



**75<sup>th</sup> Avenue**  
**MC 85 to Van Buren Street**  
**Final Design Concept Report**

MCDOT Work Order No. 68986



September 2001

Prepared For:

**Maricopa County Department of Transportation**  
**Transportation Planning Division**

Prepared By:



**Stantec**



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## DESIGN CONCEPT REPORT

### 75<sup>TH</sup> AVENUE:

### MC 85 TO VAN BUREN STREET

### WO#68986

SEPTEMBER 2001

<b>Project Name:</b> 75 <sup>th</sup> Avenue	<b>Project Termini:</b> MC 85 to Van Buren Street
<b>Requested by:</b> MCDOT	
<b>Improvement Request:</b> Improve existing two-lane roadway to accommodate current and future traffic conditions.	
<b>PM<sub>10</sub> Area:</b> Yes	<b>Length:</b> 1.6 km (1 mile)
<b>Estimated Cost:</b> \$4,940,519	

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## EXECUTIVE SUMMARY

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This Design Concept Report is being prepared for Maricopa County Department of Transportation (MCDOT) to assess the viable options of improving 75<sup>th</sup> Avenue between MC 85 (Buckeye Road) and Van Buren Street, approximately one mile of roadway improvements. Three concepts are analyzed and one recommended to the County based on the most optimal and cost effective way to enhance the existing performance of 75<sup>th</sup> Avenue while accommodating future growth demands and meeting MCDOT requirements.

75<sup>th</sup> Avenue currently exists as a two-lane roadway with dirt shoulders. This strip of roadway is impacted with high truck traffic. This truck traffic is generated from major trucking facilities within the area including: Coastal Grain Incorporated located on 75<sup>th</sup> Avenue near the mid-section, Freezer Services Distribution located at the Northeast corner of 75<sup>th</sup> Avenue and Buckeye Road and Swift Transportation Company located on 75<sup>th</sup> Avenue a quarter mile North of Lower Buckeye Road. Major features within this corridor which will be impacted by proposed enhancements include an existing bridge crossing over the Roosevelt Irrigation District (RID) canal, Salt River Project delivery ditch and Union Pacific Rail Road. Utilities which may be affected by roadway reconstruction and widening include overhead power along the east side of the roadway, street lighting along the west side of 75<sup>th</sup> Avenue north of the mid-section line and the Southwest Gas suspended on the outside of the RID bridge structure. Other utility conflicts are not anticipated yet precautions should be taken

near the shallow 150mm (6 inch) petroleum pipeline and the AT&T fiber optic line which crosses 75<sup>th</sup> Avenue just north of the bridge structure.

Alternative C, the preferred alternative, recommends the MCDOT Urban Minor Arterial Road Section. This cross-section consists of four through lanes, a continuous center left turn lane, curb, gutter and sidewalk. Traffic data researched by Bolduc Smiley and Associates supports this five-lane section. Although 75<sup>th</sup> Avenue from MC85 to Van Buren Street is not included in MCDOT's planned bike network, MCDOT planning department requires that bike lanes be added to proposed improvements for 75<sup>th</sup> Avenue. Hence, slightly adjusting the Urban Minor Arterial Roadway lane configuration to include bike lanes will not only accommodate future traffic demands but also offers MCDOT planning department the flexibility to add 75<sup>th</sup> Avenue into their bike network plan in the future. Modifying the lane configuration to include 1.65 meter (5.5 foot) bike lanes to the MCDOT Urban Minor Arterial Road typical section will still meet MCDOT's minimum 3.3 meter (11 foot) lane width criteria. At the northern terminus, Van Buren Street, roadway improvements will taper and tie into the City of Phoenix's future intersection improvements. At the southern terminus, MC 85, roadway improvements will include the reconstruction of the northwest and southwest corners of the intersection to facilitate the merging of traffic due to proposed improvements to the north. The concrete bridge crossing over the Roosevelt Irrigation District Canal and the Union Pacific Railroad crossing will require upgrades to accommodate the MCDOT Urban Minor Arterial Road typical section. Storm drains will be proposed along 75<sup>th</sup> Avenue to intercept street drainage. These systems will outfall into two retention basins. The first located at the northwest corner of 75<sup>th</sup> Avenue and the RID bridge. The second located at the northwest corner of MC 85 and 75<sup>th</sup> Avenue. 75<sup>th</sup> Avenue roadway improvements have yet to be scheduled into MCDOT's Transportation Improvement Projects (TIP).

Alternative C, the preferred alternative described within this DCR, is the most effective option to enhance operational capacity, safety and control roadway drainage, while meeting MCDOT criteria. The total estimated cost for the recommended alternative is:

Recommended Alternative C	\$4,940,519
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## 1.0 GENERAL

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### 1.1 PROJECT DESCRIPTION

This Design Concept Report provides Maricopa County Department of Transportation with a study for proposed improvements to 75<sup>th</sup> Avenue from MC 85 to Van Buren Street. This report will look at reconstructing the existing two lane 75<sup>th</sup> Avenue to either MCDOT's Urban Minor Arterial Road typical section, the City of Phoenix 19.2-meter (64-foot) typical section or MCDOT's 14.4 meter (48-foot) Rural Collector Road. As part of this 1.6 kilometer (one-mile) reconstruction project the northwest and southwest corners of the intersection of MC 85 and 75<sup>th</sup> Avenue will be improved to facilitate proposed improvements along 75<sup>th</sup> Avenue. Catch basins will be installed to control roadway flooding. Storm drains will collect roadway runoff and outfall into localized retention basins.

### 1.2 PURPOSE

The purposes of this project is to improve the overall operational capacity by widening the roadway cross-section to accommodate current traffic conditions, anticipated future growth and mitigate roadway drainage issues, thereby increasing the overall safety of 75<sup>th</sup> Avenue.



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### 1.3 PROJECT LOCATION

The project is located on 75<sup>th</sup> Avenue between MC 85 and Van Buren Street (refer to Figure 1).

Figure 1: Vicinity Map



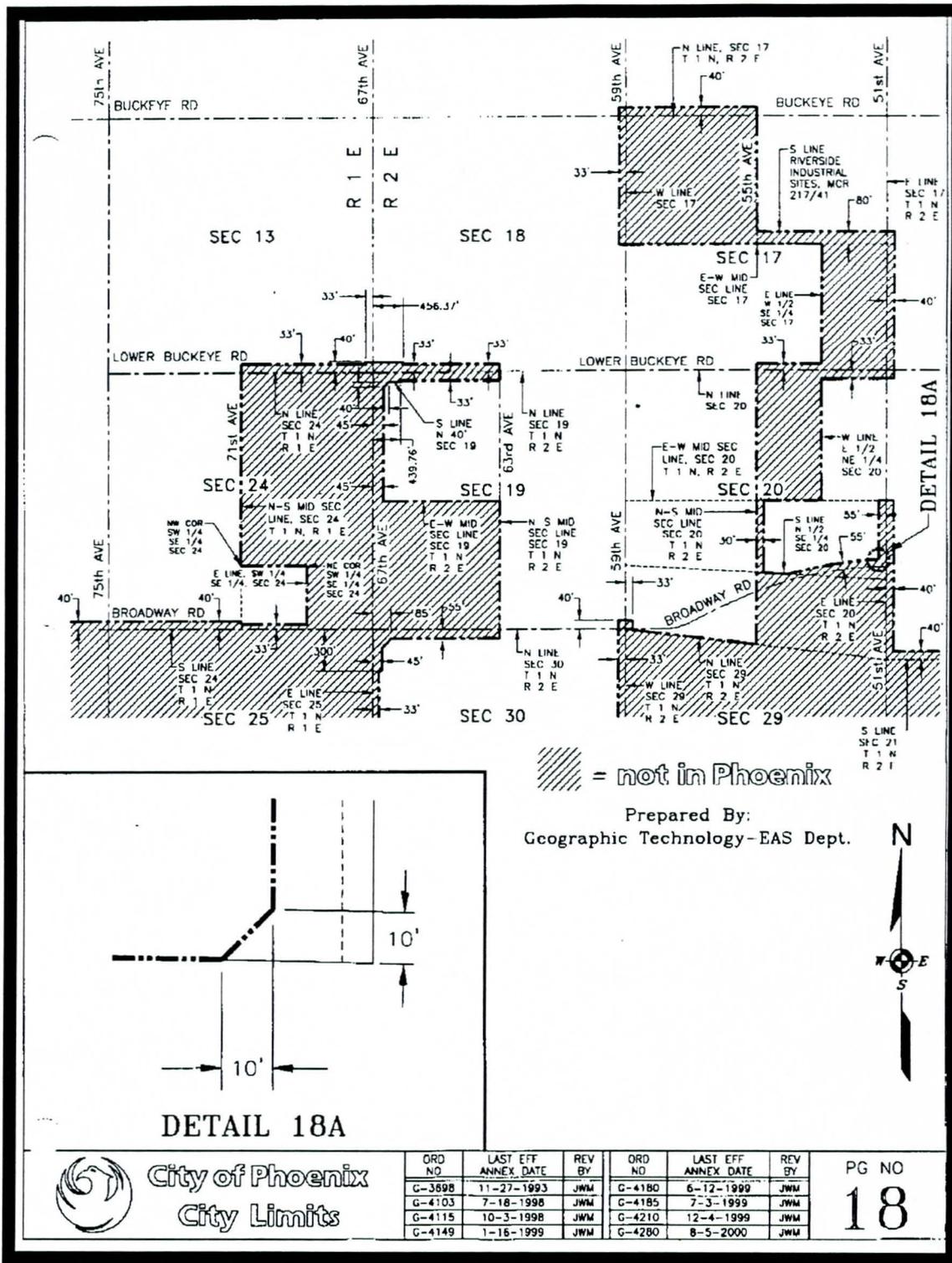
### 1.4 JURISDICTIONS

75<sup>th</sup> Avenue Road between MC 85 and Van Buren Street is under the jurisdiction of Maricopa County. The land to the North, South and East of the project is in the City of Phoenix (Figures 4-1 to 4-3). The western portion between Van Buren Street and approximately the mid-section line is under the City of Tolleson's jurisdiction. The County has jurisdiction over the remaining western portion to MC 85. Jurisdiction delineation maps are depicted in Figure 1.4.1 through Figure 1.4.4.



