



PARKING STUDY

**Downtown Main Street Streetscape
Broken Arrow, Oklahoma**

**Prepared for:
R.L. Shears Company, P.C.**

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**Prepared by:
Traffic Engineering Consultants, Inc.**

Jon Eshelman

**Jon H. Eshelman, P.E., PTOE
Oklahoma P.E. #10253
CA # 1160**



Date



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1.0 INTRODUCTION

Traffic Engineering Consultants, Inc. (TEC) was retained to conduct a parking study in the Downtown District in Broken Arrow as a part of the Main Street Streetscape planning project. The study area included:

Main Street from College to Ft. Worth
Broadway from the alley west of Main to the alley east of Main
Commercial from Ash to 1st Street
Dallas from the alley west of Main to the alley east of Main
El Paso from the alley west of Main to the alley east of Main

The purpose of the study was to inventory the current on-street parking spaces and to collect data related to the occupancy and duration of parking on a typical weekday. The parking data was collected between the hours of 9:00 a.m. and 5:00 p.m. on Thursday, June 7, 2012. The weather on that day was sunny and warm. Separate data was collected for each of the 26 block “faces” in the study area so each side of each block could be evaluated separately.

2.0 STUDY METHODOLOGY

2.1 *Parking Space Inventory*

Survey maps from the recent topographical survey of the Downtown District were taken to the field for a physical review and inventory of the marked and unmarked parking spaces currently provided. **Figures 1-10** illustrate all the current angle and parallel parking spaces in each block of the study area. “Reserved for Handicapped” spaces are identified with an “HC”.

There are a total of 274 parking spaces in the study area. The five blocks of Main Street have 139 spaces which account for 51% of the total.

There are “2-Hour Parking Limit” signs posted fairly conspicuously on both sides of Main Street for the full 5-block length. There are “2-Hour Parking Limit” signs very obscurely posted on one block of Commercial east and west of Main and one block of Dallas east and west of Main Street.

There are 15 designated “Handicapped” parking spaces, all but two of which are on the side streets.

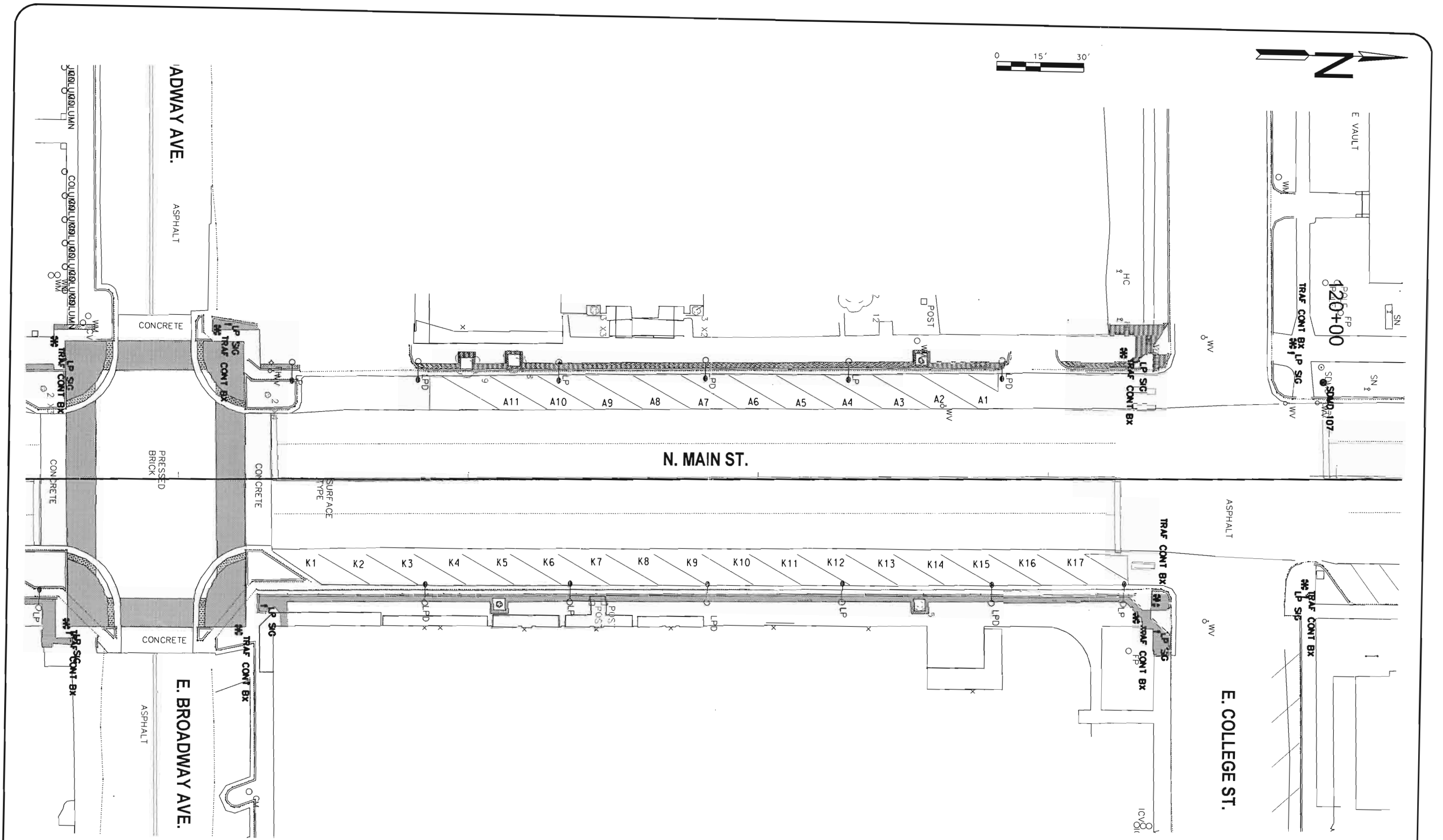


FIGURE 1. CURRENT PARKING
 MAIN STREET
 COLLEGE TO BROADWAY



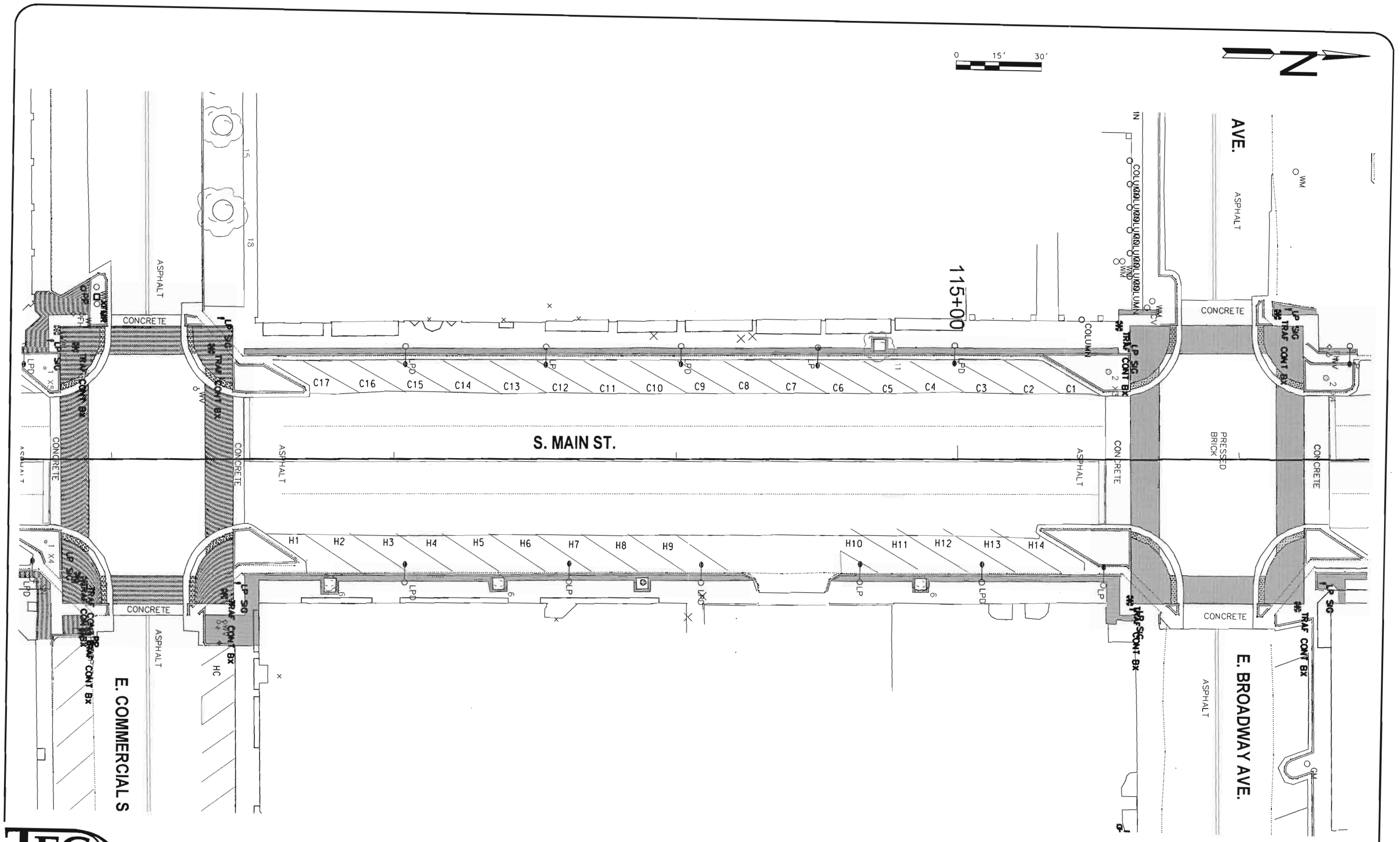


FIGURE 2. CURRENT PARKING
 MAIN STREET
 BROADWAY TO COMMERCIAL



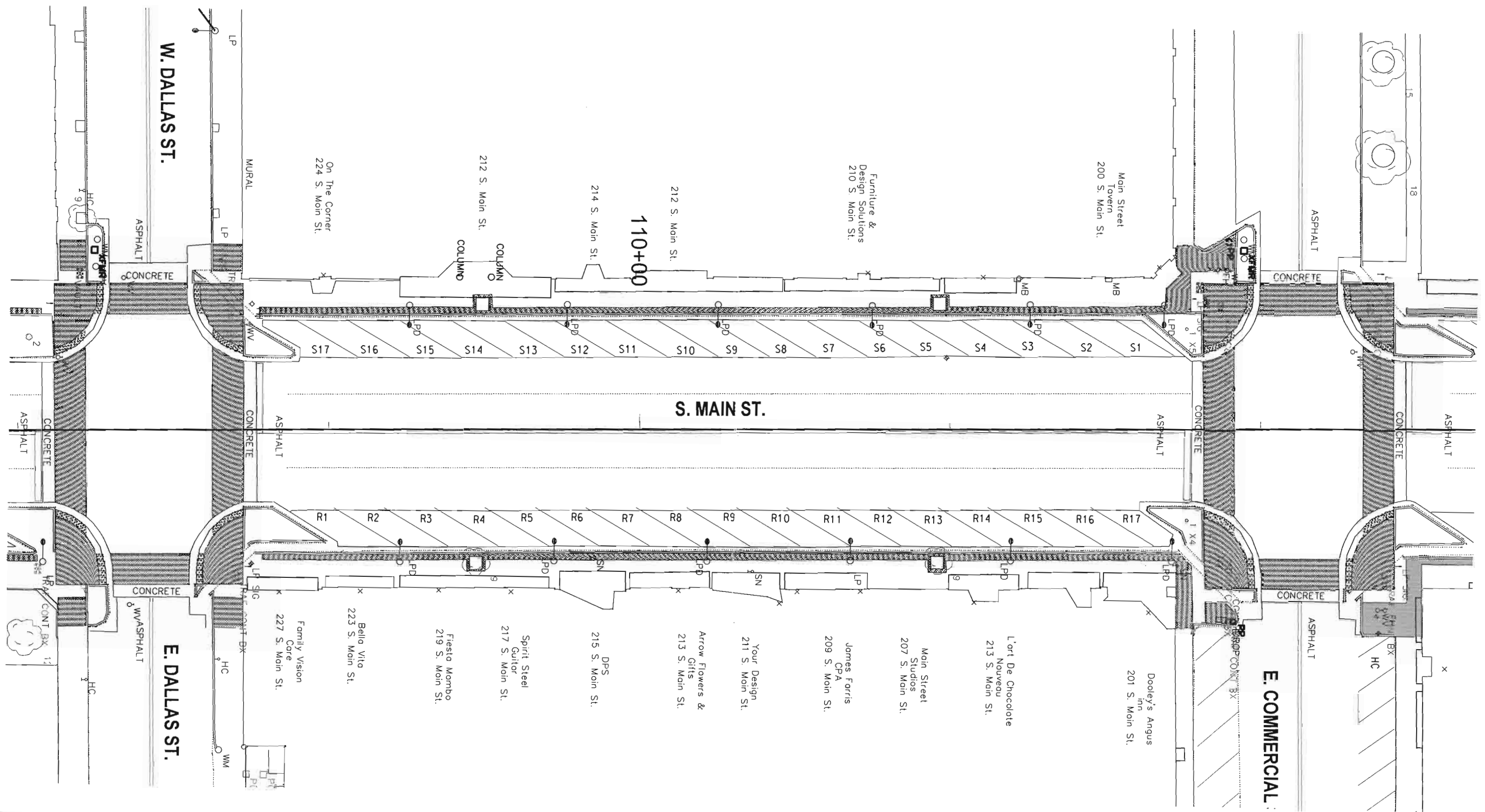
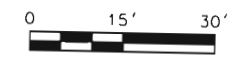


