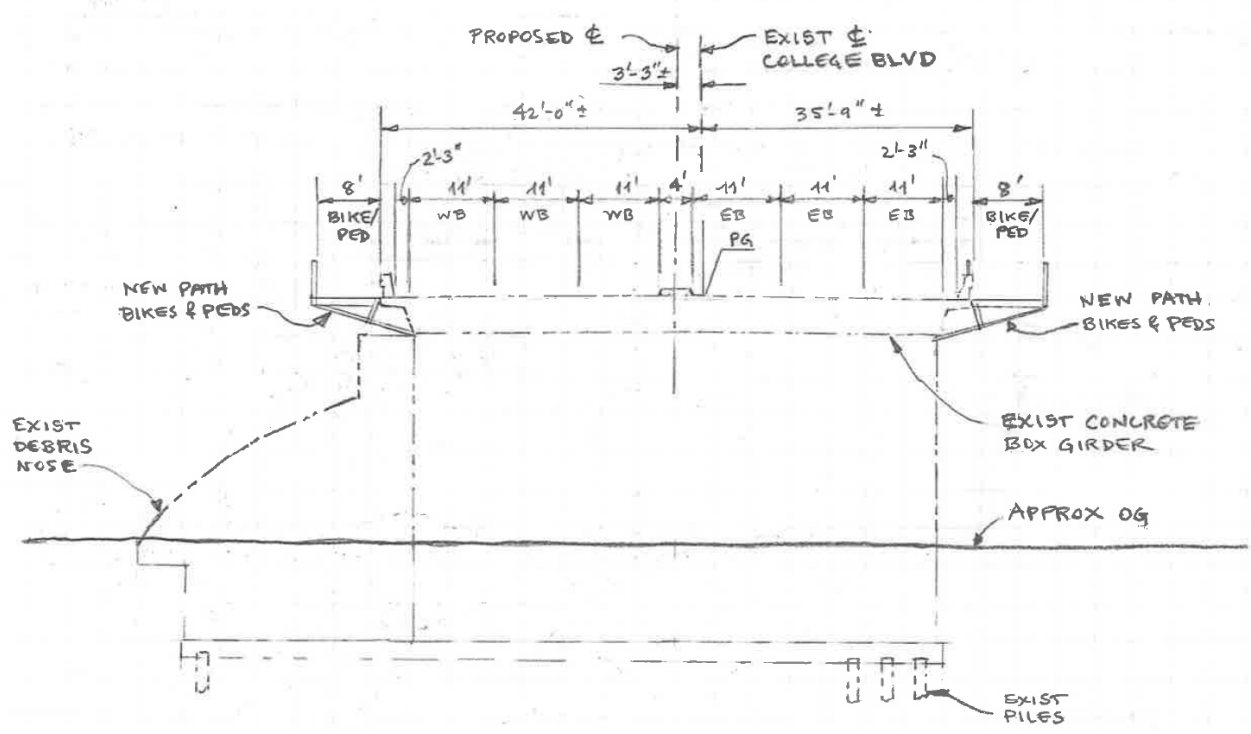
As can be seen in Figure 2, the bridge would carry six 11' wide vehicular lanes. To accomplish this, the existing Type 26 barrier with sidewalk on the north side of the bridge would be removed, and we assume it would be replaced by a crash tested barrier such as a Type 732.

Since the existing Type 50 concrete barrier in the center of the bridge is offset toward the south, we assume it would be replaced, so the six lanes can be centered on the bridge. We assume it would be replaced with a raised median, which is consistent with the approach roadway east of the bridge. A

benefit of the raised median is that it does not require a 2' buffer or "shy distance" on each side like a tall barrier. A 2' wide barrier with 2' buffer on each side has an effective width of 6' compared to 4' for a raised median, so the 2' savings can be included in the lane widths, where it is needed.

Based on a meeting with City staff on October 10, 2018, the City requested two 8' wide shared-use (bike and pedestrian) paths, one on each side. This configuration is shown in Figure 2 below.

