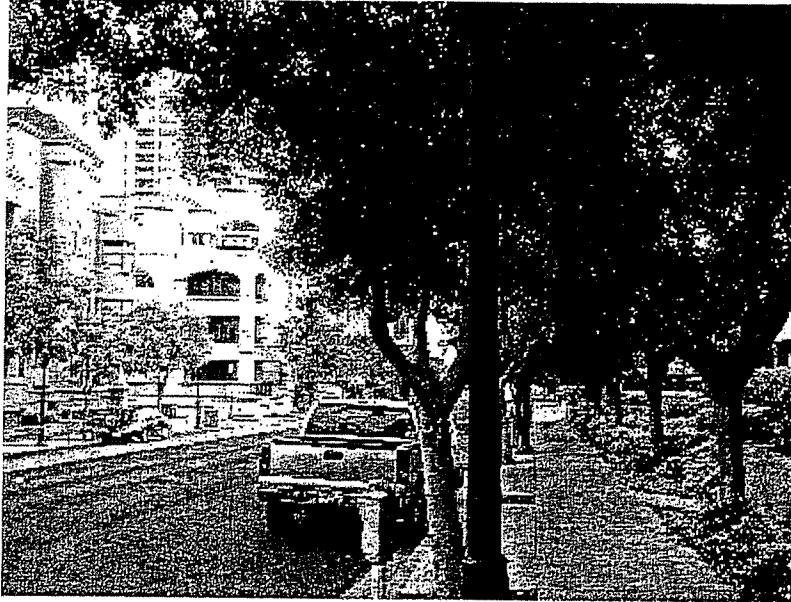


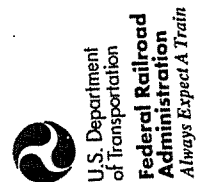
SAN DIEGO QUIET ZONE "G" STREET ONE-WAY CONVERSION TRAFFIC STUDY



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September 2005

1.0 INTRODUCTION

The purpose of this study is to determine the effects of converting "G" Street in downtown San Diego from a two-way street to a one-way eastbound street within the study area. The scope of the study is the area circumscribed by Harbor Drive on the west, Harbor Drive and Market Street on the south, Front Street to the east, and Broadway to the north. A map of downtown San Diego with the study area outlined is shown in Figure 1. Three separate one-way scenarios for "G" Street are evaluated, with Harbor Drive on the west being the starting point for each scenario. The first scenario envisions "G" Street as a one-way road only to Columbia Street, while the second scenario continues the one-way segment a block further to the east to State Street. The third scenario envisions "G" Street as a one-way eastbound street all the way to Front Street where the existing one-way segment begins. If adopted, this scenario would effectively make "G" Street a one-way eastbound roadway through its entire length from Harbor Drive to SR-94 when G Street is extended from Pacific Highway to Harbor Drive.

2.0 ROADWAY DESCRIPTIONS

Each roadway in the study area has sidewalks on both sides of the road. Crosswalks are generally provided in both directions at every street corner, although a few exceptions do exist. There are no designated on-street bicycle lanes, but an off-street bicycle/pedestrian path exists along the railroad tracks from Kettner Boulevard southeast to the end of the study area. With the exception of the southeast portion of Harbor Drive (which runs northwest-southeast), all of the roadways in the study area have a strict north-south or east-west orientation. A combination of metered and non-metered on-street parking, loading zones, and unregulated curbside parking is present within the area. More detailed descriptions of key roadways in the study area are provided in the following paragraphs.

Broadway is the main east-west roadway in the central downtown area, running from the east end of downtown to its western terminus at Harbor Drive. It has two traffic lanes in each direction and a raised median. Broadway also carries heavy pedestrian traffic, particularly at its western end, where a cruise ship terminal and a commuter rail/light rail train station combine to generate significant pedestrian traffic. On-street metered parking is available along most segments of Broadway.