FIGURE 3. CURRENT PARKING
MAIN STREET
COMMERCIAL TO DALLAS



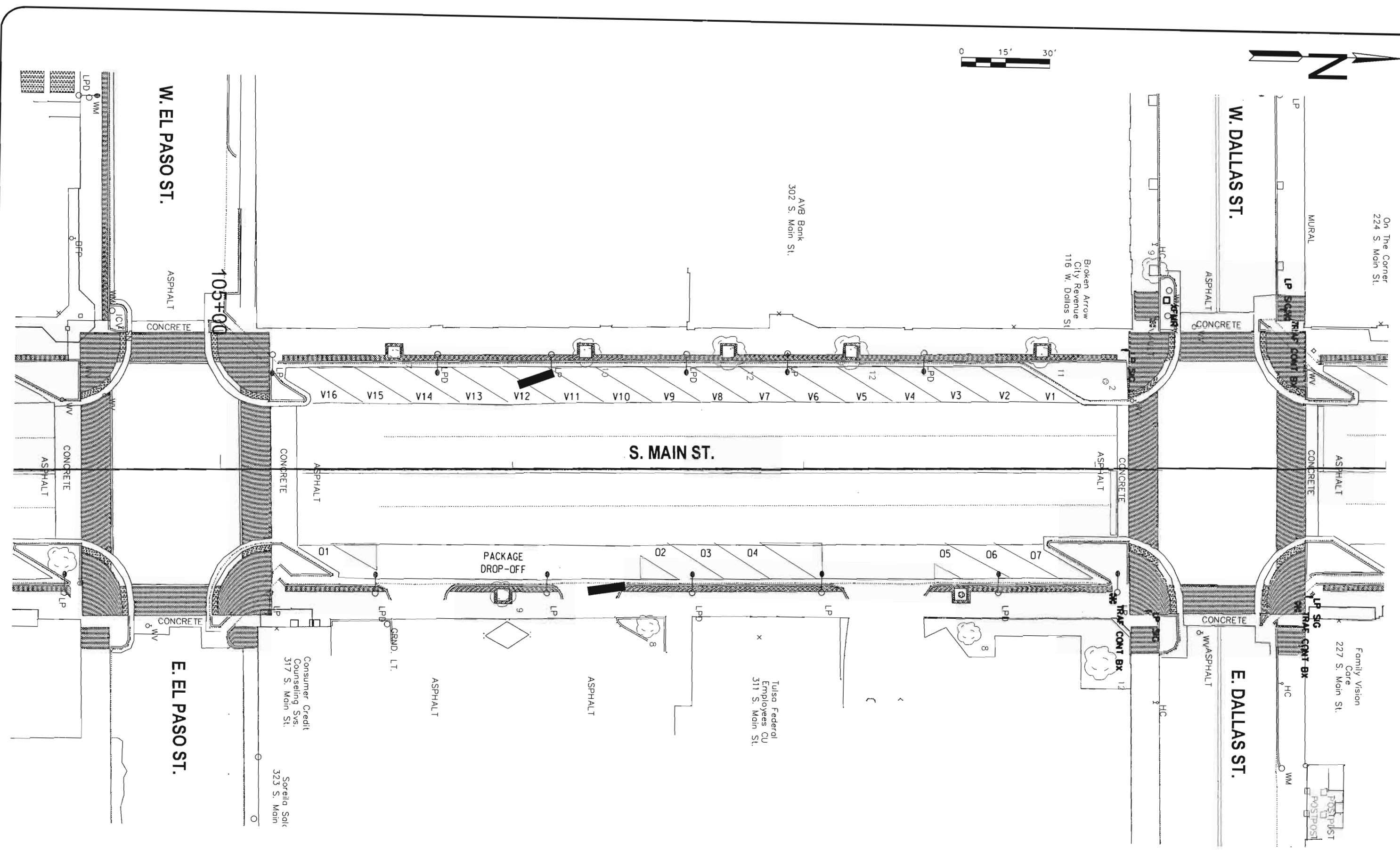


FIGURE 4. CURRENT PARKING
 MAIN STREET
 DALLAS TO EL PASO



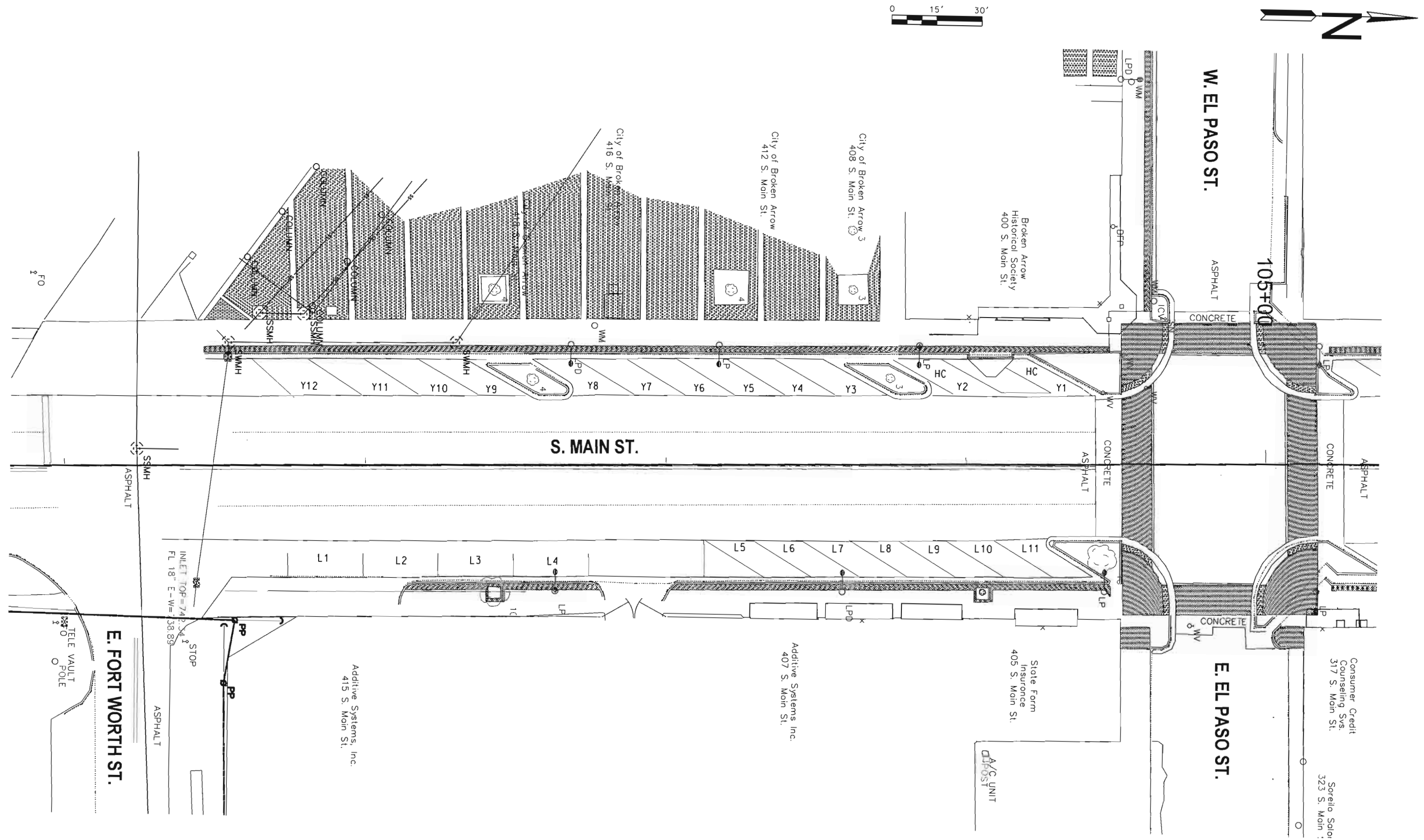


FIGURE 5. CURRENT PARKING MAIN STREET EL PASO TO FT. WORTH

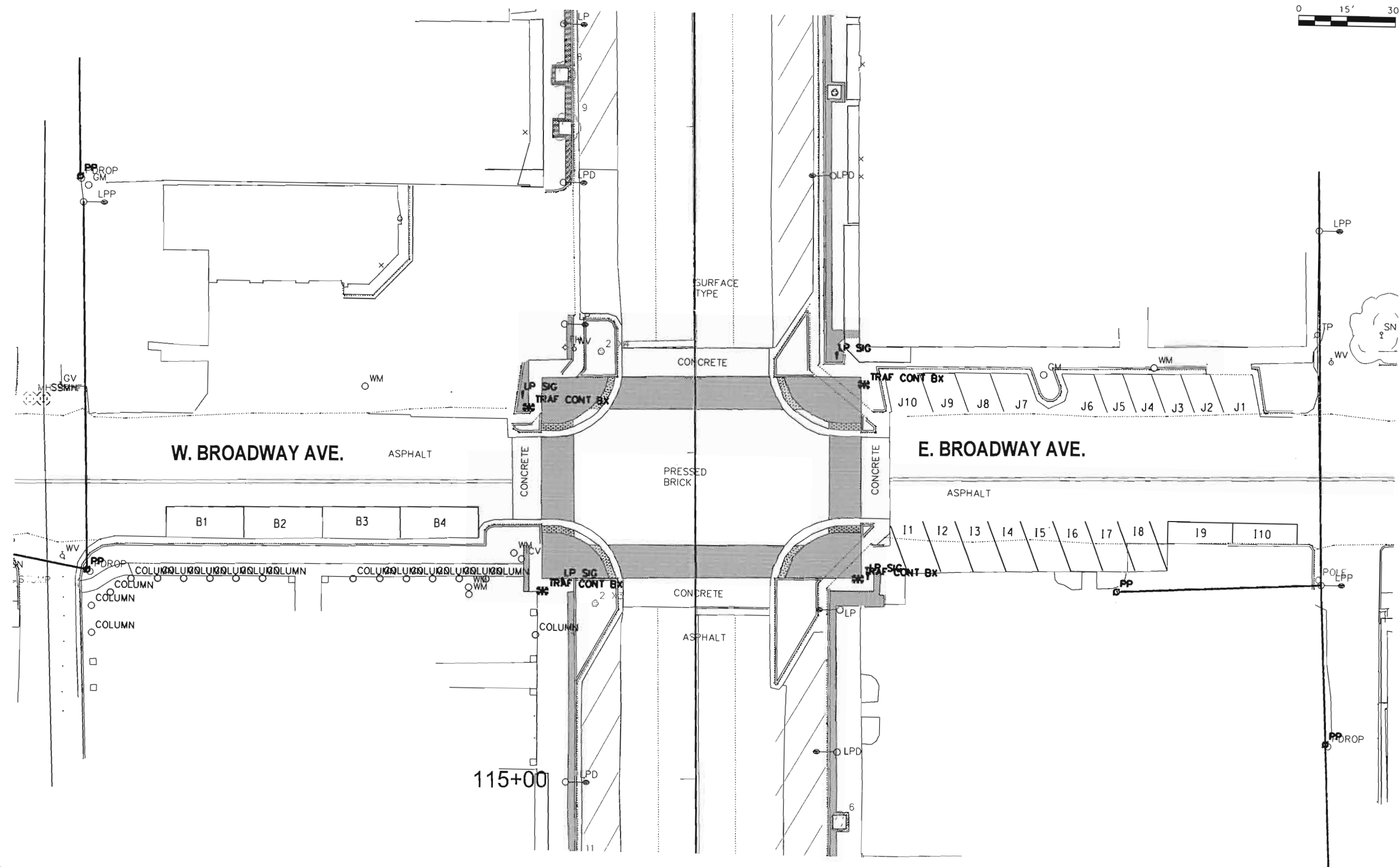