The final lane and shoulder widths and transitions in the approach roadways should be evaluated in more detail by the client and traffic engineer and approved by the City. However, any minor changes in lane positions or barrier types, would not be expected to change the results of this structural feasibility study.



TYPICAL SECTION
(Looking east)

Figure 2, Proposed modifications to existing 77'-9" wide bridge. Six vehicular lanes. Two 8' wide bike and pedestrian paths, one per side.

Scope of the Study

In general, the scope of this feasibility study was as follows:

1. Evaluate the proposed modifications in accordance with Caltrans design guidance for widening existing bridges, including Caltrans MTD 9-3, "Widening Existing Bridges," and MTD 20-12, "Seismic Design Criteria for Bridge Widenings."
2. Review an existing example of a cantilevered path.
3. Develop a structural concept for the proposed cantilevered paths.

4. Evaluate the structural feasibility of supporting the proposed cantilever paths from the existing bridge.
5. Evaluate the structural capacity of the existing bridge to carry six vehicular lanes in combination with the proposed cantilever paths.
6. Perform cursory calculations for gravity (dead and live) loads, and the effects of prestressing, creep, shrinkage, and thermal loads on the girders, pier walls and pier foundations.
7. Evaluate the dead load (seismic mass) of the bridge with proposed modifications and compare to existing conditions.
8. Evaluate the bridge using the dimensions, details, and material properties shown on the as-built plans.

Cantilevered Paths

Cantilevered paths have been successfully used on local area bridges. In fact, there is one on the nearby Camino Del Mar Bridge over the San Dieguito River in the City of Del Mar. This path is 5' wide. The current path was built in 2001, when it replaced a previous cantilever path at the same location. A photo of the Camino Del Mar cantilever path is shown in Figure 3 below.

Figure 3, Photo of cantilever path at Camino Del Mar Bridge (looking east.) Photo taken by Caltrans in 2006.

We obtained the as-built plans for the Camino Del Mar bridge and studied the details for the existing cantilever path. The path has a 3" thick wooden (glu-lam) deck supported by a transverse cantilever galvanized steel truss brackets. The steel trusses are spaced at approximately 5' on center along the length of the bridge. They are anchored into the existing concrete bridge with through bolts at the deck level and with drilled in anchor bolts at the face of the concrete girder.

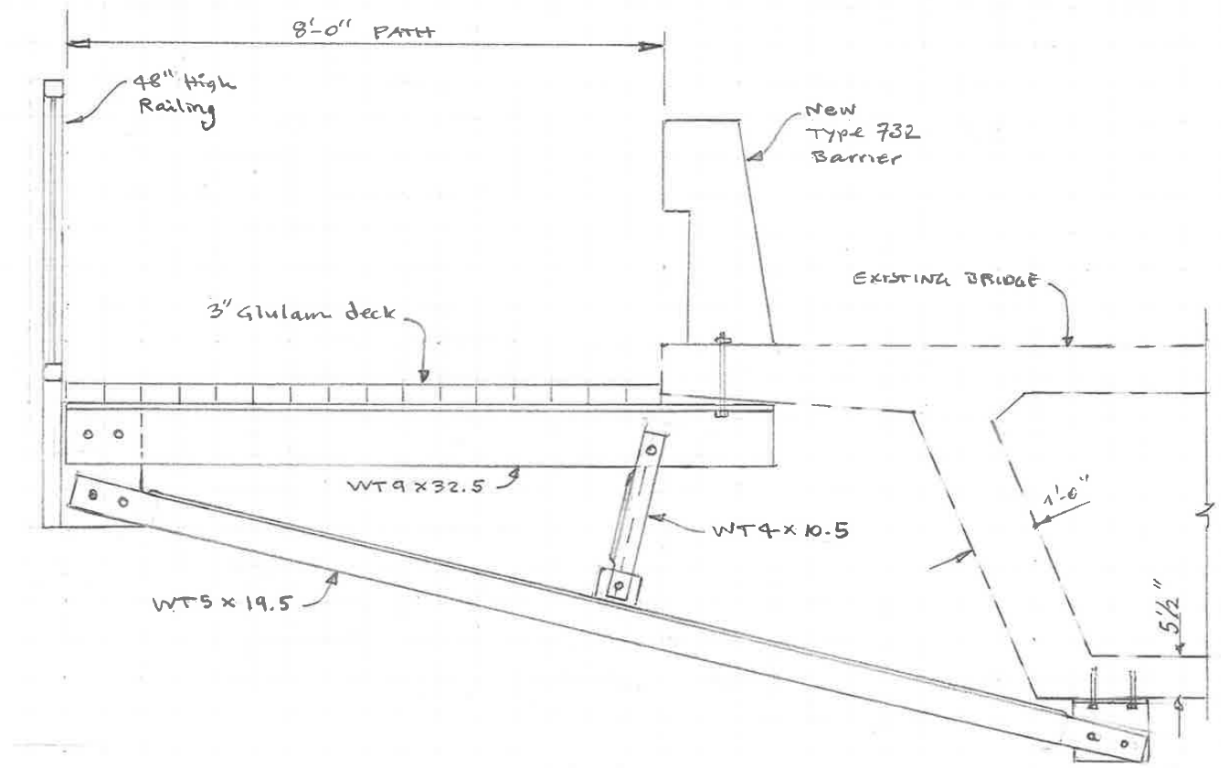
Since we are cantilevering the paths from the existing bridge, we recommend two small cantilevers, rather than one large cantilever. Structurally, this works much better, as each cantilever is lighter, the