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Figure 1.4.1: City of Phoenix Jurisdiction Map 18

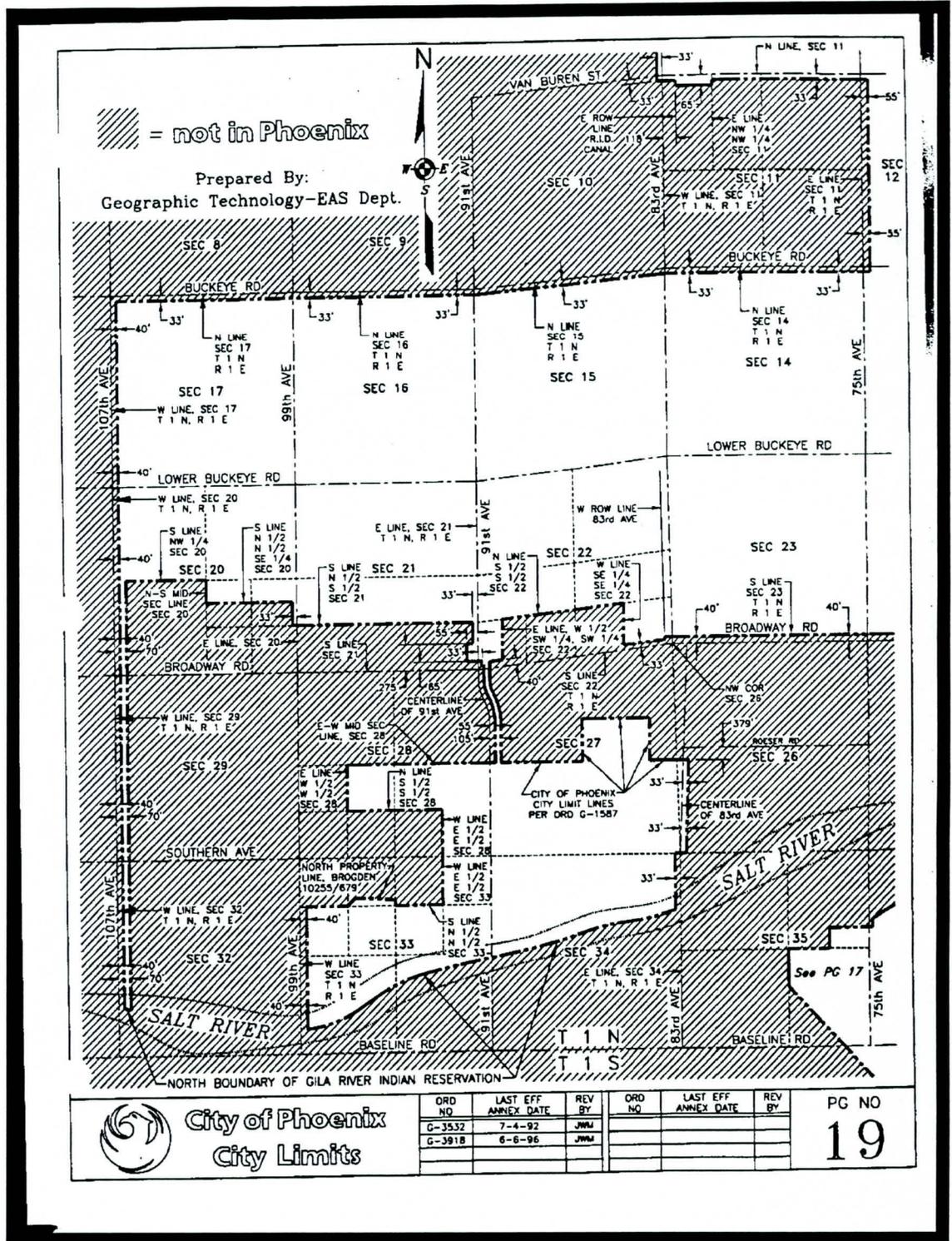


Source: Maricopa County Dept. of Transportation ROW.



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Figure 1.4.2: City of Phoenix Jurisdiction Map 19

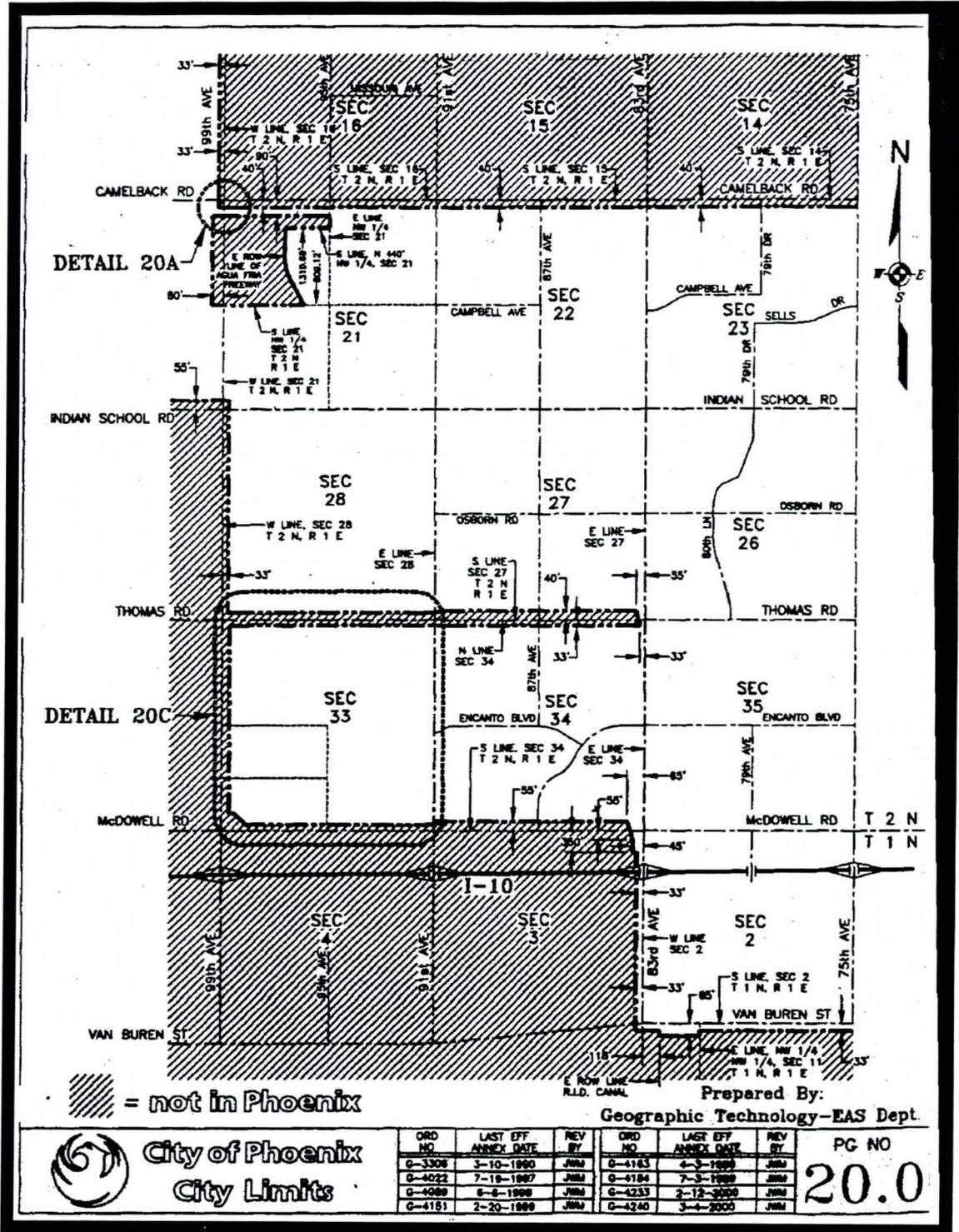


Source: Maricopa County Dept. of Transportation ROW.



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Figure 1.4.3: City of Phoenix Jurisdiction Map 20