FIGURE 6. CURRENT PARKING BROADWAY

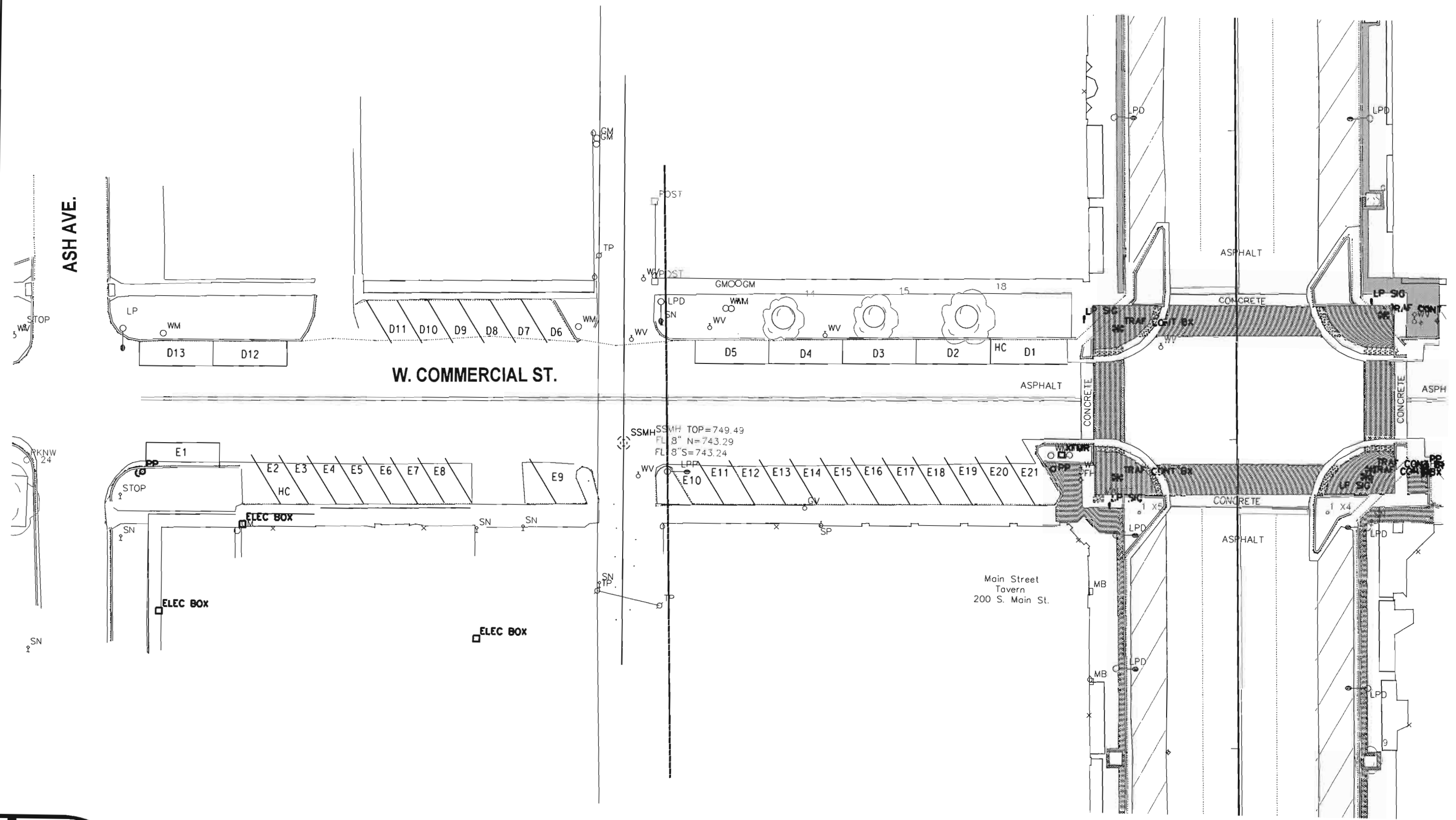
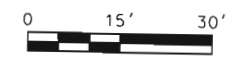


FIGURE 7. CURRENT PARKING W. COMMERCIAL



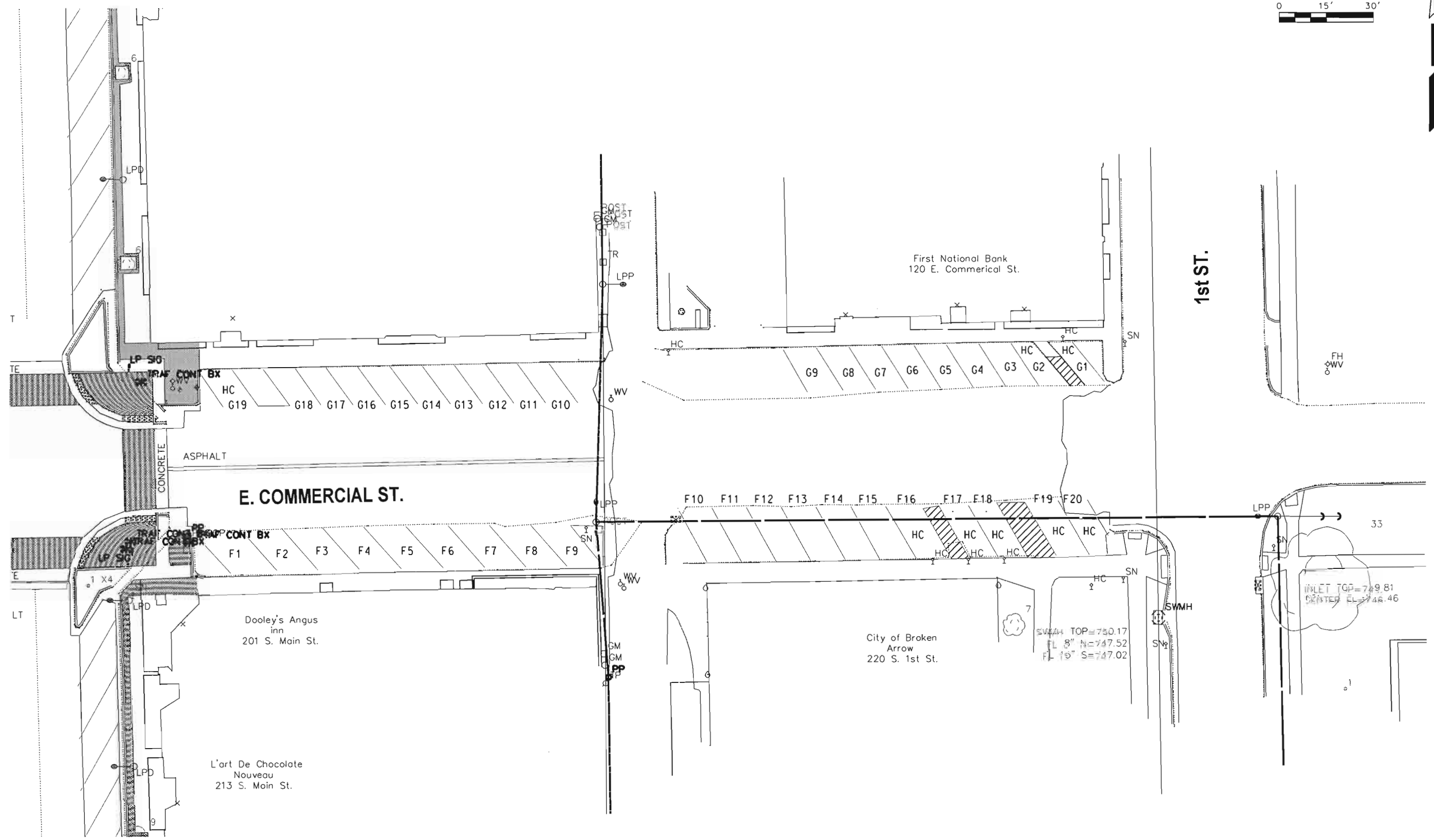


FIGURE 8. CURRENT PARKING E. COMMERCIAL



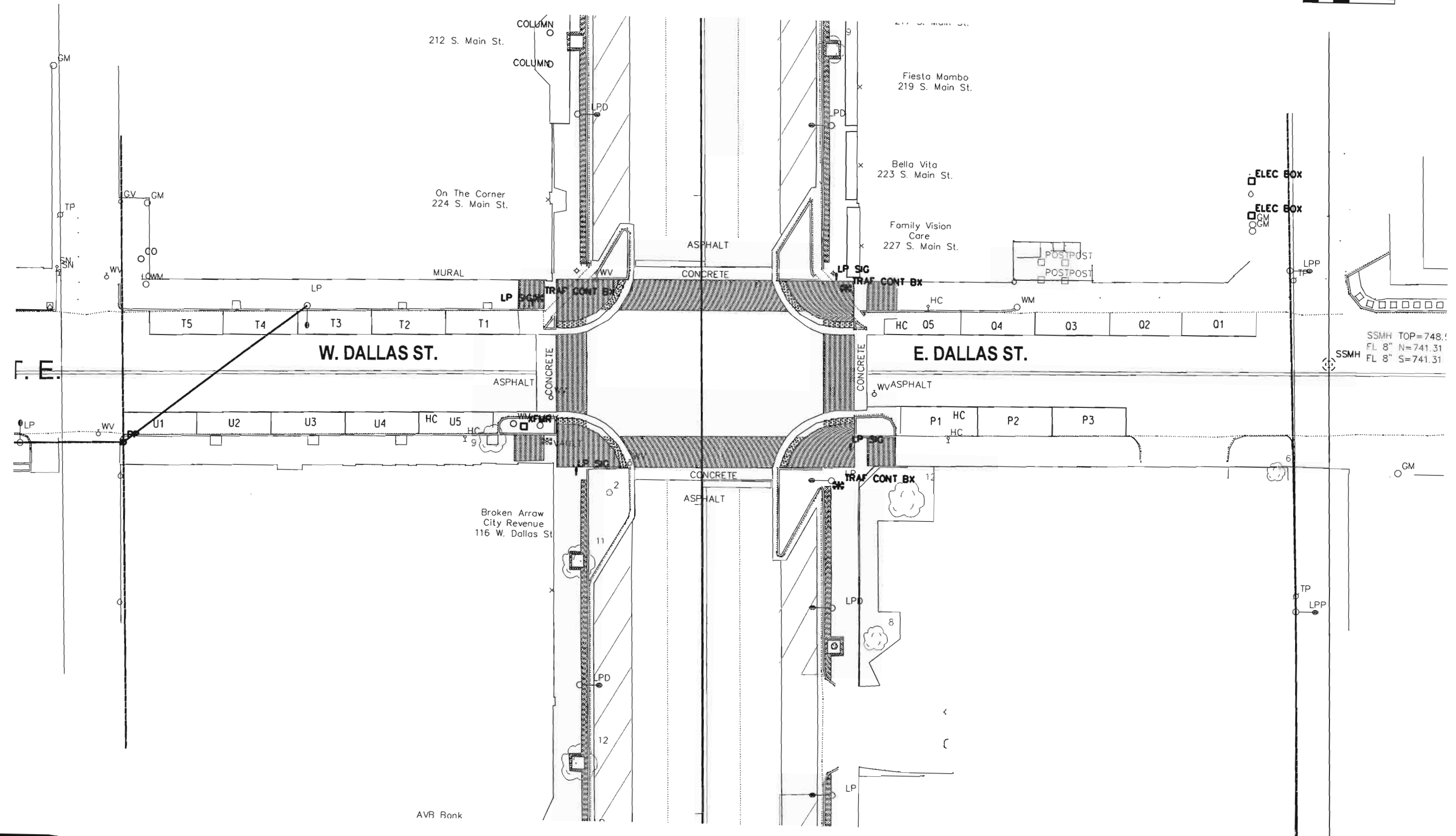
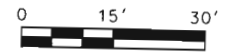