G Street currently is a three-lane road from Pacific Highway to Front Street, with two lanes in the eastbound direction and one westbound lane west of Front Street. East of Front Street, it is one-way to the east with three lanes of traffic. Metered parking is generally present on both sides of the road throughout the length of this road. At the eastern edge of the downtown area, "G" Street provides a direct link to SR-94, which feeds the rapidly-growing suburbs southeast of San Diego. This report evaluates the impacts of converting "G" Street from two-way to one-way with two lanes in the eastbound direction only. The space freed up by removal of the westbound traffic lane would be used to install diagonal parking stalls on the north side of the road.

Harbor Drive travels in a north-south direction along the western waterfront before curving to the east from Seaport Village to Market Street. It then curves to the southeast past several hotels, the San Diego Convention Center, and Petco Park baseball stadium. East of Pacific Highway, Harbor Drive has three lanes of traffic in each direction, with a raised landscaped median in the center. No parking is allowed along the portion of this roadway within the study area.

Market Street begins in the west at its intersection with Harbor Drive and runs eastward through southeast San Diego. In the study area, it has two lanes of traffic in the east- and westbound directions and a raised median.

Pacific Highway begins at Seaport Village on the south and travels northward along the western edge of downtown towards points northwest of downtown. In the study area south of Broadway, it carries three lanes of traffic in each direction, with a raised median for part of its length. Parking (both metered and non-metered) is present in some areas and prohibited in others.

Kettner Boulevard is a two-way street with one traffic lane in both the north- and southbound directions between Broadway and Seaport Village. On-street metered parking is allowed in most areas within the study area.

Columbia Street is a small two-way road with one traffic lane in each direction between "G" Street and Market Street. A mixture of metered parallel and diagonal parking exists on this street. This short one-block section of roadway is used mostly for residential access. Another section of Columbia Street also exists north of Broadway but is not continuous with the section within the study area in the north and Market Street in the south.

State Street is a two-way road with one traffic lane in each direction between Broadway in the north and Market Street in the south. North of Broadway, State Street is one-way in the northbound direction. On-street metered parking is plentiful on this road.

Union Street has one traffic lane in the north- and southbound directions in the study area. It begins at Interstate 5 in the north, ends at Island Avenue to the south, and has abundant metered on-street parking.

Front Street is a one-way southbound street with three through lanes. The downtown portion begins at Interstate 5 in the north and ends at Harbor Drive at its southern terminus. Front Street has curbside metered parking and loading zones.

3.0 STUDY INTERSECTIONS

Traffic volumes were counted on May 11-12, 2005, for all movements at the following twelve intersections. These volumes are illustrated in Figure 2. Figure 3 shows the existing lane geometry at these intersections.

- | | |
|-------------------------------|------------------------------------|
| 1. Broadway/Pacific Highway | 7. G Street/Union Street |
| 2. Broadway/Kettner Boulevard | 8. G Street/Front Street |
| 3. Broadway/State Street | 9. Harbor Drive/Pacific Highway |
| 4. G Street/Pacific Highway | 10. Harbor Drive/Kettner Boulevard |
| 5. G Street/Kettner Boulevard | 11. Harbor Drive/Market Street |
| 6. G Street/State Street | 12. Market Street/State Street |

Generally, visible delay and congestion are greater in the evening peak hour than during the morning peak. The most visible queuing occurs at the Broadway/Kettner intersection when trains come through and the gates come down and at the Harbor Drive intersections with Kettner Boulevard and Market Street. Along Harbor Drive, the eastbound traffic consistently backs up from Market Street through the Kettner Boulevard intersection.