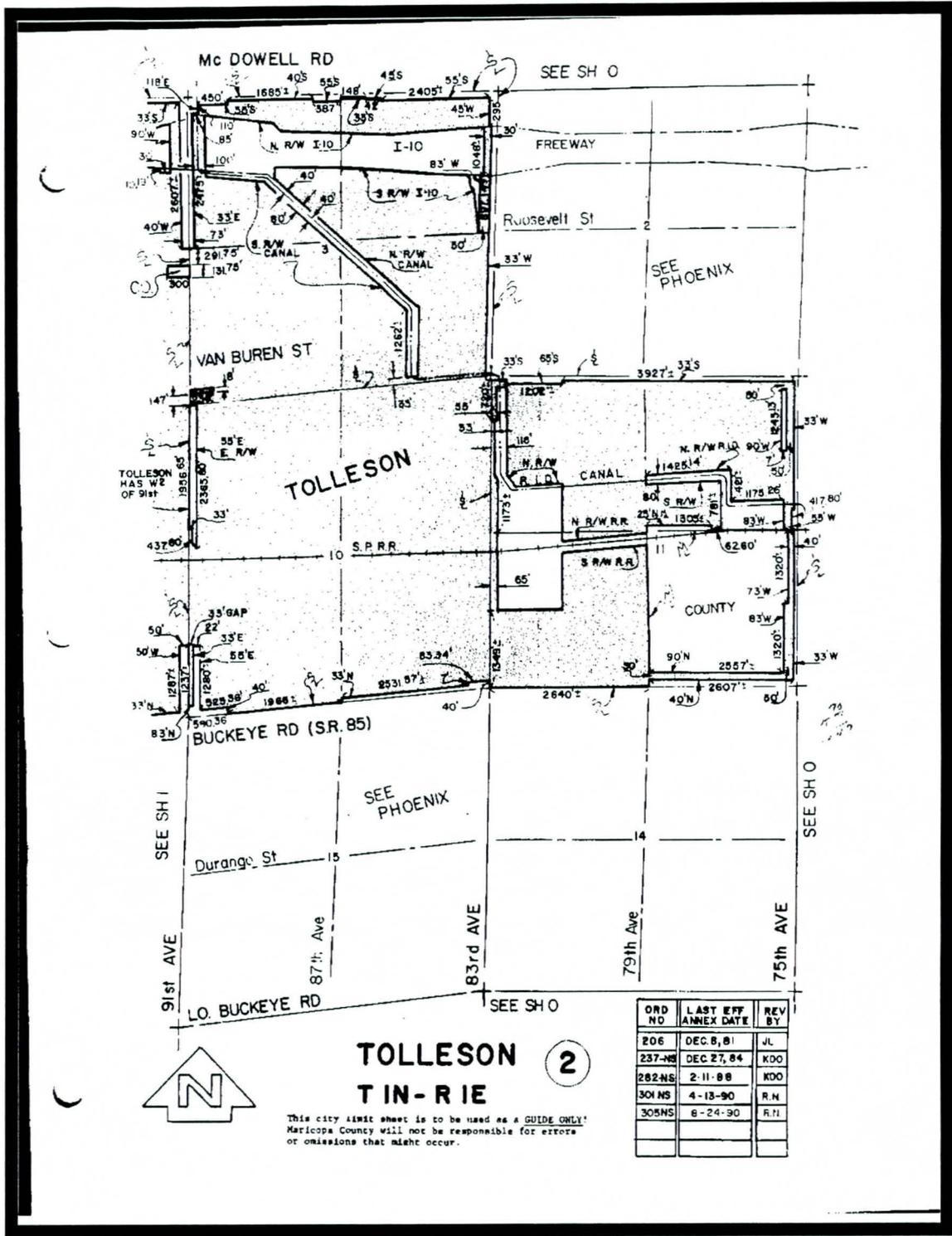


Source: Maricopa County Dept. of Transportation ROW.



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Figure 1.4.4: City of Tolleson Jurisdiction Map



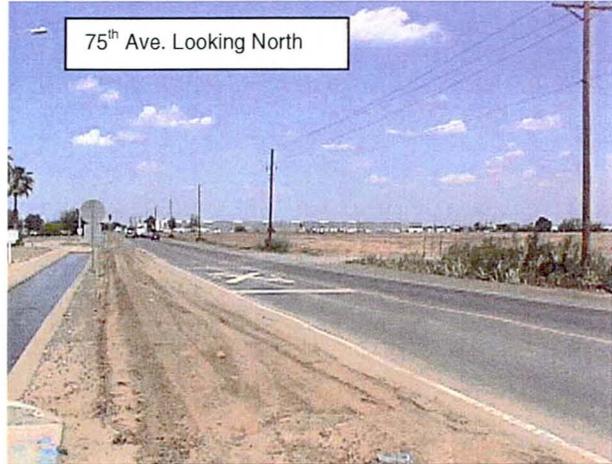
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Source: Maricopa County Dept. of Transportation ROW.

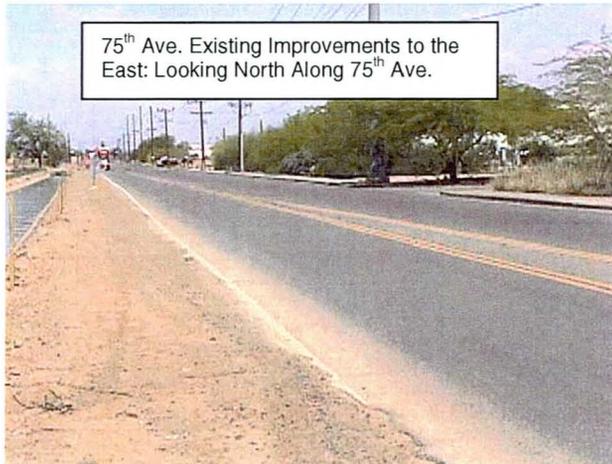
## 1.5 EXISTING CONDITIONS

75<sup>th</sup> Avenue exists as a north south 7.8 meter (26-foot) two lane rural asphalt roadway with dirt shoulders between Van Buren Street and the mid-section line.

South of the mid-section line; curb, gutter, sidewalk, scuppers and minor landscape improvements have been made along the east half of 75<sup>th</sup> Avenue. The western half of the roadway remains as a 3.9 meter (13-foot) roadway with a dirt shoulder. The present roadway centerline coincides with the section line between Van Buren Street and the mid-section line. South of this point, the roadway centerline begins to taper and is approximately 5 meters east of the section line at MC 85. The project corridor acts as a boundary between the City of Phoenix to the east and the City of Tolleson to the west. The posted speed limit is 80 kph (50 mph).



The intersection of 75<sup>th</sup> Avenue and Van Buren Street is a four-way stop condition consisting of 7.9 meter (26 feet) approach widths per leg and operating with one lane in each direction. The intersection of 75<sup>th</sup> Avenue and MC 85 is signalized. The north and south legs of 75<sup>th</sup> Avenue and MC 85 reflect a three lane typical section containing a left turn lane, northbound and southbound through lanes. The cross section of MC 85 at this intersection reflects a five-lane section consisting of an exclusive left turn lane and two through lanes in each direction. All four corners of this intersection have been improved with curb, gutter and sidewalk ramps.



The existing roadway pavement consists of approximately 125 mm (5 inches) of Asphaltic Concrete, 150mm of (6 inches) Base Course and 150mm of (6 inches) Selected Material (AMEC, Geotechnical Investigations for 75<sup>th</sup> Ave Between Buckeye Road and Van Buren Street). Visual appearance of the pavement shows that it is in fair condition. The Roadway Summary Report generated by MCDOT indicates pavement within the corridor has a Pavement Condition Rating (PCR) of 94, an International Roughness Index (IRI) of 110 and a Sufficiency rating of 80. A PCR of



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100 indicates a road in excellent condition, an IRI of 0 indicates a smooth road and a Sufficiency rating of 100 is equivalent to a new road. 75<sup>th</sup> Avenue is classified as a Secondary Transportation System planned route by MCDOT.

### 1.5.1 Bridge Structure

75<sup>th</sup> Avenue crosses over the RID canal via a single span bridge. As-built plans show the bridge was built in 1975. The bridge is 11.7 meters (39 feet) long between bearing centerlines and is 15.125 meters wide (50 feet). The deck section consists of pre-cast single tee beam with 125 mm (5 inch) concrete slab topping. Each bridge abutment is supported on seven 500 mm (20") diameter belled bottom shafts. The as-built plans indicate the bridge was designed for an HS30-44 live load. A 9.6 meter long, 1.65 meter wide concrete flume was constructed approximately 1.5 meters (5 feet) west of the bridge under the same project. The south end of the flume support lines up with the bridge's southern abutment. The northern support is situated 1.2 meters (4 feet) south of the bridge's northern abutment. A 900 mm (36 inch) sewer line, located approximately 0.9 meters (3 feet) west of the bridge centerline, runs along 75<sup>th</sup> Avenue underneath the RID canal. A 50 mm (2 inch) gas line is attached to the bridge's east fascia.

### 1.6 SUMMARY OF PUBLIC PROCESS

MCDOT organized a public open house on July 11, 2001 to get the public's feedback on the 75<sup>th</sup> Avenue Design Concept Report. During this public open house MCDOT was invited to do a DCR project overview presentation to the Estrella Village Planning Committee. Roadway widening, drainage, right of way concerns and existing and future traffic conditions were addressed at these meetings. In general, feedback provided by the public was very positive. The need to improve 75<sup>th</sup> Avenue was mutually agreed upon by the public. Appendix H contains handouts provided to the public, open house advertisements and meeting memorandums.



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## 2.0 TRAFFIC INFORMATION

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The existing traffic volume on 75<sup>th</sup> Avenue consists of 19% truck traffic and 81% passenger vehicles. The 24-hour average daily traffic (ADT) volume was found to be 9,540 vehicles per day (vpd). This volume exceeds MCDOT's desired maximum ADT of 7,000 vpd for 75<sup>th</sup> Avenue, which is designated as a major urban collector. The Van Buren Street intersection exists as an all-way stop controlled intersection and is currently functioning at a level of service "D" in the morning peak hour and a level of service "F" during the afternoon peak hour. The signalized intersection of MC 85 shows that the intersection is operating at a level of service "B" in the morning peak hours and a level of service "A" during the afternoon peak hours. 75<sup>th</sup> Avenue within the project limits operates at an approximate level of service of "D", which is lower than MCDOT's desired level of service. Between 1998 and 2000 a total of 26 vehicular collisions were reported. These collisions were comprised of 13 rear end, 5 angle, 4 side swipes, 3 single vehicles and one U-turn. There were no roadway geometric deficiencies identified, which may have contributed to these accidents. The forecast and existing traffic volumes for 75<sup>th</sup> Avenue from MC 85 to Van Buren Street are summarized below. For detailed existing and future traffic information refer to Appendix E: Traffic Analysis.

**Table 2.0: 75<sup>th</sup> Avenue: MC 85 to Van Buren Street Traffic Volumes**

Existing	9,540 ADT
2010	14,600 ADT
2020	23,300 ADT



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## 3.0 DESIGN CRITERIA

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### 3.1 MAJOR DESIGN FEATURES

**Roadway Design-** The design speed for this roadway designation is 90 kph (55 mph). The proposed Right of Way will be 33.528 meters (110 feet) for all alternatives except for Alternative B. Alternative B Right of Way requirements will be 30.480 meters (100 feet). The City of Phoenix requires 30.480 meters for this designation of roadway. The roadway design criteria is summarized in the table below.

**Roadway Drainage-** Catch Basins, scuppers and storm drains will be designed for a 10-year storm event for Alternatives A & C and a 2-year storm event for Alternative B. Detention basins will be designed to retain the 100-year, 2-hour storm event. Drainage design will be in accordance with Flood Control District of Maricopa County's Drainage Manuals for Alternative A and the City of Phoenix Storm Drain Design Manual for Alternative B.

**Railroad Widening-** At the Design Concept Phase of the project, the Union Pacific Railroad has minimum involvement. During the design phase of the project, plans will need to be submitted to and approved by the UPRR representatives. Once final plans have been approved by UPRR, the contractor must agree to meet railroad specifications and insurance requirements prior to being issued a permit once all fees have been paid.

In general, the November 1993 MCDOT Roadway Design Manual, the 1994 AASHTO Policy of Geometric Design of Highways and Streets and the Manual of Uniform Traffic Control Devices (MUTCD) were used as references for design guidelines. The following table summarizes Design Criteria.