FIGURE 9. CURRENT PARKING DALLAS

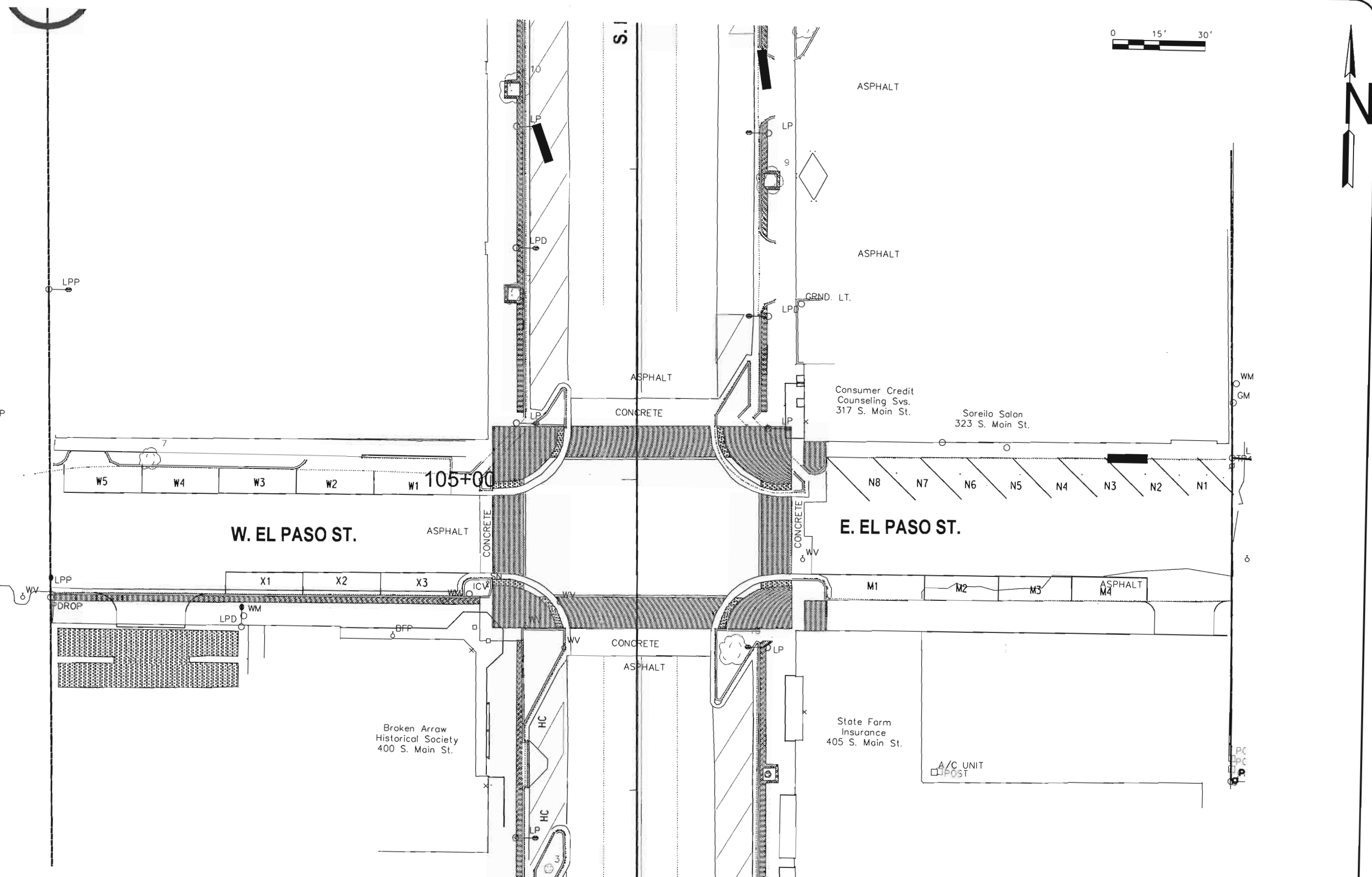


FIGURE 10. CURRENT PARKING
EL PASO



2.2 *Parking Study*

The parking study data collection consisted of recording the first three numbers (or letters) of the license tag of every parked vehicle and the space in which they were parked. This was done at 15 minute intervals continuously from 9:00 a.m. to 5:00 p.m. These “snap shots” at 15 minute intervals provide data for the calculation of the percentage of parking spaces occupied (occupancy) and the length of time that individual vehicles were parked (duration).

The following page is a summary table of several parking measures and statistics for each of the 26 block faces in the study area. Descriptions of the various metrics are as follows:

- “Total Parking Spaces” is the count of spaces in this block on this side of the street.
- “Total Vehicles Served” is the count of the number of individual vehicles that parked in this block on this side of the street during the 8-hour study period. (If a vehicle parked, then left, then returned later in the day and parked again, it would be counted as two vehicles served).
- “Average Occupancy” is the percent of total parking availability that was actually used (or occupied) by parked vehicles when averaged over the full 8-hour study period.
- “Maximum Occupancy” is the highest percentage of occupied parking spaces (when compared to the total parking spaces) observed during the 8-hour study period. A value of 100% would indicate that at some time(s) during the day every parking space in the block face was occupied.
- “Maximum Occupancy Duration” indicates the amount of time that the “Maximum Occupancy” rate continued before dropping to a lower level.
- “Average Parked Time” or average duration is the average length of time parked by all vehicles observed over the entire 8-hour study period.
- “Maximum Parked Time” is the maximum parked duration for any single vehicle observed over the 8-hour study period.
- “Vehicles Parked Over 2-Hours” is the number of vehicles that were observed to have parked longer than two hours but less than four hours.
- “Vehicles Parked Over 4-Hours” is the number of vehicles that were observed to have parked longer than four hours but less than six hours.
- “Vehicles Parked Over 6-Hours” is the number of vehicles that were observed to have parked longer than six hours.

Data Summary Table
Broken Arrow Downtown District Parking Study

Thursday, June 7, 2012
9:00 AM to 5:00 PM

Street	Block	Side	Total Parking Spaces	Total Vehicles Served	Ave. Occupancy (%)	Max. Occupancy (%)	Max. Occupancy Duration (minutes)	Ave. Parked Time (minutes)	Max. Parked Time (minutes)	Vehicles Parked Over 2 Hrs.	Vehicles Parked Over 4 Hrs.	Vehicles Parked Over 6 Hrs.
Main Street	College to Broadway	West Side	11	5	1	9	1h 15m	8	8	0	0	0
		East Side	17	42	32	65	15	49	2h 30m	3	0	0
	Broadway to Commercial	West Side	17	73	41	100	15	35	5h 15m	3	1	0
		East Side	14	20	8	21	1h 15m	15	45	0	0	0
	Commercial to Dallas	West Side	17	64	48	88	30	49	7h 45m	5	0	2
		East Side	17	77	47	88	30	38	7h 15m	2	0	1
	Dallas to El Paso	West Side	16	32	12	31	30	18	2h 15m	1	0	0
		East Side	7	4	4	29	30	23	30	0	0	0
	El Paso to Ft. Worth	West Side	12	7	12	25	30	1h 27m	7h 45m	0	0	1
		East Side	11	22	38	64	45	1h 17m	5h 30m	5	1	0
W. Broadway	Main to Alley	North Side	0	0	0	0	0	0	0	0	0	0
		South Side	4	4	68	100	15	5h 13m	7h 45m	0	1	2
E. Broadway	Main to Alley	North Side	10	13	38	70	15	2h 5m	5h 45m	2	3	0
		South Side	10	0	0	0	0	0	0	0	0	0
W. Commercial	Main to Ash	North Side	13	13	33	62	15	2h 25m	7h 45m	2	1	2
		South Side	21	36	45	67	45	1h 51m	7h 45m	1	3	4
E. Commercial	Main to 1st	North Side	19	55	35	68	30	46	6h 45m	4	2	1
		South Side	20	37	36	50	15	1h 20m	7h 0m	5	4	1
W. Dallas	Main to Alley	North Side	5	10	28	80	15	53	3h 15m	1	0	0
		South Side	5	6	4	40	15	10	15	0	0	0
E. Dallas	Main to Alley	North Side	5	8	63	100	15	2h 51m	7h 15m	2	0	2
		South Side	3	4	6	67	15	11	15	0	0	0
W. El Paso	Main to Alley	North Side	5	4	3	40	15	10	15	0	0	0
		South Side	3	5	9	67	15	17	45	0	0	0
E. El Paso	Main to Alley	North Side	8	18	56	100	30	1h 45m	5h 0m	7	1	0
		South Side	4	3	6	50	15	25	30	0	0	0
TOTAL			274	562	31	NA	NA	58	NA	43	17	16

The overall average occupancy rate over the entire study area for the full eight hours was 31%.

The overall average parked duration for the 562 vehicles served over the entire study area for the full eight hours was 58 minutes.

There were 33 vehicles that parked for more than four hours, 16 of which parked for more than six hours without moving.

3.0 OCCUPANCY GRAPHS

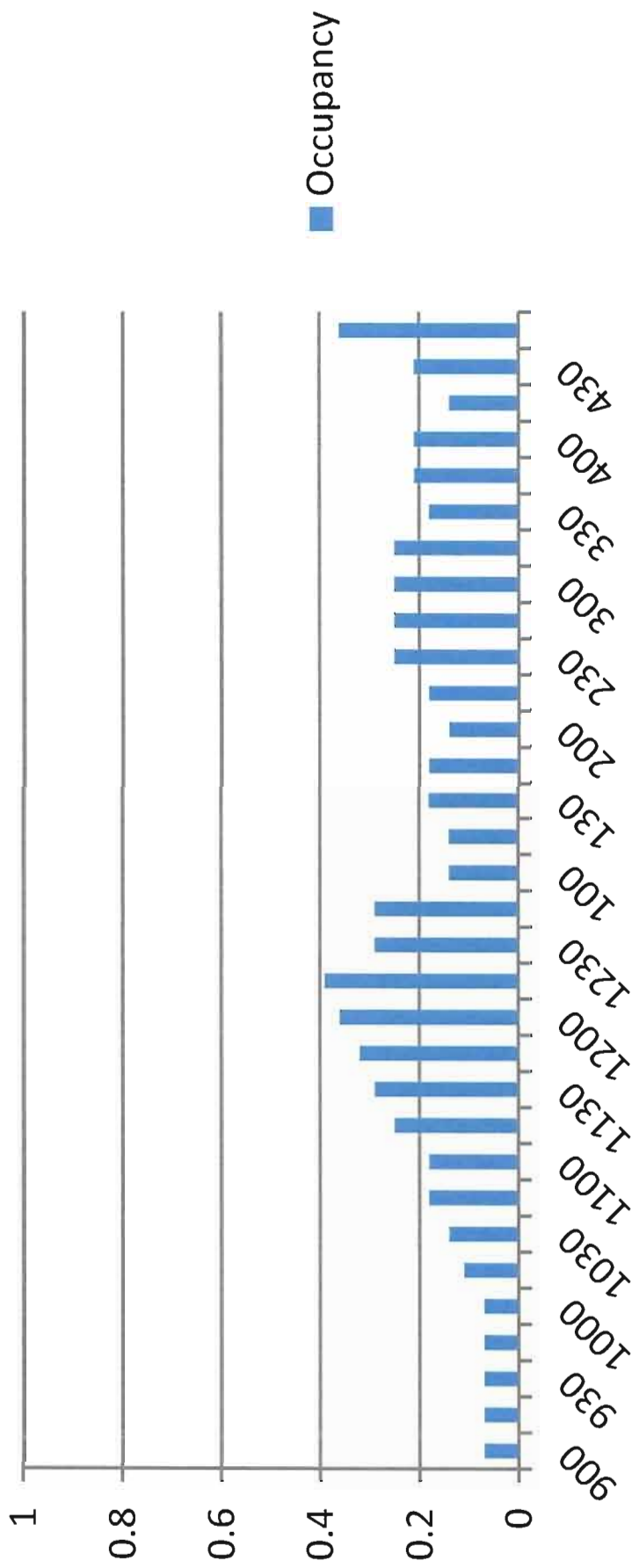
The following graphs were prepared for each block in the study area graphically illustrating the occupancy percent (includes both sides of the street) for each 15-minute period throughout the entire 8-hour study period. They are helpful for a clear understanding of how parking demand (occupancy) varies over time in each block throughout the day, and how large the demand is when compared to the spaces available. Some blocks have a clear peak demand around the lunch hour while other blocks have a much more uniform demand throughout the day.

4.0 ANGLED VS. PARALLEL PARKING

Both types of parking have their advantages and disadvantages, and neither is the best solution for all situations.