4.0 "G" STREET ACCESS POINTS

Currently, the only part of "G" Street with direct access from driveways is the segment between Pacific Highway and Kettner Boulevard. On this segment, there is an exit from a parking structure serving a hotel to the south as well as two accesses to adjacent residential housing complexes. Although there is no direct access to "G" Street between Kettner Boulevard and Front Street, there are numerous accesses on the streets that cross "G" Street, such as Columbia Street, State Street, and Union Street. Thus, the conversion of "G" Street to one-way eastbound from Harbor Drive to Columbia Street, State Street, or Front Street will likely affect routing choices for those who currently travel into the neighborhood from the east. A conversion only to Columbia Street would be least disruptive because those who live in the residential complexes with accesses onto Columbia Street and State Street would still be able to travel to their homes either from the east or the west using the same routes they currently use.

5.0 EXISTING LEVEL OF SERVICE

Level of Service (LOS) is a qualitative measure describing operational traffic conditions and their perception by motorists. A Level of Service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and delay. There are six levels of service describing these conditions, ranging from A to F, which have been standardized by the Transportation Research Board. LOS A represents a free-flowing traffic condition where motorists are affected very little by other motorists, and the level of comfort and convenience to the motorist is excellent. LOS F is characterized by congested conditions. Motorists have little if any freedom to choose speeds or lanes of travel, and experience discomfort, inconvenience, and long delays. Table 1 shows the Level of Service criteria for signalized intersections and Table 2 presents similar information for stopped movements at unsignalized intersections.

Table 1 LOS Criteria for Signalized Intersections

Level Of Service	Control Delay Per Vehicle (In Seconds)
A	< 10
B	> 10 and < 20
C	> 20 and < 35
D	> 35 and < 55
E	> 55 and < 80
F	> 80

Table 2 LOS Criteria for Stopped Movements at Unsignalized Intersections

Level Of Service	Control Delay Per Vehicle (In Seconds)
A	< 10
B	> 10 and < 15
C	> 15 and < 25
D	> 25 and < 35
E	> 35 and < 50
F	> 50

Synchro software was used to analyze the current LOS at the study intersections. Signal timing and phasing information was obtained directly from the City of San Diego. Table 3 summarizes the existing LOS at each of the twelve locations. All of the intersections currently operate at LOS C or better during both peak hours except for the Broadway/Kettner intersection, which operates at LOS D during the p.m. peak hour. This intersection is frequently affected by the railroad gates and has large traffic volumes relative to the available lane capacity. Eight of the twelve intersections exhibit better LOS in the morning peak versus the evening.

Table 3 Year 2005 Peak Hour LOS Summary

Intersection	Time Period	2005	
		Delay (sec/veh)	LOS
Broadway / Pacific Highway	AM	22.0	C
	PM	23.9	C
Broadway / Kettner Boulevard	AM	20.6	C
	PM	25.8	C
Broadway / State Street	AM	11.4	B
	PM	9.5	A
G Street / Pacific Highway ¹	AM	10.4	B
	PM	9.7	A
G Street / Kettner Boulevard	AM	18.3	B
	PM	18.7	B
G Street / State Street	AM	12.3	B
	PM	11.3	B
G Street / Union Street ²	AM	8.7	A
	PM	12.3	B
G Street / Front Street	AM	12.2	B
	PM	13.2	B
Harbor Drive / Pacific Highway	AM	27.1	C
	PM	27.2	C
Harbor Drive / Kettner Boulevard	AM	32.2	C
	PM	39.0	D
Harbor Drive / Market Street	AM	16.9	B
	PM	22.3	C
Market Street / State Street ³	AM	10.3	B
	PM	9.4	A

¹ Delay and LOS for the westbound stopped movements.

² Delay and LOS for all directions at the four-way stop.

³ Delay and LOS for the southbound stopped movements.

6.0 "G" STREET ONE-WAY SCENARIO DESCRIPTIONS

Three separate one-way eastbound scenarios were evaluated for "G" Street. The first scenario assumes conversion of "G" Street to one-way traffic from Pacific Highway to Columbia Street, while the second scenario would result in one-way traffic from Pacific Highway to State Street. The final scenario assumes

one-way traffic from Pacific Highway to Front Street. When redevelopment of the naval property between Pacific Highway and Harbor Drive occurs "G" Street will be extended westward to Harbor Drive. Since "G" Street is already one-way in the eastbound direction east of Front Street, this final scenario would effectively result in "G" Street becoming a one-way eastbound roadway from Harbor Drive to SR-94.