**Partnering-** Potential partnering is anticipated with the City of Phoenix, City of Tolleson and the Flood Control District of Maricopa County, Salt River Project, Union Pacific Rail Road and future developers.



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**Table 3.1A: Design Criteria & Constraints**

Typical Section	Refer to Individual Alternative Analysis
Design Speed & Posted Speed	90 kph (55 mph) and 80 kph (50 mph)
Design Vehicle	WB-15 (WB-50) (Large Semi-Trailer)
Design Year and Design ADT	2020 and 23,300 vpd
Pavement Design Life	20 years
Pavement Structural Section (Refer to Geotechnical Report)	150 mm (6 in) Asphaltic Concrete 125 mm (5 in) Aggregate Base Course 400 mm (16 in) Lime Stabilized Subgrade
Horizontal Alignment	90 kph (55 mph)
Vertical Alignment	Design Speed of 90 kph (55 mph). In Accordance with MCDOT Design Guidelines Section 5:11
Roadway Cross Slope	2%
Longitudinal Profile Grade	5% Maximum 0.25% Minimum Ideal 0.20% Minimum (Special Cases)
Embankment/Excavation Slope	Maximum: Match Existing at 1Vertical:4 Horizontal & Within ROW
Clear Zone Widths	Curbed roadway sections a clear zone width minimum of 0.45 meters (1.5 feet) between the face of curb and the object in accordance with MCDOT's Roadway Design Guidelines. Uncurbed roadway clear zone widths shall be in accordance with AASHTO Roadside Design Guide.
Driveway Design	Industrial: MCDOT CH-1 (Refer to MCDOT Design Guidelines.)
Tapers	Minimum L=0.6WS (AASHTO Green Book)
Flares	Minimum 15:1
Roadway Drainage	Alternative A: Catch Basins 10-year event contained within curb height. Maintain one dry lane in each direction. Alternative B: Catch Basins 2-year event contained within curb height. Maintain one dry lane in each direction. Alternatives A & B: Retention Basin design is based on the 100-year, 2hour storm event.
Right of Way	Alternative A & C: 16.764m (55 feet) Alternative B: 15.24m (50 feet)
RID Bridge Crossing: Structural	Bridge Reconstruction.
Rail Road	Match Existing Track Elevations. UPRR Standards and Requirements (Contact: Bob Prince with UPRR)



## 4.0 DRAINAGE

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### 4.1 HYDROLOGIC OVERVIEW

Based on information provided in the *Hydrology Report for Floodplain Delineation of the Tolleson Area* and the *Durango Area Drainage Master Plan*, the project is located within the Durango Area Drainage Master Plan (DADMP) study area. Landmark boundaries which encompass the DADMP are the I-10 Freeway to the north, the I-17 Freeway to the east, the Salt and Gila Rivers to the south and the Agua Fria River to the west as depicted in Figure II-1-Existing Drainage Sub-Area boundaries, an excerpt from Dibble and Associates' DADMP Master Plan. This exhibit also shows the drainage pattern surrounding the project. The existing drainage pattern in the vicinity of this project generally drains from northeast to southwest accumulating along the RID Canal and UPRR. This drainage path created by these elevated features routes the flow to the Salt and Gila River on the south and the Agua Fria River on the west (Dibble & Associates, *Durango Area Drainage Master Plan, March 2001*). A strip of roadway along 75<sup>th</sup> Avenue between the bridge structure and Van Buren Street falls within the existing FEMA floodplan, refer to Figure II-1-Existing FEMA Floodplains, an excerpt from the Durango Area Drainage Master Plan. Please refer to the above mentioned reports for detailed hydrologic information within the project vicinity.



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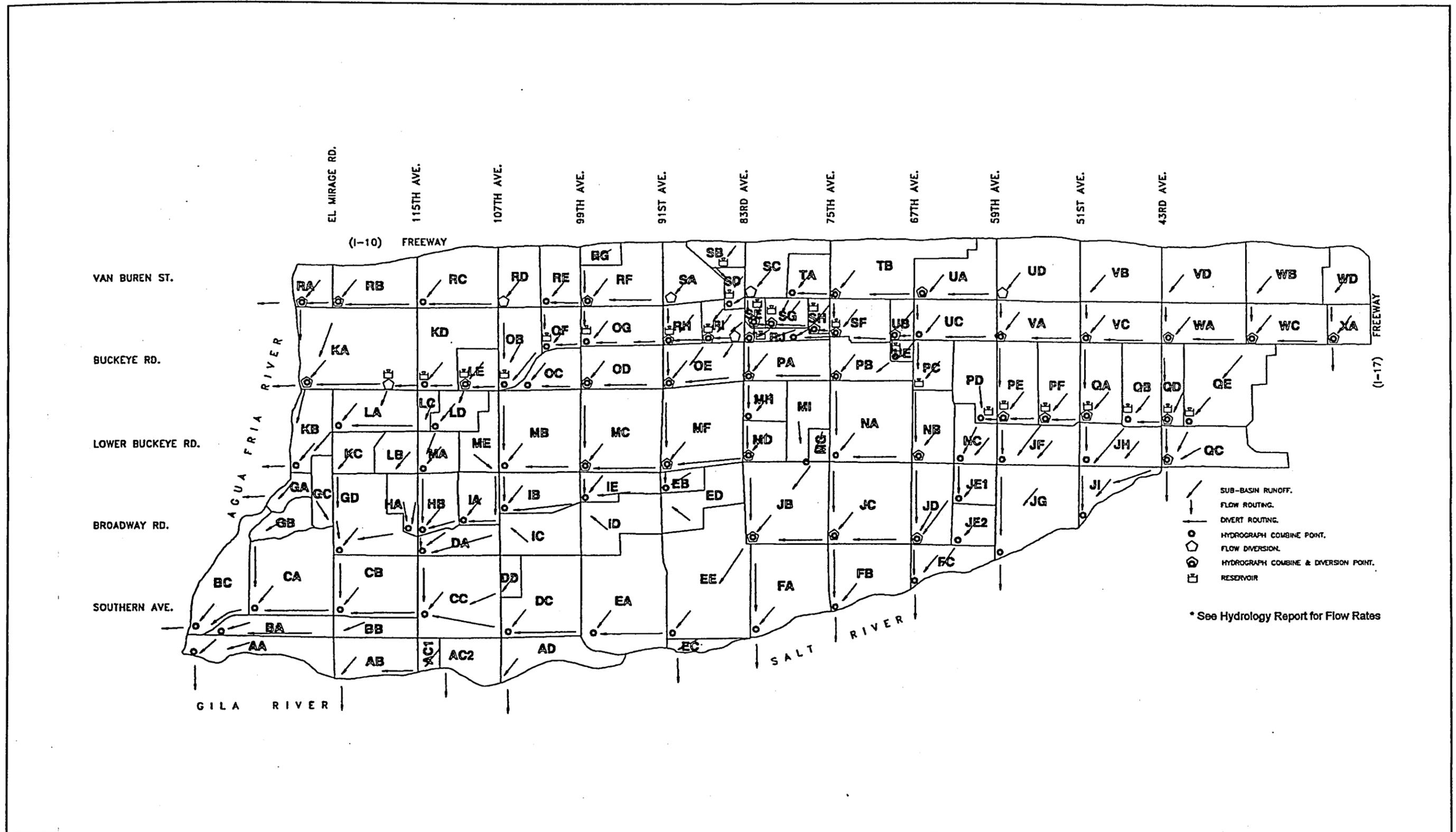
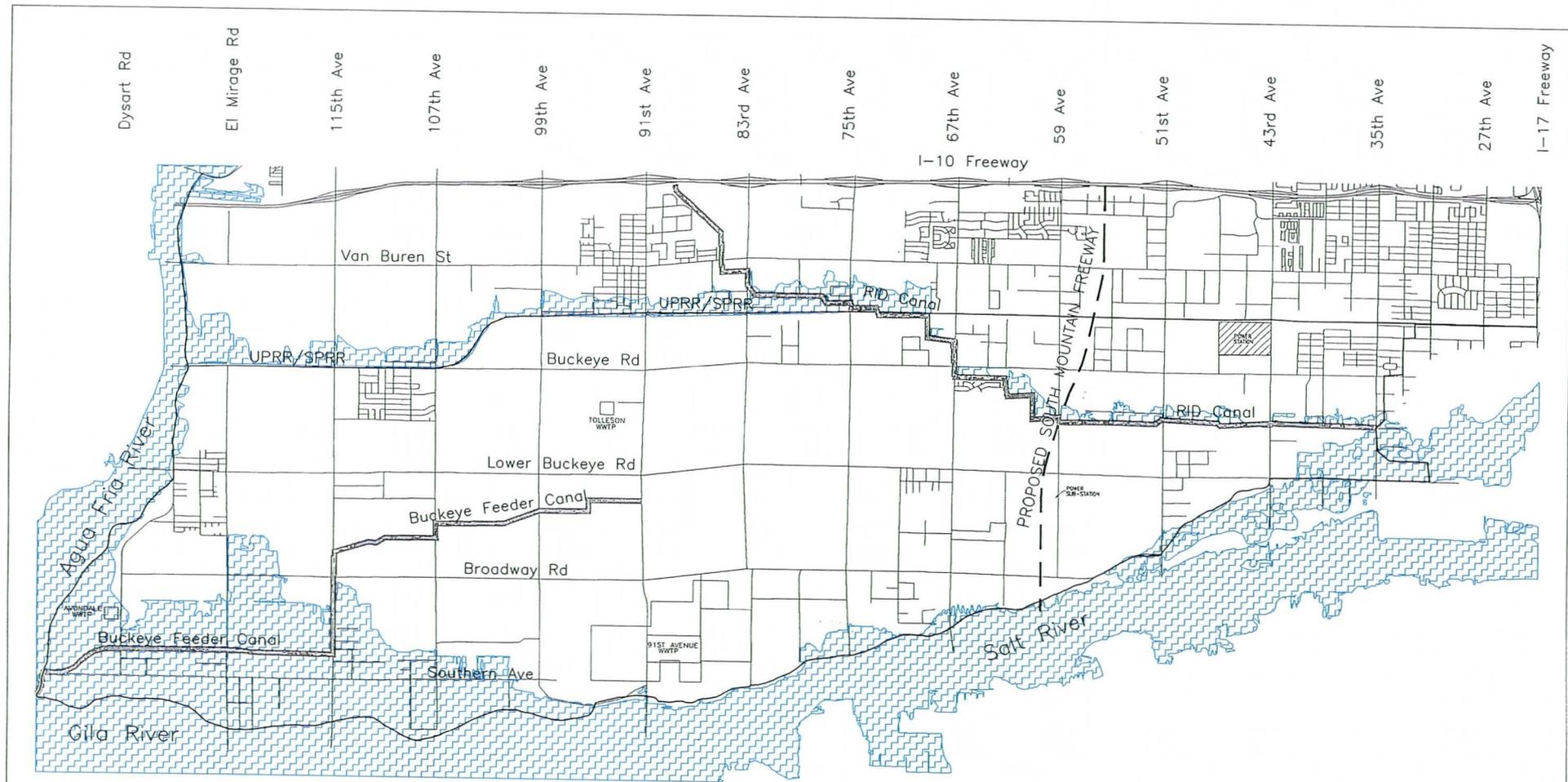
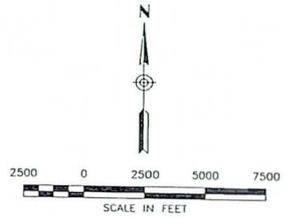