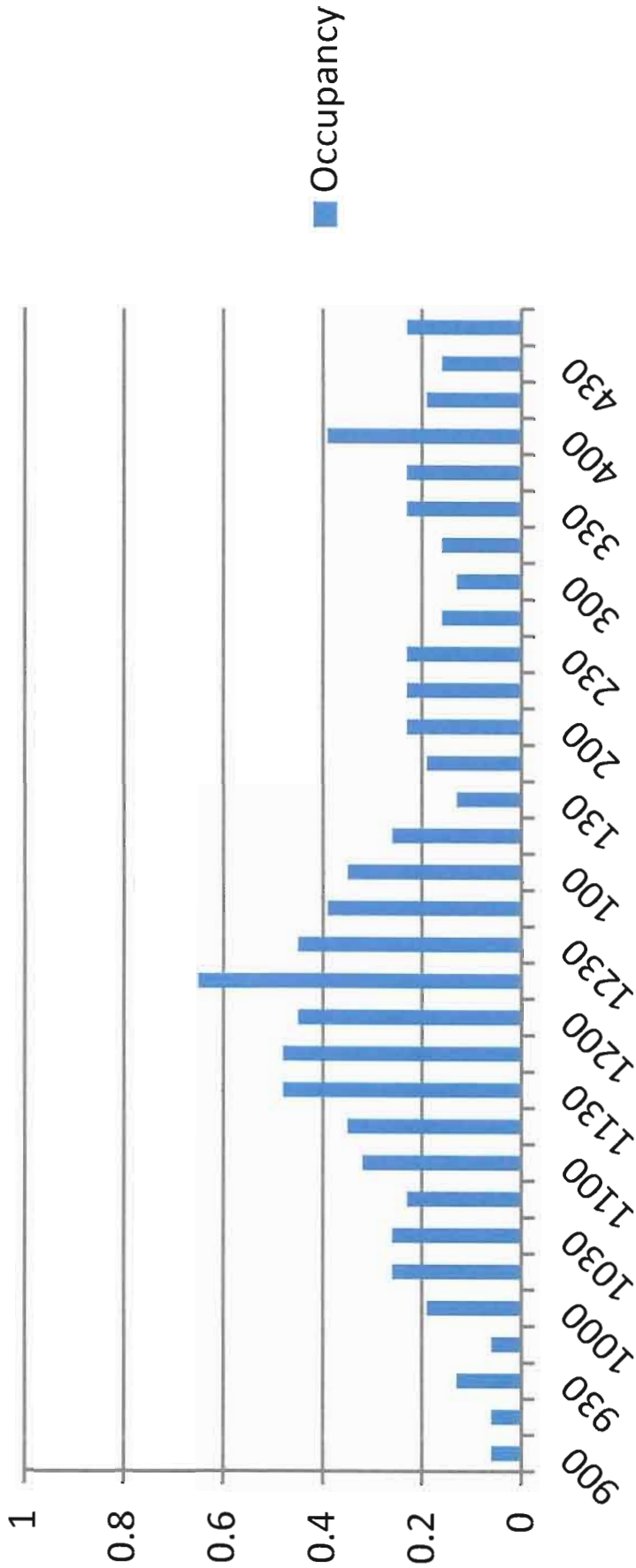
- Parallel parking consumes less roadway width, but it also parks fewer cars.
- Angled parking typically ranges from 30° to 60°. The larger the angle the more cars are parked, but the more roadway width is consumed. Larger parking angles require wider maneuvering aisles behind the space. Angles smaller than 30° or larger than 60° are discouraged for operational reasons.
- Parallel parking is generally considered to be safer because vehicles entering parking spaces can be clearly seen by concerning traffic, and drivers exiting parking spaces can clearly see (in their side mirror) oncoming traffic to determine when it is safe to pull out. Of course drivers must be careful before opening their car doors and passengers should discharge on the curb side of the vehicle.