new loads are better distributed, and overturning and torsional loads on the existing bridge are greatly reduced.

Based on discussions with the client, the project's traffic engineer, and the City of Oceanside, we propose two 8' wide, mixed-use (bicycle and pedestrian) paths, one per side. This provides a total clear width of 16' for bicycles and pedestrians, which is wider than the AASHTO recommended Class I bike/ped facility.

We developed a structural concept for the 8' wide cantilevered path by studying the details and member sizes of the Camino Del Mar example. Based on the wider path and the flatter angle of the bottom chord of the truss required to conform to the existing College Blvd Bridge, larger members will be required. We performed preliminary stress calculations to get rough sizing of the members. The structural concept for the proposed 8' wide path is shown in Figure 4 below. The 8' wide path on the other side of the bridge would have the same details.

Since the College Blvd Bridge has prestressing strands in the girder webs, we would anchor the bottom chord by drilling into the bottom (soffit) slab.



PROPOSED CANTILVER PATH - TYPICAL SECTION

Figure 4, Structural concept for the proposed 8' wide bike/pedestrian path on the north side of the bridge. The 8' wide path on the south side would have the same details.

Evaluation Methodology

Bridges in California are designed in accordance with the AASHTO Bridge Design Specifications, California Amendments, and the Caltrans bridge design manuals, including the Caltrans Bridge Memo to Designers (MTD). The following Caltrans Memos are relevant for widening an existing bridge:

- Caltrans MTD 9-3, "Widening Existing Bridges."
- Caltrans MTD 20-12, "Seismic Design Criteria for Bridge Widenings."

The current structural code for bridges in California is the AASHTO LRFD Bridge Design Specifications, 6th Edition, with the California Amendments. This new "LRFD" design methodology was first implemented in California around 2007 and has many differences compared the "BDS - LFD" code used before.

Caltrans recognizes that it is not practical to expect an older bridge to comply with all aspects of the newer, and in some cases more stringent, LRFD code, and that the vast majority of bridges designed using the older LFD version of the code have performed well over their design lives. To this end, in MTD 9-3 they provide guidance on which code should be used for each component:

> *Widenings on stand-alone substructure shall be LRFD. The Caltrans Bridge Design Specifications, LFD April 2000 (BDS) may be used for overhangs without girders and elements connected to the existing structure such as closure pours, if the existing structure was designed using BDS. If the widening shares support, such as cantilevering the deck, slab, and/or bent cap off of the existing structure, BDS and its HS20 vehicular live load may have to be used in order to maintain an acceptable structure depth.*

In accordance with Caltrans MTD 9-3, we used the Caltrans Bridge Design Specifications, LFD April 2000, as the controlling code for checking the existing bridge components for the proposed modifications.