Figure II-1. - Existing Drainage Sub-Area Boundaries



LEGEND  
 EXISTING FEMA FLOODPLAIN

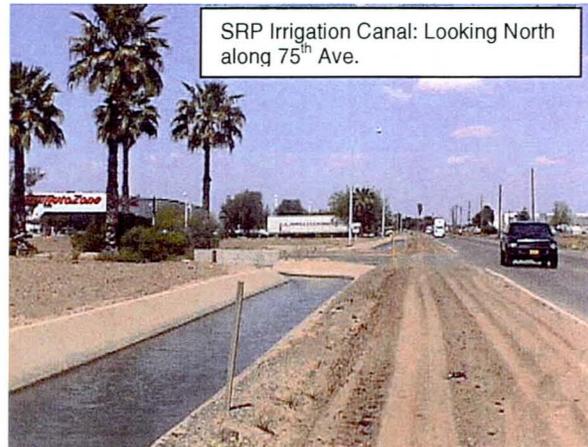


PROJECT TITLE	DURANGO AREA DRAINAGE MASTER PLAN PROJECT NO. FCD 99-41
CONSULTANT	 <b>DIBBLE &amp; ASSOCIATES</b> CONSULTING ENGINEERS
FIGURE TITLE	EXISTING FEMA FLOODPLAINS

FIGURE II-1

## 4.2 EXISTING DRAINAGE

Scuppers collect street drainage along the eastern portion of 75<sup>th</sup> Avenue between MC 85 and the mid-section line. Street drainage along the western half flows onto dirt shoulders. Heavy rains, which inundate the corridor, could potentially end up in the SRP irrigation canal flowing along the western side of 75<sup>th</sup> Avenue. This irrigation canal was not designed to intercept storm flows hence an important element of this DCR is to



find alternatives to resolve roadway drainage issues. Alternatives will look at collecting street runoff into catch basins to prevent contamination of the SRP canal as well as alleviate roadway flooding. Currently, there are no storm drain facilities within the project corridor. Proposed roadway improvements will not adversely affect the existing drainage flow pattern. The existing vertical alignment must be retained at the UPRR crossing, therefore, correcting the barrier that the crossing creates is not going to be viable. Refer to specific alternative discussions for recommended drainage improvements.

## 4.3 FUTURE DRAINAGE IMPROVEMENTS

Target developers are in the process of constructing their Southwest Distribution Center at the southeast corner of 75<sup>th</sup> Avenue and Van Buren Street. Based on information provided in the Target Southwest Distribution Center's Preliminary Drainage Study, offsite flows that enter the site shall be conveyed through the property via wide, flat channels which also functions as onsite retention facilities capturing the 100-year, 2-hour storm event. According to the report, a 100-year peak discharge from the north of 475 cfs enters the subject property near 75<sup>th</sup> Avenue and Van Buren Street. The peak runoff that enters the site from the east along the RID canal and the railroad tracks is 1020 cfs. Offsite flows are routed to a retention basin located along the southern boundary of the site. This basin has been designed to convey off-site flows through the site such that the 100-year storm event will overtop 75<sup>th</sup> Avenue at the southwest corner of Target's site and not cause an increase in the current weir flow condition. Flows exceeding the 100-year, 2-hour storm event will continue westerly and parallel to the UPRR. The scope of this particular DCR entails determining roadway and roadway drainage improvements and is not required to resolve drainage issues of the entire watershed. Flood Control District of Maricopa County is in the process of studying alternatives to alleviate the flooding issues that occur within and surrounding the project. This study is discussed below.



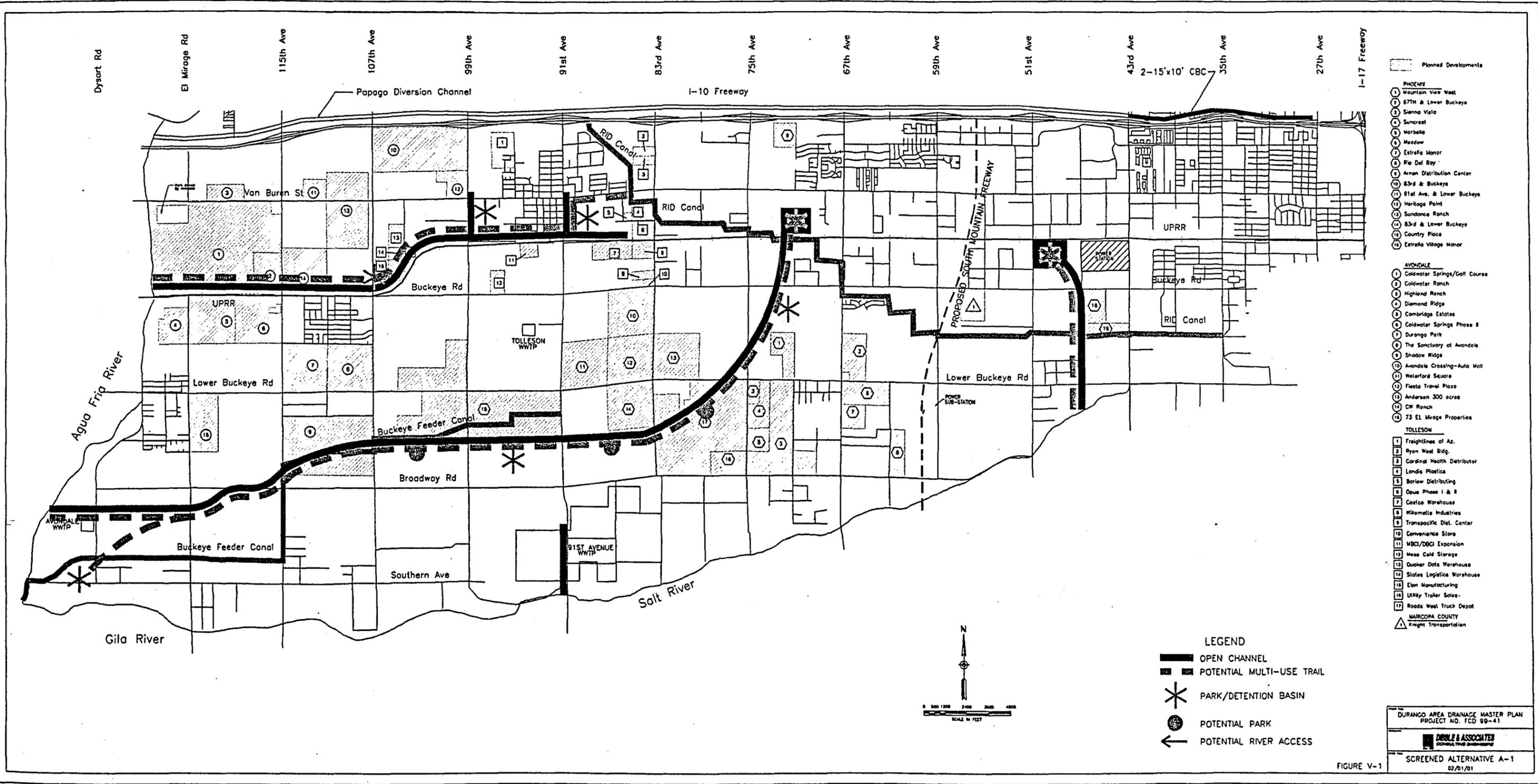
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Flood Control District reviewed several options, but the chosen regional system consists of three main channels with two key detention basins. The first channel alignment will route overland flow collected in a detention basin located near 51<sup>st</sup> Avenue and the UPRR southeast along the powerline corridor and outfall into the Salt River. The second channel will route overland flow collected in a detention basin located near 71<sup>st</sup> Avenue and the UPRR southwesterly and outfall into the Agua Fria River. The third channel alignment is along the north side of the UPRR from approximately 85<sup>th</sup> Avenue west to the Agua Fria River, with tributary channels along 91<sup>st</sup> Avenue and 99<sup>th</sup> Avenue from north of Van Buren Street south to the UPRR. Dibble and Associates addresses these alternatives in the Durango Area Drainage Master Plan Alternative Analysis Report (DADMP) prepared for the County. Figure V-1, an excerpt from this report, depicts the chosen alternative alignments. Design and construction of the Durango Regional Outfall has been budgeted into Flood Control's Capital Improvement Project Budget for Fiscal years 2000 through 2003.