All three one-way conversion scenarios would entail two traffic lanes in the eastbound direction. The space currently occupied by metered on-street parking and the westbound traffic lane would be replaced with diagonal parking on the north side of the roadway. One of the concerns of converting a street from two-way to one-way operation is that motorists may travel faster. However, in this case the westbound traffic lane and parallel on-street parking will be replaced by diagonal parking which will have a traffic calming effect. The speed of traffic on "G" Street is not expected to change significantly. Additionally, the diagonal parking is expected to increase the available parking supply.

Traffic that would otherwise continue to travel westbound on "G" Street if the two-way character of the street is retained was redistributed to other roadway movements, primarily Broadway, Market Street, and the portion of Harbor Drive west of Market Street. Turning movements from side streets onto westbound "G" Street were also redistributed onto adjacent roadways. The major changes to roadway volumes would be increased through traffic on Broadway and Market Street. Some turning movements are expected to increase, while others will decrease.

Figures 4 through 9 show how the existing 2005 traffic was re-distributed for each one-way scenario. Figure 4 shows the changes made from the existing scenario to the first one-way scenario to Columbia Street. Movements that are expected to experience a decrease in traffic are denoted by a "-" sign in front of the numbers. Numbers that do not have a "-" sign are expected to increase as a result of one-way conversion. Figure 5 shows the anticipated total 2005 volumes for each movement at the study intersections based on a one-way conversion of "G" Street from Pacific Highway to Columbia Street.

Figures 6 and 7 show the changes relative to the existing scenario and the volumes anticipated from a one-way conversion to State Street, while Figures 8 and 9 show the same information for a one-way conversion the entire way to Front Street. The differences between the scenarios with one-way conversion to Columbia, State or Front Street are expected to result in relatively minor volume changes at the study intersections.

7.0 YEAR 2005 ONE-WAY SCENARIOS LOS ANALYSIS

The LOS and delay was calculated at each of the study intersections for all three one-way scenarios. Table 4 shows a comparison of the 2005 existing scenario with the first one-way scenario on "G" Street from Pacific Highway to Columbia Street. Delay changes are shown in the last column and are generally less than one second per vehicle. Tables 5 and 6 present the delay and LOS for the one-way scenarios to State Street and Front Street, respectively compared to the 2005 existing conditions. The conversion of the "G" Street to one-way eastbound is not expected to significantly change the existing level of service at key intersections in the study area for any of the three one-way scenarios.

Table 6 LOS Comparison of 2005 Existing and One-way to Front Scenarios

Intersection	Time Period	2005 Existing		2005 – One-way to Front Street		Delay Change
		Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	
Broadway / Pacific Highway	AM	22.0	C	22.3	C	0.3
	PM	23.9	C	23.8	C	-0.1
Broadway / Kettner Boulevard	AM	20.6	C	19.6	B	-1.0
	PM	25.8	C	26.0	C	0.2
Broadway / State Street	AM	11.4	B	12.8	B	1.4
	PM	9.5	A	9.6	A	0.1
G Street / Pacific Highway ¹	AM	8.3	A	8.4	A	0.1
	PM	8.7	A	8.8	A	0.1
G Street / Kettner Boulevard	AM	18.3	B	16.7	B	-1.6
	PM	18.7	B	19.8	B	1.1
G Street / State Street	AM	12.3	B	12.6	B	0.3
	PM	11.3	B	11.5	B	0.2
G Street / Union Street ²	AM	8.7	A	8.6	A	-0.1
	PM	12.3	B	12.2	B	-0.1
G Street / Front Street	AM	12.2	B	12.2	B	0.0
	PM	13.2	B	13.2	B	0.0
Harbor Drive / Pacific Highway	AM	27.1	C	31.2	C	4.1
	PM	27.2	C	28.5	C	1.3
Harbor Drive / Kettner Boulevard	AM	32.2	C	41.2	D	9.0
	PM	39.0	D	34.6	C	-4.4
Harbor Drive / Market Street	AM	16.9	B	19.5	B	2.6
	PM	22.3	C	22.5	C	0.2
Market Street / State Street ³	AM	10.3	B	10.5	B	0.2
	PM	9.4	A	9.5	A	0.1