We used the VBridge program (v2.7.0) to analyze the bridge superstructure and piers for the effects of dead loads, live loads, prestressing, concrete creep and shrinkage and thermal loads. We developed this analysis model from the details shown on the as-built plans and included the proposed modifications. We used the VBridge results with hand calculations for other design checks.

We checked the stresses in the existing bridge overhangs using the working stress method to evaluate if they can support the increased loads from the cantilever paths. From the as-built plans, the existing overhangs are 11" thick where they meet the girder, and the reinforcing bars are #5 transverse bars (tot. 3 bars every 10") along the bridge. Based on a working stress design check, the allowable stresses in the existing rebar and concrete are not exceeded.

Summary of Findings

We prepared calculations to investigate if the existing bridge has the structural capacity to support the following loads:

1. Existing dead loads (with modified cross section.)
2. Six lanes of HS20 vehicular live load
3. One lane of P13 Permit Truck

4. Added dead load from proposed cantilever bike/pedestrian paths
5. Added live load from the proposed bike/pedestrian paths

We evaluated the following components of the bridge. The demands and capacities shown are for the controlling load cases at the controlling locations.

Table 1, Summary of Results

Structural Component	Action (Limit State)	Demand	Capacity	Controlling Load & Location	Capacity/ Demand
Deck overhangs	Flexure (Service)	Concrete stress, f_c = 851 psi	Allowable stress, f_a = 1200 psi	Service I. Bottom fiber.	C/D = 1.41 OK
Deck overhangs	Flexure (Service)	Steel stress, f_s = 15,207 psi	Allowable stress, f_a = 20,000 psi	Service I. Top fiber.	C/D = 1.31 OK
Superstructure	Flexure (Service)	P_{jack} = 12,491 kips	P_{jack} = 12,700 kips	Service I. Top fiber at Pier 4.	C/D = 1.02 OK
Superstructure	Neg Moment (Strength)	M_u = -53,047 k-ft	ϕM_n = -64,527 k-ft	Group I. Face of Pier 4.	C/D = 1.22 OK
Superstructure	Pos Moment (Strength)	M_u = 43,476	ϕM_n = 60,153 k-ft	Group I. 0.4 Span 1, and 0.6 Span 6.	C/D = 1.38 OK
Superstructure	Shear (Strength)	V_u = 2192 kips	ϕV_n =2893 kips	Group I. Face of Abutments	C/D = 1.32 OK
Pier walls	Flexure (Strength)	M_u = 6200 k-ft	ϕM_n =15,010 k-ft	Group IV. Top of Piers 2 and 6.	C/D = 2.42 OK
Pier walls	Shear (Strength)	V_u = 198 kips	ϕV_n =1770 kips	Group IV. Piers 2 and 6.	C/D = 8.94 OK
Pier walls	Bearing (Strength)	P_u = 5862 kips	ϕP_n = 30,942 kips	Group I_H. Pier 4.	C/D = 5.28 OK
Pier walls	Pins (Strength)	V_u = 198 kips	ϕV_n =10,355 kips	Group IV. Piers 2 and 6.	C/D = 52.3 OK
Pier pile caps	Flexure (Strength)	T_u =112 kips	ϕT_n =147 kips	Group I_H. Pier 4.	C/D = 1.31 OK
Pier piles	Compression (Service)	P_u = 64 tons	P_n = 70 tons	Service I. Pier 5 piles.	C/D = 1.09 OK

Observations

Based on the results of our evaluation we offer the following observations.

1. **Existing overhangs.** With the existing reinforcement, the relatively thick and short overhangs have adequate capacity to support the proposed cantilever paths.
2. **Superstructure.** The existing superstructure has adequate prestressing and reinforcing to support the proposed modifications. All prestress and reinforcing checks passed. Part of the reserve capacity can be attributed to a conservative assumption for the friction coefficient for

the prestressing. According to the notes on the plans, a value of 0.25 was used. Based on the 2000 LFD code, which is the basis of our structural assessment per Caltrans MTD 9-3, a value of 0.20 is appropriate for this length of bridge. This is also the value used in the current LRFD code, which would be used for a new bridge.