In March of 2001 the City of Phoenix passed their 2000 bond proposition for storm sewer improvements. The City of Phoenix is researching alternatives to relieve the drainage problems occurring within and surrounding the project corridor. One option the City of Phoenix is evaluating is the construction of a storm drain system along 75<sup>th</sup> Avenue, which would begin north of the project limits at the Papago Freeway and outfall at the Salt River. The second option being examined is the construction of a major storm drain trunk which would begin north of the Papago Freeway, exact limits unknown at this time, and outfall into the Flood Control District of Maricopa County's proposed 39-acre detention basin located on 71<sup>st</sup> Avenue and the UPRR. This option will require the City of Phoenix partnering with Flood Control District of Maricopa County and coordination of the construction schedule to ensure that it accommodates the City's bond timetable. As of this date the City has not performed a drainage study or analysis of the drainage issues surrounding the project vicinity but storm drain improvements are programmed in the City of Phoenix's 2002 to 2003 capital improvement program.



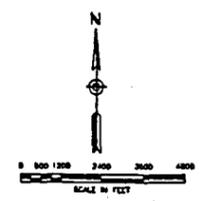
**Stantec**



- Planned Developments**
- PHOENIX**
- ① Mountain View West
  - ② 67th & Lower Buckeye
  - ③ Sierra Vista
  - ④ Suncrest
  - ⑤ Marbella
  - ⑥ Meadow
  - ⑦ Extraña Manor
  - ⑧ Rio Del Rey
  - ⑨ Arvan Distribution Center
  - ⑩ 83rd & Buckeye
  - ⑪ 81st Ave. & Lower Buckeye
  - ⑫ Heritage Point
  - ⑬ Sundance Ranch
  - ⑭ 83rd & Lower Buckeye
  - ⑮ Country Place
  - ⑯ Extraña Village Manor
- AVONDALE**
- ⑰ Coldwater Springs/Golf Course
  - ⑱ Coldwater Ranch
  - ⑲ Highland Ranch
  - ⑳ Diamond Ridge
  - ㉑ Cambridge Estates
  - ㉒ Coldwater Springs Phase II
  - ㉓ Durango Park
  - ㉔ The Sanctuary at Avondale
  - ㉕ Shadow Ridge
  - ㉖ Avondale Crossing-Auto Mall
  - ㉗ Waterford Square
  - ㉘ Fiesta Travel Plaza
  - ㉙ Anderson 300 acres
  - ㉚ CW Ranch
  - ㉛ 73 El Mirage Properties
- TOLLESON**
- ㉜ Freightlines of Az.
  - ㉝ Ryan West Bldg.
  - ㉞ Cardinal Health Distributor
  - ㉟ Landis Plastics
  - ㊱ Barlow Distributing
  - ㊲ Opus Phase I & II
  - ㊳ Costco Warehouse
  - ㊴ Wilamette Industries
  - ㊵ Transpacific Dist. Center
  - ㊶ Convenience Store
  - ㊷ MBO/DBCI Expansion
  - ㊸ Mesa Cold Storage
  - ㊹ Quaker Oats Warehouse
  - ㊺ States Logistics Warehouse
  - ㊻ Eton Manufacturing
  - ㊼ URRy Trailer Sales
  - ㊽ Roads West Truck Depot
- MARICOPA COUNTY**
- ㊾ Freight Transportation

**LEGEND**

- OPEN CHANNEL
- POTENTIAL MULTI-USE TRAIL
- \* PARK/DETENTION BASIN
- POTENTIAL PARK
- ↑ POTENTIAL RIVER ACCESS



DURANGO AREA DRAINAGE MASTER PLAN  
PROJECT NO. FCD 99-41

**DIBBLE & ASSOCIATES**  
CONSULTING ENGINEERS

SCREENED ALTERNATIVE A-1  
02/01/01

FIGURE V-1

## 5.0 LAND USE

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### 5.1 LAND USE AND ZONING

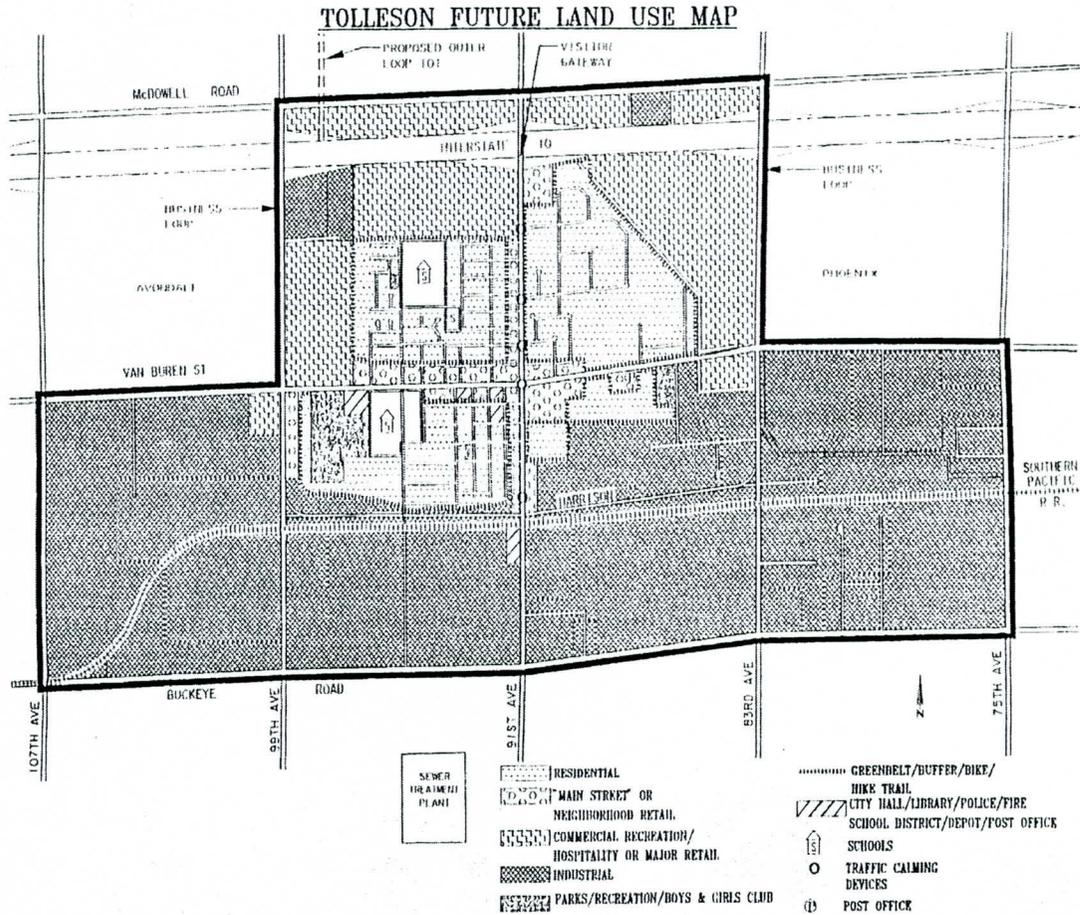
The project is located within the Estrella Village Planning Community which is bordered by the I-17 to the east, the Papago Freeway to the North, the Salt River to the South and 175<sup>th</sup> Avenue to the west. Approximately 62% of the village is vacant or currently used for agricultural purposes. The concentration of existing single family housing is located in the eastern portion of the village between 19<sup>th</sup> and 43<sup>rd</sup> Avenues. Over the years extensive industrial developments have built up within the community. According to the City of Phoenix's general plan additional single family developments are proposed for this area, but this would mainly occur south of MC 85.

Land directly adjacent to the project within the project limits consists of agricultural and industrial use. Autozone, Southwest Feed and Grain, and agricultural land occupy the western portion of 75<sup>th</sup> Avenue within the project limits. Two homes reside on the west side of the roadway between MC 85 and the mid-section line. An occupied home located at the northwest corner of 75<sup>th</sup> Avenue and MC 85. Freezer Services Distribution Center and Target's future Southwest Distribution Center occupy the eastern portion of 75<sup>th</sup> Avenue. The City of Phoenix and Tolleson have zoned the parcels adjacent to the project as industrial. Refer to the City of Phoenix's General Plan and City of Tolleson's Future Land Use Maps shown below for zoning designations.



**Stantec**

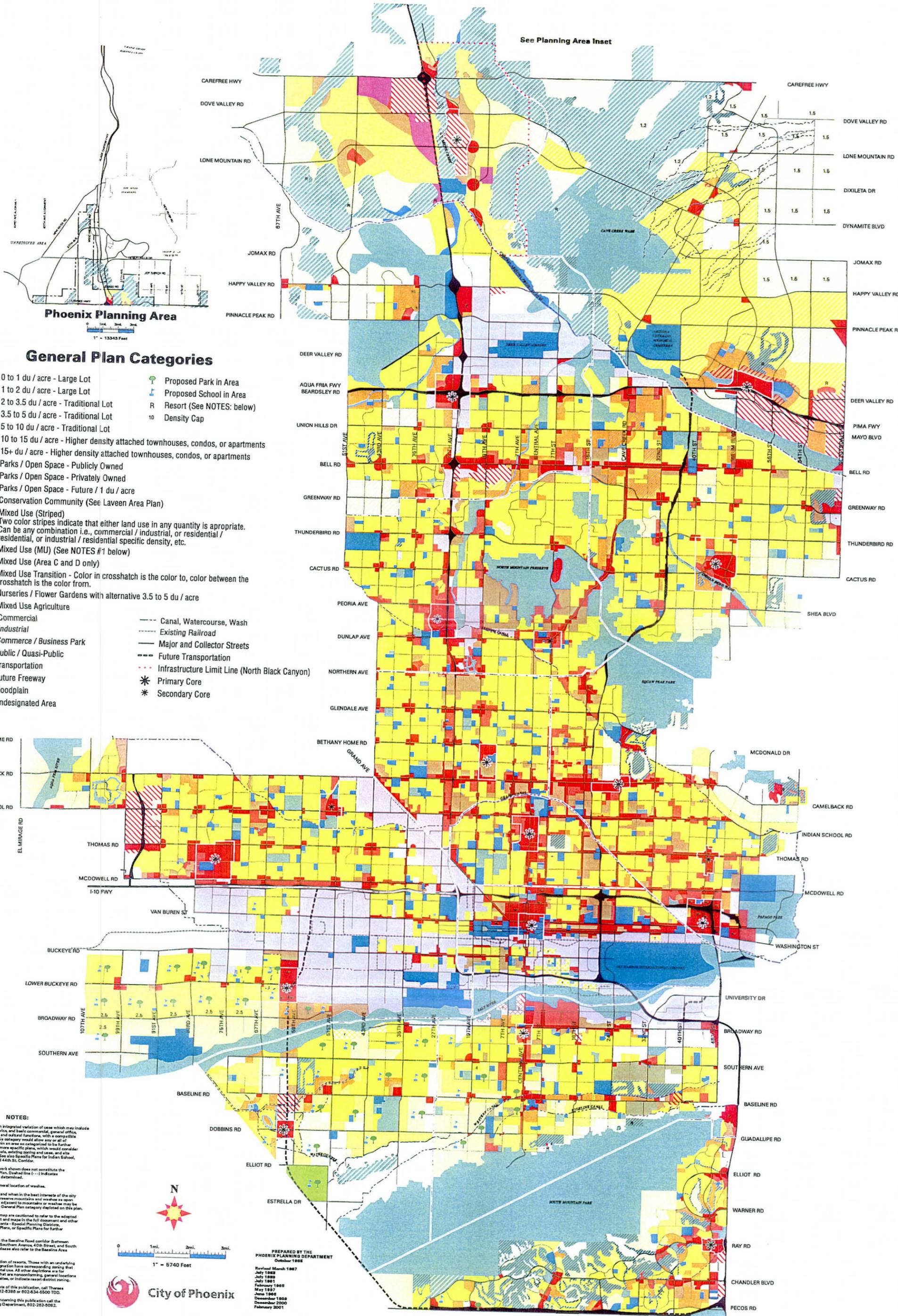
Figure 5.1A: City of Tolleson Zoning Map