¹ Delay and LOS for the southbound left turn movement.

² Delay and LOS for all directions at the four-way stop.

³ Delay and LOS for the southbound stopped movements.

10.0 "G" STREET ONE-WAY SCENARIO DESCRIPTIONS

Three separate one-way eastbound scenarios were evaluated for "G" Street. The first scenario assumes conversion of "G" Street to one-way traffic from Harbor Drive to Columbia Street, while the second scenario would result in one-way traffic from Harbor Drive to State Street. The final scenario assumes one-way traffic from Harbor Drive to Front Street. Traffic that would otherwise continue to travel westbound on "G" Street if the two-way character of the street is retained was redistributed to other roadway movements, primarily Broadway, Market Street, and the portion of Harbor Drive west of Market Street. Turning movements from side streets onto westbound "G" Street were also redistributed onto adjacent roadways. The major changes to roadway volumes would be increased through traffic on Broadway and Market Street. Some turning movements are expected to increase, while others will decrease.

12.0 CONCLUSIONS

- The only part of "G" Street with direct access from driveways is the segment between Pacific Highway and Kettner Boulevard. However, there are numerous accesses on the streets that cross "G" Street, such as Columbia Street, State Street, and Union Street. Thus, the conversion of "G" Street to one-way eastbound from Harbor Drive to Columbia Street, State Street, or Front Street will affect routing choices for those who currently travel into the neighborhood from the east. A conversion only to Columbia Street would be least disruptive from a convenience standpoint, with a conversion to Front Street being the most disruptive.
- All of the intersections currently operate at LOS C or better during both peak hours except for the Broadway/Kettner intersection, which operates at LOS D during the p.m. peak hour. Observations indicate that delay and congestion are greater in the evening peak hour than during the morning peak. The most visible queuing occurs at the Broadway/Kettner, Harbor/Kettner, and Harbor/Market intersections.
- The conversion of "G" Street to one-way eastbound traffic from Pacific Highway to Columbia Street, State Street, or Front Street (the three scenarios evaluated in this study) will not significantly change the peak hour level of service at key intersections in the study area based on existing 2005 traffic volumes.
- Future plans include extending "G" Street westward to Harbor Drive. A signal was assumed to be in place at this intersection in 2030 and also at the "G" Street/Union Street intersection. It was also assumed for the base case that the new segment of "G" Street would match the existing cross-section – two travel lanes in the eastbound direction and one westbound lane. Additionally, plans include the closure of Union Street to through traffic between Broadway and "F" Street. "E" Street would be closed between Front Street and State Street.
- Traffic growth is forecast to cause six of the twelve intersections to operate at LOS E or F during at least one of the peak hours for the 2030 Base scenario.
- All three one-way scenarios are expected to result in decrease in delay for 14 of the 24 possible intersection/peak hour combinations, increase in delay for 9 combinations, and no change at one combination. The magnitude of the changes in delay (relative to the 2030 Base scenario) is expected to be similar for all alternatives, but it will be slightly less for the one-way to Front scenario as compared to the other two one-way scenarios.
- The conversion of "G" Street to one-way eastbound is not expected to result in a significant change in vehicular speeds, because of the traffic calming effect of the proposed diagonal parking on the north side of the road.