3. **Pier walls.** The existing pier walls have adequate strength to support the proposed modifications. Based on our calculations, the pier walls have approximately 2.4 times the required flexural strength. The controlling flexural demands on the pier walls are caused by shortening of the bridge superstructure under the combined effects of concrete creep, shrinkage and thermal loads, where the end piers are pulled toward the center of the bridge. The demands on the piers from the proposed modifications are relatively minor in comparison. We attribute this reserve capacity to the probable use of gross section properties for the pier walls, which was a common practice when the bridge was designed. The use of gross section properties leads to an overestimate of the bending stiffness and increased bending moment demands. We performed a study where we used gross section properties for the piers and get a similar amount of reinforcing required as shown in the as-built plans. However, based on current practice, we know effective section properties are appropriate and result in more accurate demands.
4. **Pier piles caps.** With the existing reinforcement, the stocky pile caps have adequate capacity to support the small increase in loads from the proposed bridge modifications.
5. **Pier piles.** Based on a nominal service level capacity of 70 tons for the existing pier piles, they have adequate capacity to support the proposed modifications. We are assuming the actual service capacity of the existing piles is 70 tons as stated on the plans. However, the Client should have a qualified geotechnical engineer confirm this assumption.
6. **Seismic.** The proposed cantilever paths are very light and increase the seismic mass of the bridge by less than 3%. This is much less than the 20% limit allowed per Caltrans MTD 20-19, so the proposed project would be considered a minor modification per Caltrans. Since no modifications to the piers or foundations are proposed, and no new faults or other significant seismic changes have been found near the bridge, per Caltrans practice, seismic analysis is not required. We reviewed the as-built plans, and seismic loading for this area using the Caltrans ARS on-line tool, and do not see any seismic issues, and agree with the Caltrans guidance that a seismic evaluation is not required.

Cost of the Proposed Modifications

Estimating the cost of the proposed modification was not part of our scope of work. However, we can develop a planning study and cost estimate as part of a future scope of services.

In the short-term, we can provide the bid results for Camino Del Mar project to the Client as a point of reference. However, the Client should be cautioned that the cost of the Camino Del Mar project may not adequately reflect the cost of the proposed College Blvd project, due to differences in the scope of

work, and the difficulty in comparing projects bid at significantly different times and with differing site and market conditions.

When preparing a budget for the project, the Client should consider all project costs including other site work, reconfiguration of the intersection and approach roadways, relocation of utilities, traffic control, signing and striping, right of way costs, environmental permitting, monitoring and mitigation, and soft costs such as engineering studies, design, engineering and construction management and inspection, and other costs, which may be applicable.

Limitations

For this study, we performed the work described above in the *Scope of the Study*. This included structural checks for the critical items shown in Table 1. Per our scope of work, we did not evaluate the abutments, or other structural components not listed in Table 1.

We relied on the dimensions, details and material properties shown on the as-built bridge plans. We did not confirm these through field measurements or material testing.

In accordance with Caltrans MTD 20-12, "Seismic Design Criteria for Bridge Widenings," since the increase in seismic mass was less than 3%, well below the 20% limit, we did not perform seismic calculations, or evaluate the bridge for liquefaction, lateral spreading, or other conditions.

Since the river channel below the bridge consists of grouted rip-rap, and no new piers or channel modifications are proposed, we did not evaluate the bridge for scour.

While the evaluation of key components is appropriate for a feasibility study, a comprehensive set of calculations should be performed during the final design phase of the project.

Conclusions

Based on the results of our calculations for the critical items shown above, the proposed modifications appear to be structurally feasible.

Closing

Please feel free to call if you have questions or would like to discuss.

Best regards,

Moffatt & Nichol

Tony Sánchez, PhD, PE
Bridge Services Manager