Occupancy Main between College and Broadway



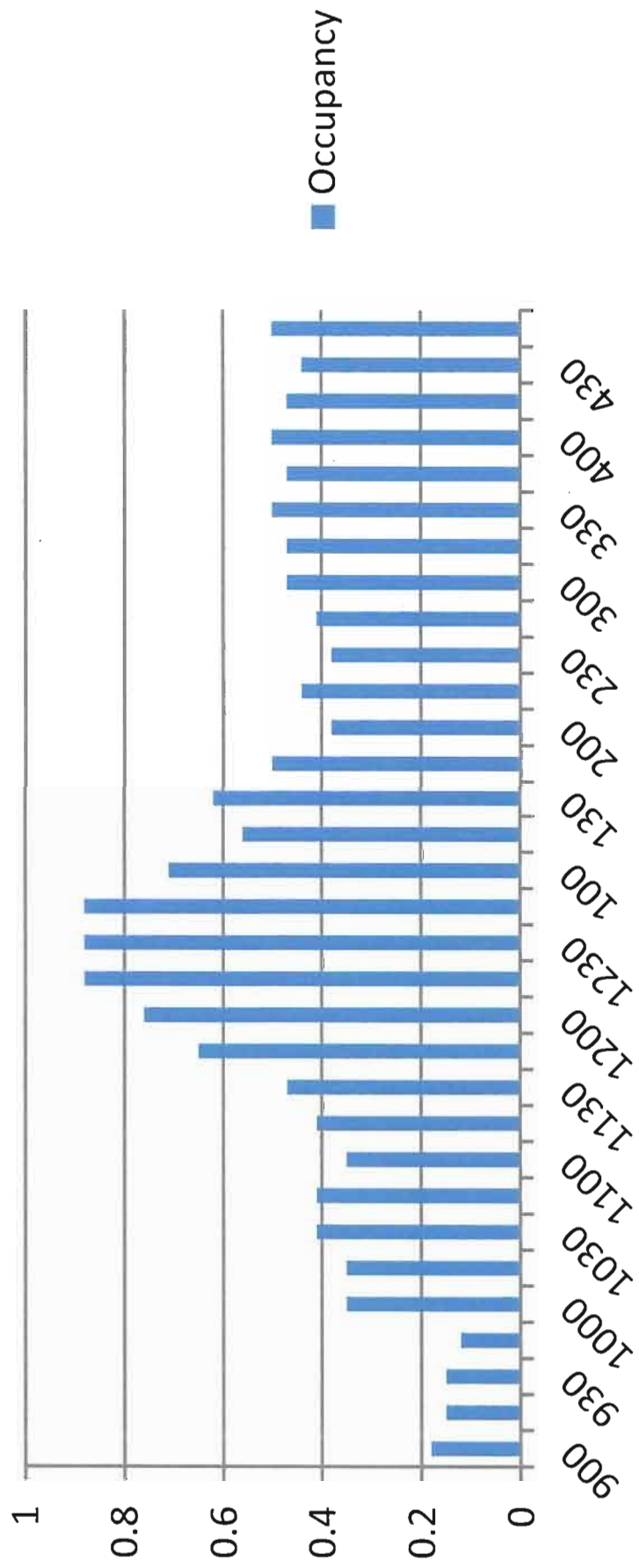
Occupancy

Main between Broadway and Commercial



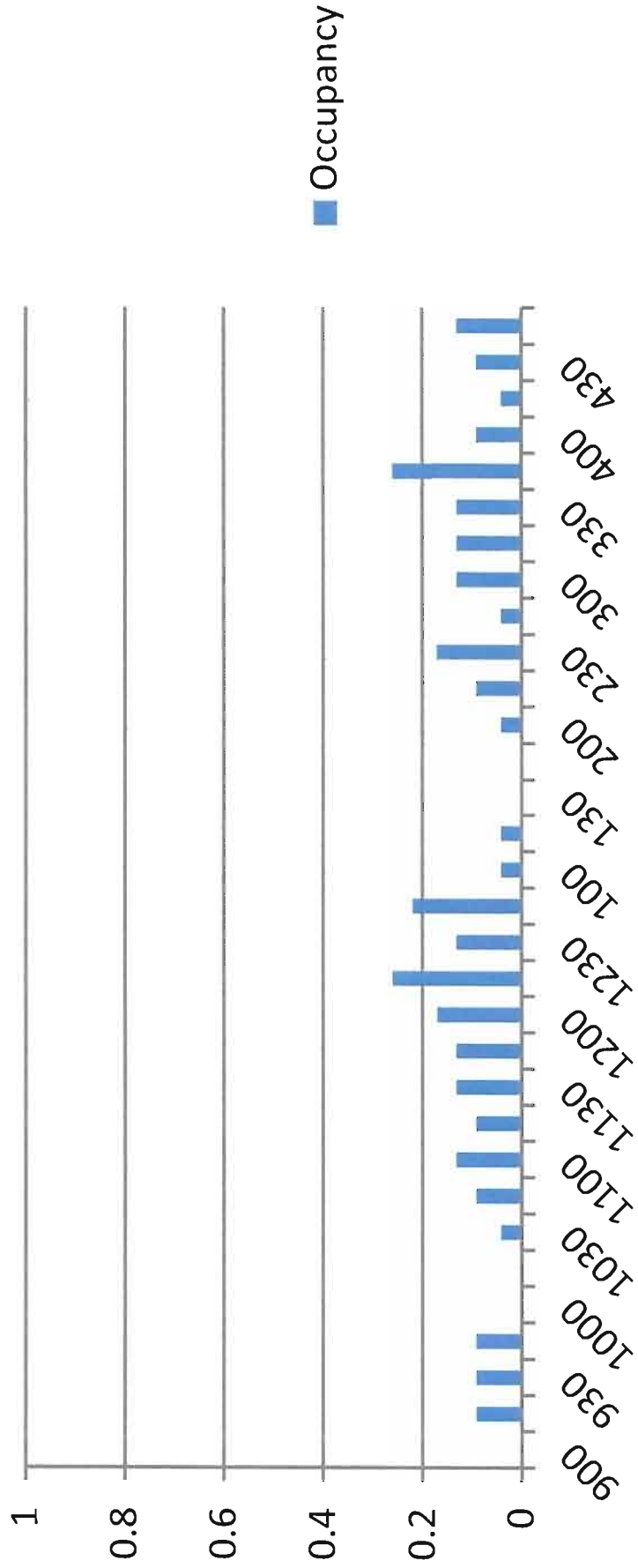
Occupancy

Main between Commercial and Dallas



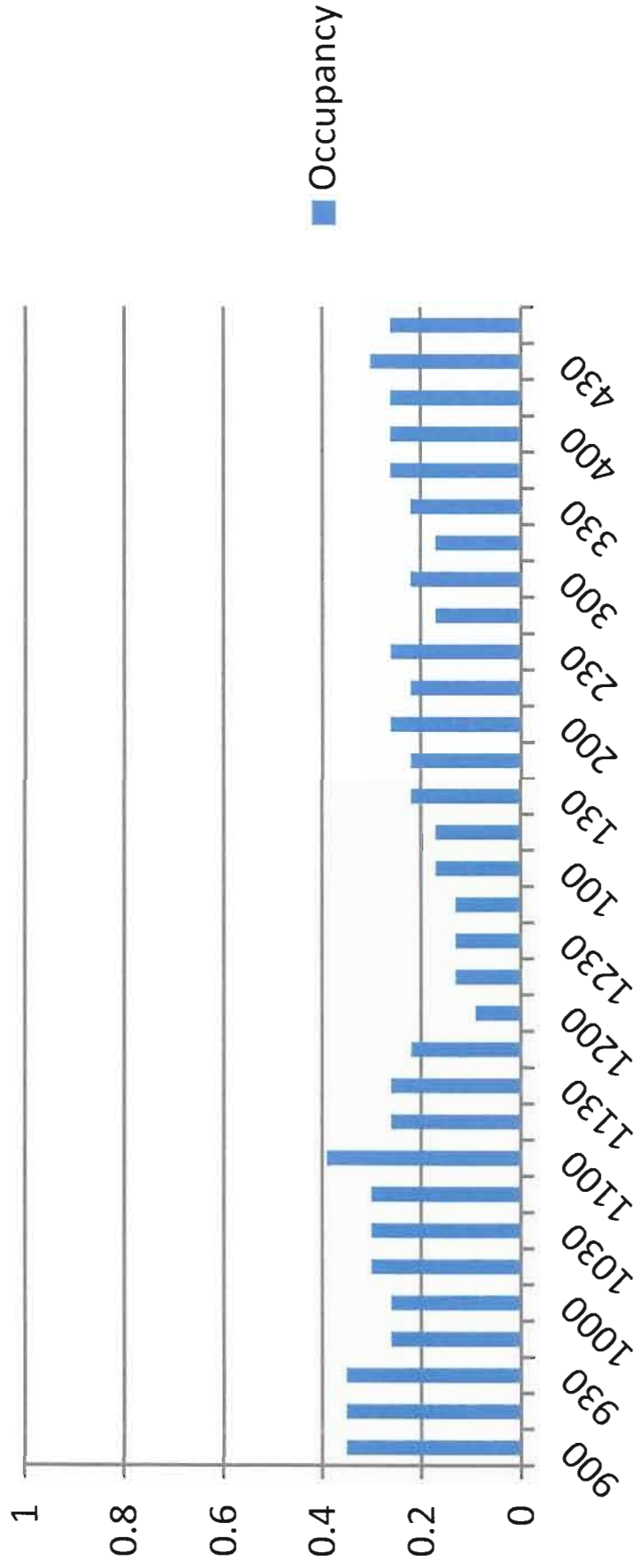
Occupancy

Main between Dallas and El Paso



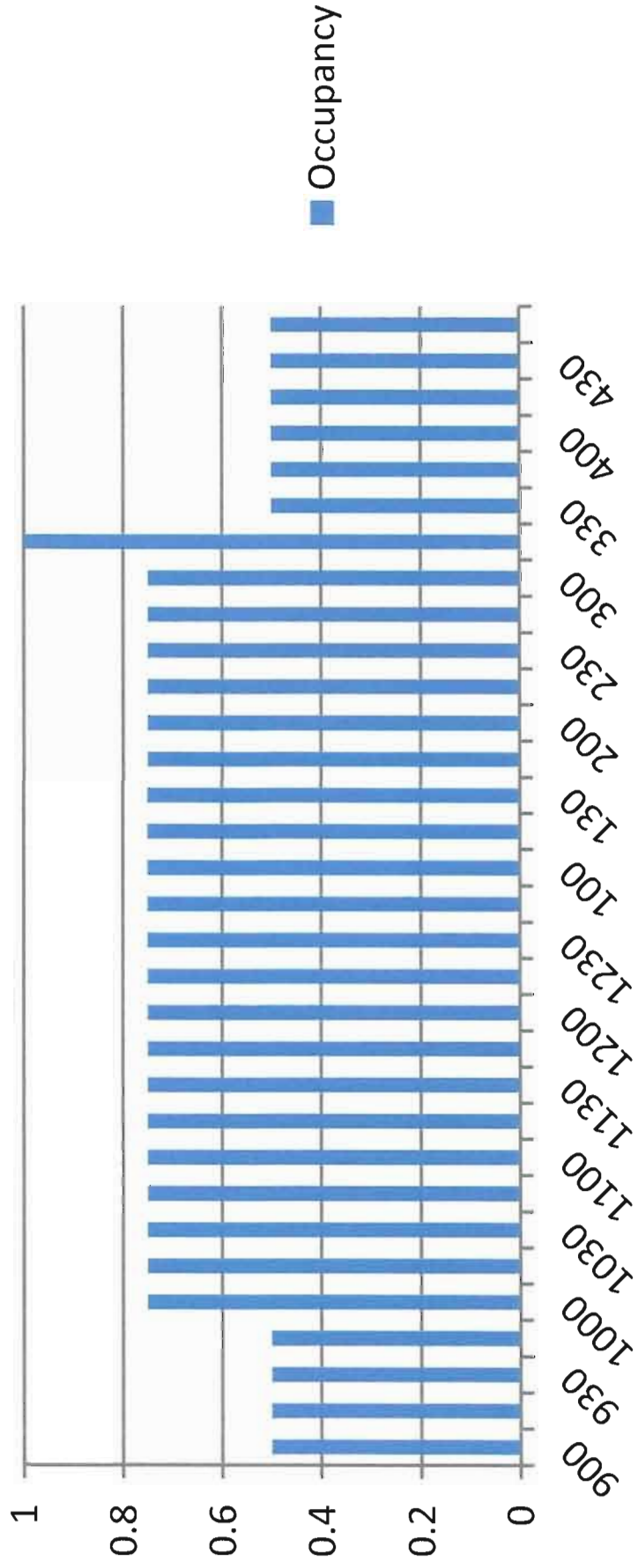
Occupancy

Main between El Paso and Ft. Worth



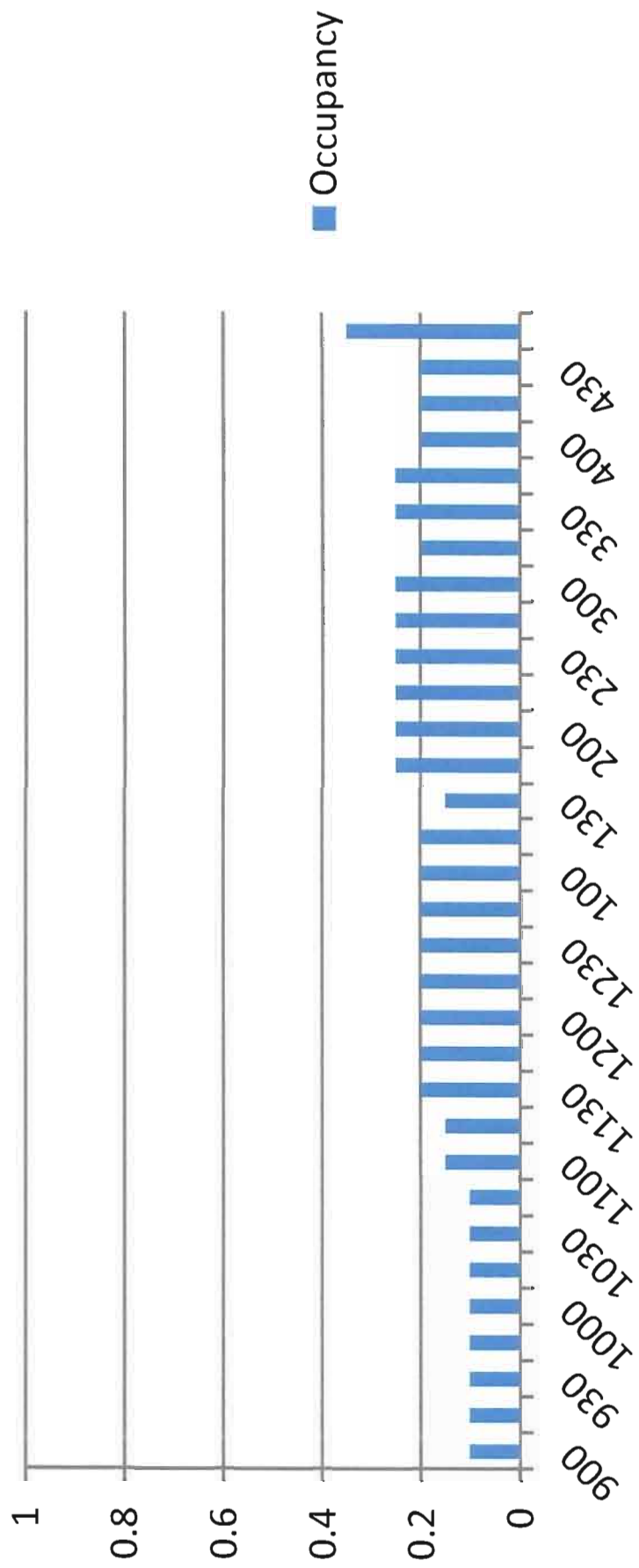
Occupancy

W. Broadway between Main and Alley



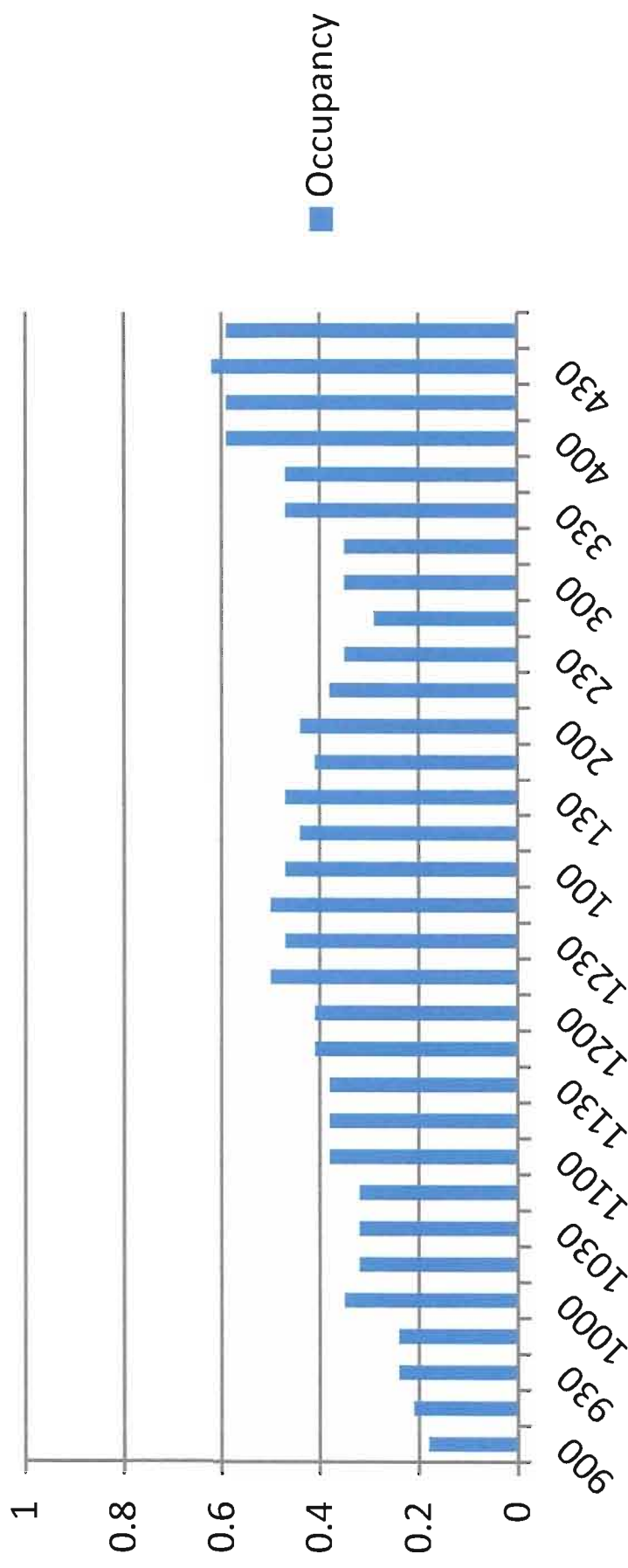
Occupancy

E. Broadway between Main and Alley



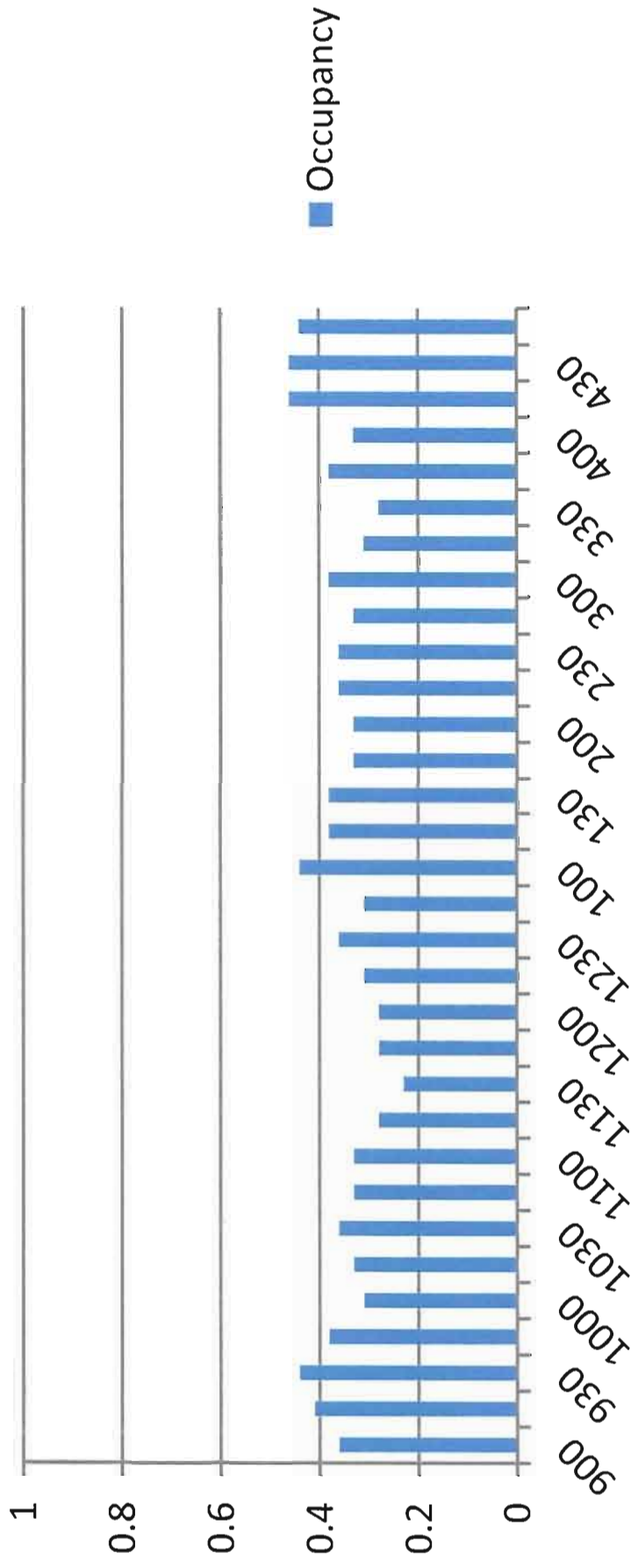
Occupancy

W. Commercial between Main and Ash

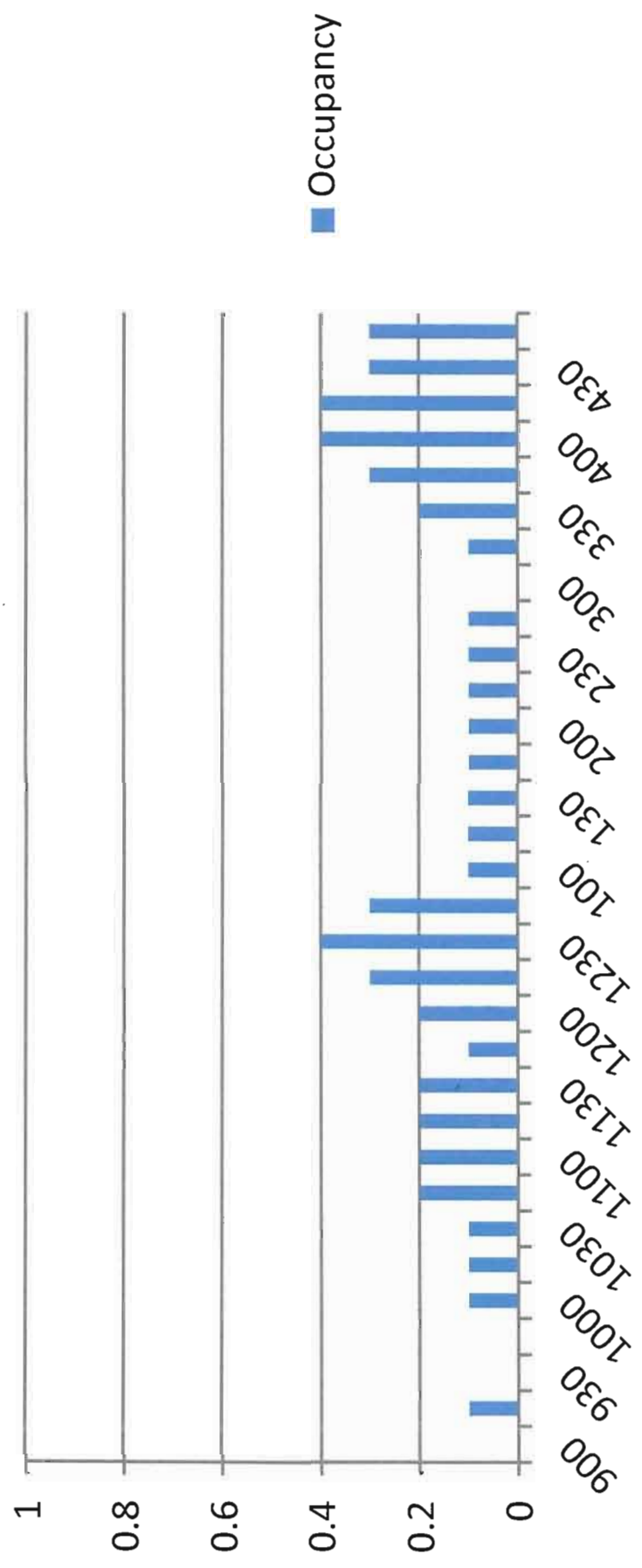


Occupancy

E. Commercial between Main and 1st

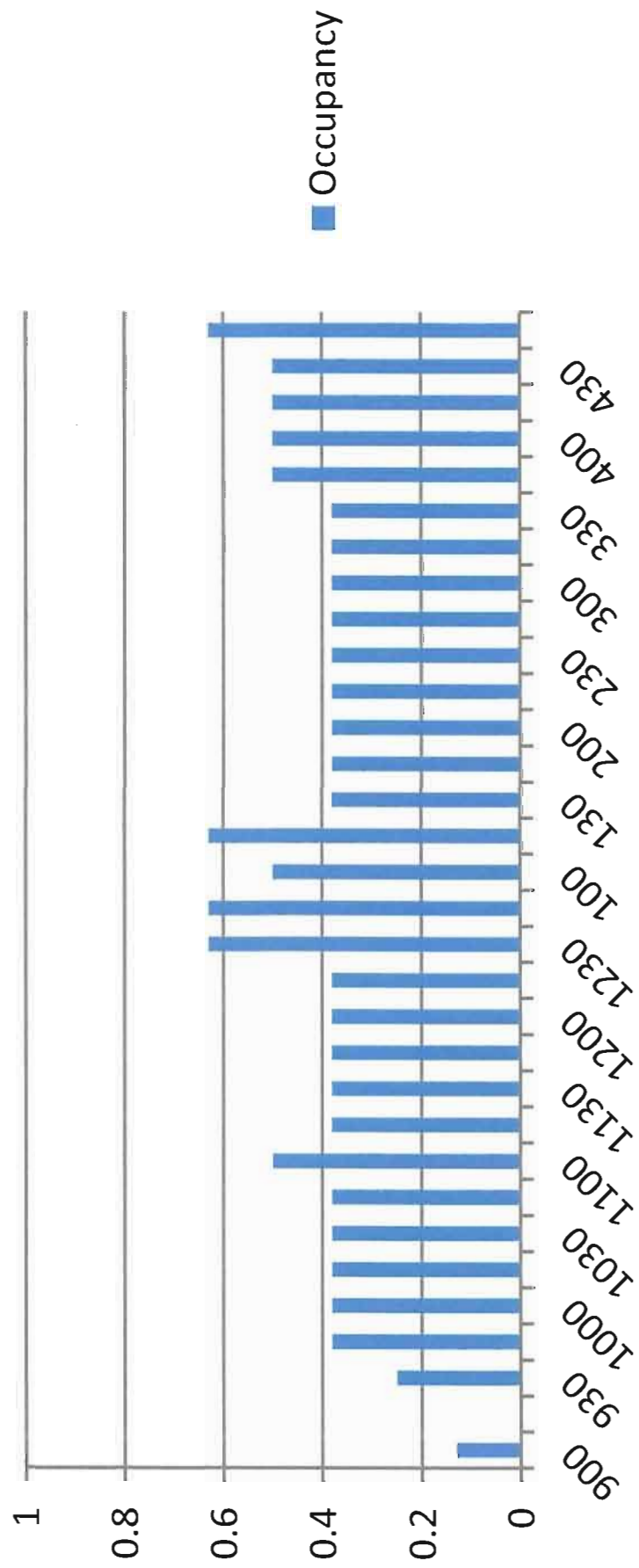


Occupancy W. Dallas between Main and Alley

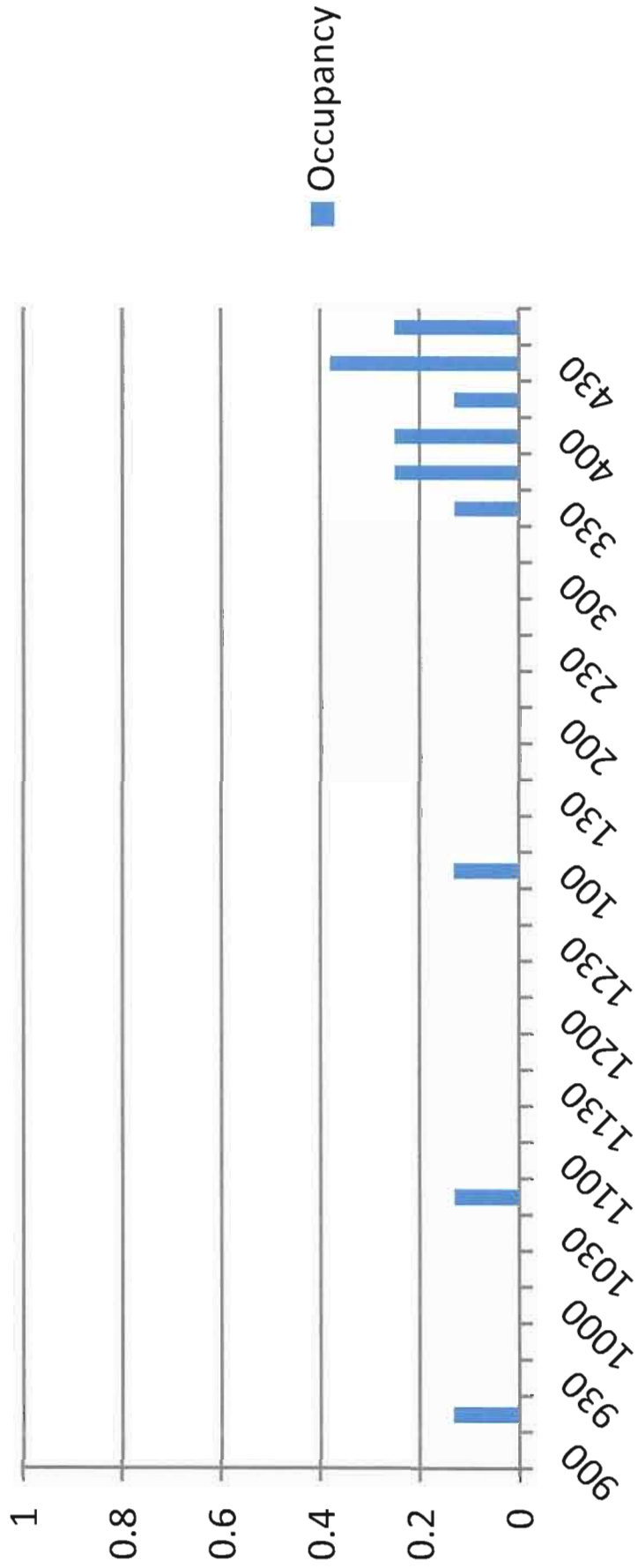


Occupancy

E. Dallas between Main and Alley

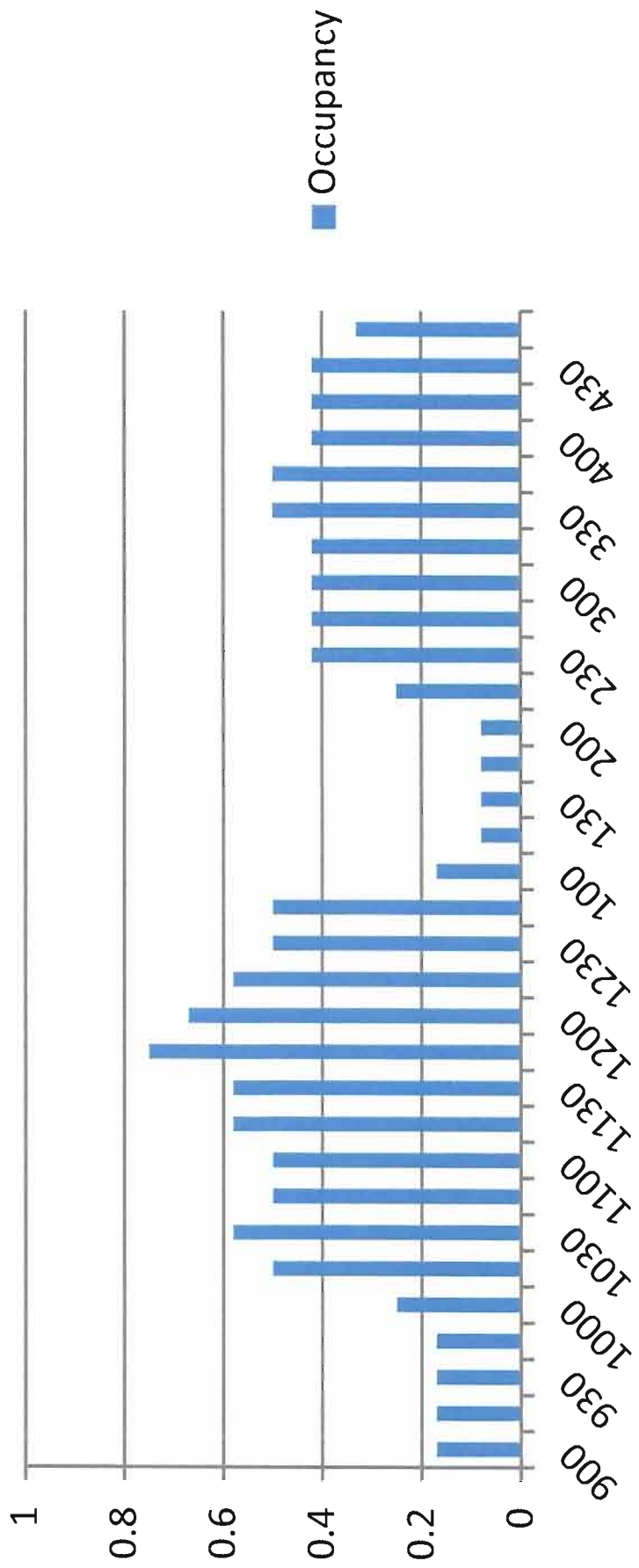


Occupancy W. El Paso between Main and Alley



Occupancy

E. El Paso between Main and Alley

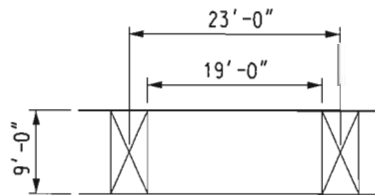
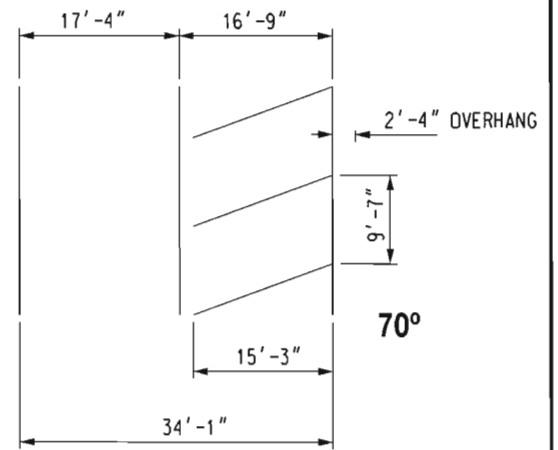
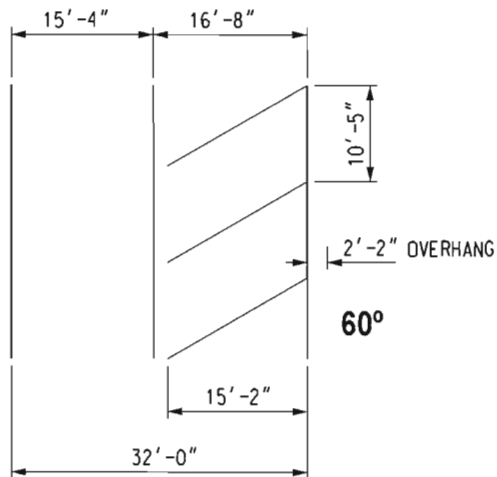
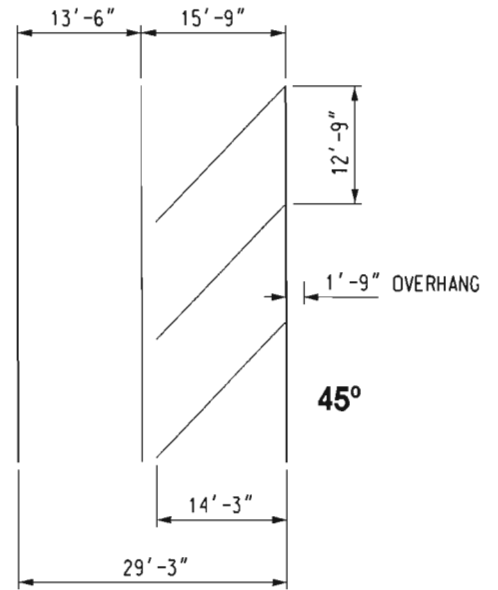
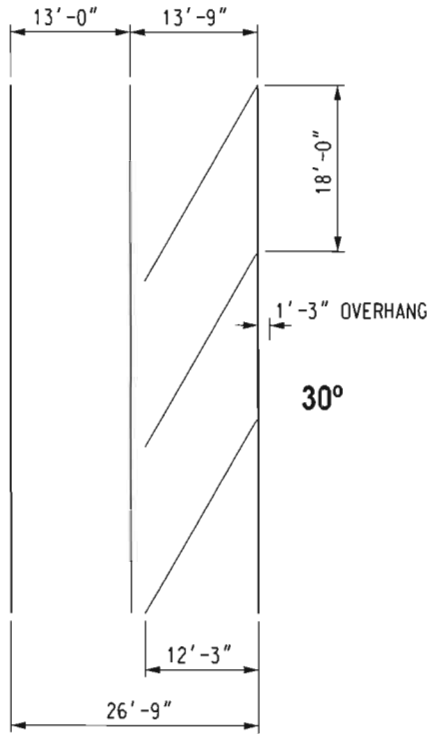


- The greatest hazard presented by angle parking is the exiting maneuver when the driver's view is frequently obstructed by the parked vehicle on the right and the driver must back slowly and carefully into the traffic lane until he can finally observe oncoming traffic. He is operating on some occasions by faith that any oncoming driver will see the vehicle backing out of the space and stop for him.
- Angled parking is typically regarded by drivers as easier to negotiate than parallel parking. Consequently, it is seen to be more convenient.
- Both types of parking provide a comfortable barrier (or separation) between pedestrians on the sidewalks and moving traffic.
- There is another style of parking that is seeing increased usage around the country because it seeks to capitalize on the advantages and minimize the disadvantages of both traditional parking styles. It is "back-in angled parking". With this style of parking drivers pull just past the vacant space (similar to parallel parking) and then back into the angled space. The maneuver is, therefore, less complicated than parallel parking and yet it retains the feature of clear visibility to oncoming traffic as with parallel parking. The exiting maneuver then is to simply pull forward. Many times the exiting driver has a much less obstructed view of oncoming traffic and doesn't have to encroach so far into the driving lane in order to see clearly. This parking style can be observed in Fayetteville, Arkansas just north of the northwest corner of the Downtown Square. One significant issue is that the rear "over-hang" of vehicles is typically longer than the front "over-hang". Therefore, a wider "clear zone" is required behind the curb so that sidewalk features are not inadvertently struck by vehicle rear bumpers.

5.0 PARKING SPACE DIMENSIONS

Recommended parking space dimensions are presented in **Figure 11**. The source for these recommendations is *Guidelines for Parking Geometrics*, National Parking Association, 2011. The various angles shown reflect the four different angles currently in use in various places in Downtown Broken Arrow. The design vehicle used in this reference is 6'7" wide by 17'1" long.