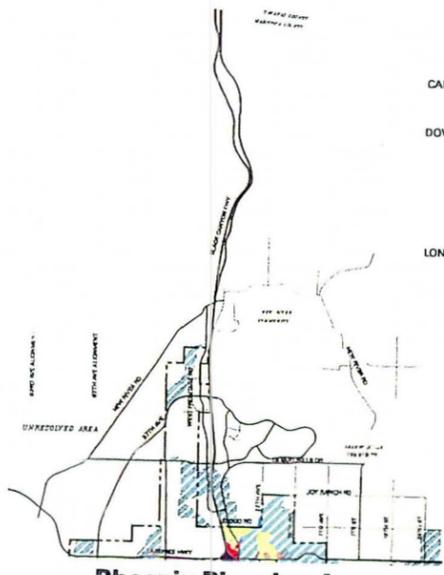
Stantec

# CITY OF PHOENIX GENERAL PLAN

## A Vision for the Future



See Planning Area Inset



### General Plan Categories

- 0 to 1 du / acre - Large Lot
- 1 to 2 du / acre - Large Lot
- 2 to 3.5 du / acre - Traditional Lot
- 3.5 to 5 du / acre - Traditional Lot
- 5 to 10 du / acre - Traditional Lot
- 10 to 15 du / acre - Higher density attached townhouses, condos, or apartments
- 15+ du / acre - Higher density attached townhouses, condos, or apartments
- Parks / Open Space - Publicly Owned
- Parks / Open Space - Privately Owned
- Parks / Open Space - Future / 1 du / acre
- Conservation Community (See Laveen Area Plan)
- Mixed Use (Striped)
- Mixed Use (Area C and D only)
- Mixed Use Transition - Color in crosshatch is the color to, color between the crosshatch is the color from.
- Nurseries / Flower Gardens with alternative 3.5 to 5 du / acre
- Mixed Use Agriculture
- Commercial
- Industrial
- Commerce / Business Park
- Public / Quasi-Public
- Transportation
- Future Freeway
- Floodplain
- Undesignated Area
- Proposed Park in Area
- Proposed School in Area
- R Resort (See NOTES: below)
- 10 Density Cap
- Canal, Watercourse, Wash
- Existing Railroad
- Major and Collector Streets
- Future Transportation
- Infrastructure Limit Line (North Black Canyon)
- Primary Core
- Secondary Core

**NOTES:**

Mixed Use is an integrated variation of use which may include residential, services, and basic commercial, general office, retail, and cultural functions, with a compatible density. This category would allow any or all of the uses within an area as categorized to be further defined by more specific plans, which would consider local Plan goals, existing zoning and use, and site characteristics. See also Specific Plans for Indian School, 19th Ave, and 44th St Corridor.

Street network shown does not constitute the transportation plan. Dashed line (---) indicates street to be determined.

depicts general location of washes.

appropriate, and when in the best interests of the city and preserve mountains and washes as soon as possible adjacent to mountains or washes may be or than the General Plan category depicted on this plan.

Use of this map are cautioned to refer to the adopted General Plan text and maps in the full document and other related references - Special Planning Division, Management Plans, or Specific Plans for further plan.

locations in the Baseline Road corridor between 10th Avenue, Southern Avenue, 40th Street, and Southern Avenue (P-13) please also refer to the Baseline Area Plan.

depicts location of resorts. Those with an underlying residential designation have corresponding zoning that is resort (R) use. All other depictions are for resorts that are nonconforming, general location, or indicate resort district zoning.

Additional information of this publication, call Thomas at 802-262-6388 or 802-262-5000 TDD.

For more information concerning this publication call the City Planning Department, 802-262-6022.

PREPARED BY THE PHOENIX PLANNING DEPARTMENT  
October 1988

Revised March 1987  
July 1988  
July 1989  
February 1990  
May 1997  
June 1998  
December 1999  
December 2000  
February 2001

City of Phoenix

## 5.2 FUTURE ROADWAY IMPROVEMENTS

The City of Phoenix is in the design process of improving the intersection of 75<sup>th</sup> Avenue and Van Buren Street. These improvements will reconstruct the existing stop condition intersection to a signalized intersection with all four legs reflecting a 19.2 meter (64 foot) typical section. These design plans are at a 90% design phase and the construction of this project is budgeted for fiscal years 2001 and 2002.

Currently, a commercial development is being constructed on the northeast corner of Van Buren Street and 75<sup>th</sup> Avenue. Target developers are also in the construction phase of building their Southwest Distribution Center. Target's new development will consume the entire strip of land to the east of 75<sup>th</sup> Avenue from Van Buren Street to the RID canal. Target developers also have 60% design plans to construct the easterly half-street improvements along 75<sup>th</sup> Avenue. These half-street improvements will tie into improvements at the intersection of 75<sup>th</sup> Avenue and Van Buren Street. Hence, the half-street typical section will be 9.6 meters (32 feet) from the section line to the face of curb. MCDOT has yet to approve the permit for the proposed construction of these half-street improvements along 75<sup>th</sup> Avenue. Table below list projects the City of Phoenix has planned into their Capital Improvement Project (CIP) program near the vicinity of the project limits.

**Table 5.2A: City of Phoenix Programmed Projects**

Project Description	Fiscal Year Budget for Construction
75 <sup>th</sup> Avenue and Van Buren Street Intersection Improvements.	2001 to 2002
75 <sup>th</sup> Avenue Roadway Improvements between Van Buren Street to the Papago Freeway.	2002 to 2003
75 <sup>th</sup> Avenue Roadway Improvements between MC 85 (Buckeye Road) to Van Buren Street.	2003 to 2004
75 <sup>th</sup> Avenue Storm Drain Project between Salt River to Papago Freeway	2002 to 2003
Van Buren Street Roadway Improvements between 75 <sup>th</sup> Avenue to 67 <sup>th</sup> Avenue.	2005 to 2006



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## 6.0 RIGHT OF WAY

### 6.1 EXISTING RIGHT OF WAY

The existing Right of Way (ROW) west of the section line from MC 85 to the UPRR ROW is 10.058 meters (33 feet). Proceeding north 22.860 meters (75 feet), Union Pacific Rail Road owns the ROW. The ROW increases to 16.764 meters (55 feet) between the UPRR property line and the RID boundary. RID's boundary extends 24.384 meters (80 feet) and the ROW within this area is 10.058 meters (33 feet). Continuing north 254.365 meters (834.53 feet) ROW resumes at 16.764 meter (55 feet). The remaining ROW to Van Buren Street is 10.058 meters (33 feet).

The existing ROW east of the section line from MC 85 north 790 meters (2,592 feet) north of MC 85 to the UPRR ROW is 16.764 meters (55 feet). Proceeding north 67.168 meters (220 feet), UPRR owns this portion of the ROW. The remaining ROW to Van Buren Street is 10.058 meters (33 feet).

The existing ROW along the western side of 75<sup>th</sup> Avenue south of MC 85 is 10.058 (33 feet). The existing ROW along the eastern portion of 75<sup>th</sup> Avenue south of MC 85 is 16.764 meters (55 feet). ROW plat maps are enclosed in Appendix D.

### 6.2 PROPOSED RIGHT OF WAY: ALTERNATIVE A

The proposed right of way required for the MCDOT Rural Minor Collector is 33.528 meters (110 feet). The following table shows the amount of right of way required for the construction of this alternative.

**Table 6.2A: Right of Way Acquisition**

Item	Book	Map	Sheet	Parcel	Hectacres	Acres	Owner
Right of Way Acquisition: Western Portion							
1	104	14	1	004A	0.030	0.0754	James Robert & Judy Gallo
2	104	14	1	004B	0.004	0.009	James Robert & Judy Gallo
3	104	14	1	004C	0.013	0.032	James Robert & Judy Gallo
4	104	14	1	001D	0.325	0.802	Hurley Emory Thomas
5	104	14	1	001F	0.154	0.380	Hurley Emory Thomas
7	104	14	1	NO #	0.016	0.040	Roosevelt Irrigation District
8	104	14	1	001F	0.141	0.348	Autozone Inc.
9	104	14	1	001G	0.115	0.284	Elmalon 75 <sup>th</sup> Avenue Partner
11	104	14	1	001G	0.115	0.284	Elmalon 75 <sup>th</sup> Avenue Partner
Right of Way Acquisition: Eastern Portion							
12	104	10	1	RR	0.031	0.0756	Union Pacific Rail Road
13	104	10	1	NO#	0.070	0.174	Roosevelt Irrigation District



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14	104	10	1	004B	0.166	0.410	Catellus Development Corp.
15	104	10	1	003J	0.251	0.620	Catellus Development Corp.
16	104	10	1	003E	0.004	0.010	Roosevelt Irrigation District
Total Right of Way Acquisition					1.435	3.544	

### 6.3 PROPOSED RIGHT OF WAY: ALTERNATIVE B

The proposed right of way required for the City of Phoenix Urban Arterial Roadway is 30.480 meters (100 feet). Right of way acquisition under this alternative assumes that the City of Phoenix has already purchased the right of way required for intersection improvements at Van Buren Street and 75<sup>th</sup> Avenue and half-street roadway improvements for the eastern portion of 75<sup>th</sup> between Van Buren Street and the RID canal. A residential home is located on the northwest corner of MC 85 and 75<sup>th</sup> Avenue. Due to roadway improvements it is likely that acquisition of this entire parcel may be required. The following table shows the amount of right of way required for the construction of this alternative. Refer to Alternative B's plan and profile sheets in Appendix A for detailed right of way limits.