Main Street currently has 30° parking. E. Broadway has 70° parking. W. Commercial has 60° parking. E. Commercial is mostly 60° parking with some 45° parking. E. El Paso has 45° parking on one side. (El Paso is not wide enough to properly provide even 30° angled parking and these spaces should be converted to parallel. Drivers backing out of these spaces currently cross the roadway centerline in order to complete this maneuver. This would result in a net loss of three parking spaces.)



PARALLEL

FIGURE 11. PARKING SPACE DIMENSIONS



SOURCE: GUIDELINES FOR PARKING GEOMETRICS
NATIONAL PARKING ASSOCIATION, 2011

6.0 ONE-WAY STREETS

As a general rule one-way streets in Downtown areas inevitably cause persistent complaints from business owners, building owners, and customers. There are sometimes operational issues for which one-way street pairs are a good solution, but such action should only be undertaken after thorough evaluation.

In the case of Commercial Street in Downtown Broken Arrow the 80' right-of-way width lends itself very well to two-way operation with 60° angled parking and sidewalks widths of 8'. Changing Commercial to one-way operation between Ash Avenue and 1st Street would not create any more parking spaces because the curb length would remain unchanged. All it would do is reduce the needed aisles behind the parking spaces from two to one. This would allow approximately 15' to be converted to sidewalk use (7.5' on each side of the street). If wider sidewalks are an important need on Commercial then one-way streets could be considered as one option. Reducing the parking angle while retaining two-way operation could also be considered, but that would result in the loss of several more parking spaces.

Another issue with one-way streets is the need to design and implement safe and clear transitions at each end where the one-way and two-way operations meet, particularly at the downstream end where problems most frequently occur.

Dallas and El Paso, which have 60' rights-of-way and mostly parallel parking, could potentially be converted to one-way streets with angle parking on both sides, but it would gain very few spaces. The possible options would be 30° parking with 9'- 9" sidewalks or 45° parking with 7'- 6" sidewalks. Given the issues and complaints that one-way streets tend to create in Downtown areas our recommendation would be not to implement one-way operation on these streets in order to gain only a few parking spaces.

7.0 SUMMARY OF FINDINGS

- 274 total parking spaces. The five blocks of Main Street have 139 spaces or 51% of the total.
- There are 15 designated "Handicapped" parking spaces, all but two of which are on the side streets.
- There are "2-Hour Parking Limit" signs posted on all five blocks of Main Street. They are also posted (very inconspicuously) on Commercial for one block east and west of Main and on Dallas for one block east and west of Main.
- There appears to be no enforcement of the posted 2-hour parking limit.

- The parking spaces on Main Street are very well marked. The parking spaces on side streets, for the most part, are poorly marked.
- The overall average occupancy rate over the entire study area for the full eight hours was 31%.
- The overall average parked duration for the 562 vehicles served over the entire study area for the full eight hours was 58 minutes. This high average means there were a number of long-term parked vehicles.
- There were 33 vehicles that parked for more than four hours, 16 of which parked for more than six hours without moving.
- 100% occupancy was reached in four block faces (See Data Summary Table). However, in three cases it only lasted for 15 minutes and in one case it lasted for 30 minutes. The other high occupancy rates reached were on the east and west sides of Main Street between Commercial and Dallas which reached 88% occupancy for 30 minutes over the lunch hour.
- If both sides of the street are considered as a unit (rather than each side separately) occupancies exceeding 80% only occurred in two blocks: Main Street between Commercial and Dallas for 45 minutes over the lunch hour (88%), and Broadway west of Main for 15 minutes in the mid-afternoon (100%).
- In every block, except Broadway west of Main, when both sides of the street are considered as a unit rather than separately, the occupancies were typically 50% or less for the greatest part of the business day.
- On Main Street the block faces with the highest average occupancy rates were
 1. Commercial to Dallas on the west side of the street with 48%
 2. Commercial to Dallas on the east side of the street with 47%
 3. Broadway to Commercial on the west side of the street with 41%
- The street right-of-way width on Main Street is 100 feet. The street right-of-way width on Broadway and Commercial is 80 feet. The street right-of-way width on Dallas and El Paso is 60 feet.
- If the current angled parking on Main Street were replaced with parallel parking the typical block face would have its parking spaces reduced from 17 to 13. This is a reduction of approximately 25%. The block faces on Main Street that have driveway(s) would experience slightly different reductions.
- There are four potential locations where additional side street parking could be added.
 1. The south side of E. Broadway immediately west of the alley where two parallel parking spaces could be replaced with three angled parking spaces (+1 space)
 2. The south side of W. Commercial immediately east of Ash where one parallel space could be replaced with three angled spaces (+2 spaces).

3. The north side of W. Commercial immediately east of Ash where two parallel spaces could be replaced with three angled spaces (+1 space).
4. The north side of W. Commercial between Main and the alley where five parallel spaces could be replaced with eleven angled spaces (+6 spaces). This would, however, cause the removal of three mature street trees and a 14' wide grass strip between the curb and the sidewalk.

All of these changes would add 10 new parking spaces.

- If Main Street were to be converted to three lanes and the current 30° angled parking were to be retained, the sidewalks on each side could be widened to 17'3". This assumes 13'9" for the parking lanes, 13'0" for the driving lanes, and 12'0" for the center left turn lane.
- The general conclusion that can be drawn from the data collected is that even during the noon peak parking demand on Main Street, there are many available spaces within easy walking distance either across the street, in the next block, or around the corner. The rest of the day there are many available spaces on Main Street itself. A shortage of parking spaces in the Downtown District does not currently exist.
- Carefully remeasuring and restriping all the angled and parallel parking spaces on the side streets would provide much better guidance to drivers and would cause much more efficient use of the space available. It would also provide a consistent look and consistent dimensions for all the Downtown parking spaces, which is a feature that does not currently exist. Proper dimensioning, marking and signing of "Reserved for Handicapped" parking spaces are also significant needs.