**Table 6.3A: Right of Way Acquisition**

Item	Book	Map	Sheet	Parcel	Hectares	Acres	Owner
Right of Way Acquisition: Western Portion							
1	104	14	1	004A	0.119	0.295	James Robert & Judy Gallo
2	104	14	1	004B	0.004	0.009	James Robert & Judy Gallo
3	104	14	1	004C	0.013	0.032	James Robert & Judy Gallo
4	104	14	1	001D	0.216	0.535	Hurley Emory Thomas
5	104	14	1	001F	0.154	0.380	Hurley Emory Thomas
6	104	14	1	NO #	0.016	0.040	Roosevelt Irrigation District
7	104	14	1	001F	0.080	0.198	Autozone Inc.
Right of Way Acquisition: Eastern Portion							
8	104	10	1	RR	0.031	0.0756	Union Pacific Rail Road
9	104	10	1	NO#	0.024	0.059	Roosevelt Irrigation District
Temporary Construction Easement: Eastern Portion							
20	104	15	1	004J	0.012	0.030	VC Freezer Phoenix
Total Right of Way Acquisition					0.670	1.654	

### 6.4 PROPOSED RIGHT OF WAY: ALTERNATIVE C

The proposed right of way required for the MCDOT Urban Arterial Roadway is 33.528 meters (110 feet). The following table shows the amount of right of way required for the construction of this alternative. A residential home is located on the northwest corner of MC 85 and 75<sup>th</sup> Avenue. Due to roadway improvements it is likely that acquisition of this entire parcel may be required. Refer to Alternative C's plan and profile sheets in Appendix B for detailed right of way limits.



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Table 6.4A: Right of Way Acquisition

Item	Book	Map	Sheet	Parcel	Hectares	Acres	Owner
Right of Way Acquisition: Western Portion							
1	104	14	1	001B	0.127	0.314	Stardust Development Inc
2	104	14	1	001C	0.038	0.093	Hurley Emory Thomas
3	104	14	1	001G	0.0053	0.013	Hurley Emory Thomas
4	104	14	1	004A	0.119	0.295	James Robert & Judy Gallo
5	104	14	1	004B	0.004	0.009	James Robert & Judy Gallo
6	104	14	1	004C	0.013	0.032	James Robert & Judy Gallo
7	104	14	1	001D	0.325	0.802	Hurley Emory Thomas
8	104	14	1	001F	0.154	0.380	Hurley Emory Thomas
9	104	14		MCR 305-3	0.115	0.284	Canal Industrial Park
10	104	14	1	NO #	0.016	0.040	Roosevelt Irrigation District
11	104	14	1	001F	0.141	0.348	Autozone Inc.
12	104	14	1	001G	0.115	0.284	Elmalon 75 <sup>th</sup> Avenue Partner
13	104	31	1	002D	0.001	0.003	AZ Dept. of Transportation
14	104	14	1	001G	0.115	0.284	Elmalon 75 <sup>th</sup> Avenue Partner
Right of Way Acquisition: Eastern Portion							
15	104	10	1	RR	0.031	0.0756	Union Pacific Rail Road
16	104	10	1	NO#	0.070	0.174	Roosevelt Irrigation District
17	104	10	1	004B	0.166	0.410	Catellus Development Corp.
18	104	10	1	003J	0.251	0.620	Catellus Development Corp.
19	104	10	1	003E	0.004	0.010	Roosevelt Irrigation District
Temporary Construction Easement: Eastern Portion							
20	104	15	1	004J	0.012	0.030	VC Freezer Phoenix
Total Right of Way Acquisition					1.820	4.500	



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## 7.0 ENVIRONMENTAL OVERVIEW

Maricopa County Department of Transportation consulted Stantec Consulting Environmental department to determine environmental issues for the 75<sup>th</sup> Avenue DCR. Table 7.0A is a summary of environmental issues and impacts for this project, please refer to Appendix F for the Environmental portion of this DCR.

**Table 7.0 A: Environmental Issues**

*Project Name:* 75<sup>th</sup> Avenue

*Date:* 7/24/01

*Work Order No.:* 68986

*Site Visit:* 3/29/01

*Photos:* Yes

ISSUE	Yes	No	STUDY
Archaeology			X
Aquatic Ecology		X	
Terrestrial Ecology		X	
T&E Species - Fed.		X	
T&E Species - State		X	
Native Protected Plants		X	
Wildlife		X	
Riparian		X	
Wetlands		X	
Floodplains		X	
Hazardous Waste Sites			X
Prime/Statewide Farmland		X	
Section 4(f), 6(f)		X	
Social		X	
Sole Source Aquifer		X	
Air			X
Land Use		X	
ROW Required	X		
Noise			X
Visual		X	
Economic		X	
Other		X	



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**ENVIRONMENTAL CLEARANCES/PERMITS REQUIRED**

Clearance/Permit	Yes	No
ADEQ Water Quality Certification		X
Corps – Section 404 Individual		X
Corps – Section 404 Nationwide (NWP) NWP 14, NWP 26		X
Corps – Pre-construction Notification		X
USFWS – Section 7 or 10(a.) Consultation		X
NPDES – National Pollutant Discharge Elimination System		X
Tribal Communities	X	
State Historic Preservation Office (SHPO)	X	
Flood Control District		X
Federal Land Management Agencies		X
Other: State Land Office (ROW)		X
AZ Dept. of Agriculture Notice		X

Comments (significant impacts, unique features, special problems, sensitive issues):



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## 8.0 GEOTECHNICAL AND PAVEMENT ANALYSIS

### 8.1 EXISTING GEOTECHNICAL FINDINGS

AMEC, Earth and Environmental Incorporated developed the geotechnical report for MCDOT in December of 2000. The findings of this report are summarized below. Located in Appendix G is AMEC's geotechnical report.

Subsurface soils encountered were as follows:

DEPTH	CLASSIFICATION	DESCRIPTION
1.65m to 2.25m (5.5' to 7.5')	Sandy Clays	Soils varied primarily from soft to moderately firm at in situ moisture content
2.25m to 4.2m (5.5' to 14')	Sandy Clays	Soils are primarily moderately firm and appear to be more firm than previous layer
4.2m to 8.7m (14' to 29')	Clayey Sand and Sand	Soils are moderately firm to firm at their relatively low moisture content
8.7m to boring depth (29'+)	Silty Sand	Soils are generally moderately to strongly cemented and are hard. No freewater encountered.

Design parameters used in pavement analysis and recommendations are as follows:

- Design Life= 20 years
- Mean R-value= 5
- Design Resilient Modulus ( $M_r$ )= 5000 psi
- Average Daily Traffic= 17,751 ADT
- ESAL= 7,327,000
- Serviceability Loss= 1.4

Soil profiles indicate that the native soils at the surface are primarily soft and provide nominal support for asphalt concrete pavement in their current state. Existing pavement structure was determined by coring the pavement at four locations. The average result of these findings shows that the existing roadway pavement structure consists of 127mm (5 in) of Asphaltic Concrete over 152mm (6 in) of Base Course and 152mm (6 in) of Selected Material.



**Stantec**

## 8.2 PAVEMENT ALTERNATIVES

Alternative pavement sections recommended in the report are listed as follows:

### 8.2.1 Asphaltic Concrete Over Granular Base

Pavement Section ID#	Asphaltic Concrete	Aggregate Base Course
1	150 mm (6 in)	613 mm (24.5 in)

### 8.2.2 Full Depth Asphaltic Concrete

Pavement Section ID#	Asphaltic Concrete	Aggregate Base Course
2	350 mm (14 in)	0

### 8.2.3 Lime-Stabilized Section

Pavement Section ID#	Asphaltic Concrete	Aggregate Base Course	Lime Stabilized Subgrade
3	150 mm (6 in)	375 mm (15 in)	200 mm (8 in)
4	150 mm (6 in)	250 mm (10 in)	300mm (12 in)
5	150 mm (6 in)	125 mm (5 in)	400 mm (16 in)

### 8.2.4 Geogrid Reinforcement

Pavement Section ID#	Asphaltic Concrete	Aggregate Base Course
6	150 mm (6 in)	400 mm (16 in)
7	288 mm (11.5 in)	0



**Stantec**

### 8.3 PAVEMENT RECOMMENDATIONS

Due to the weak native soils, the geotechnical report recommends using soil stabilization techniques to improve the subgrade. Based on AMEC's previous experience, the recommended pavement section is number 5 consisting of a lime-stabilized section of 406 mm (16 in) under 127mm (5 in) of Aggregate Base Course and 152mm (6 in) of Asphaltic Concrete.

### 8.4 BRIDGE CROSSING SUPPORT

Additionally, the report suggests using drilled shaft foundations to support the bridge spanning the RID canal. In Central Arizona the straight, drilled, cast-in-place concrete piers have been extensively used to support bridge foundations.



**Stantec**

## 9.0 FIELD SURVEY AND AERIAL PHOTOGRAPHY

---

Project stationing was chosen to begin at 1+000.00 at the intersection of MC 85 and 75<sup>th</sup> Avenue and continue up-station to the north until Van Buren Street. A digital orthophotography with a 1-meter pixel resolution was shot for this project. Horizontal control for the aerial targets and existing street monuments were established by conducting a RTK GPS survey. NGS monuments were used for calibrating to Arizona State Plane, Central Zone coordinates. The following monuments used:

"EVANS" a traverse station brass disk set in concrete found at the southwest corner of 71<sup>st</sup> Ave. and Roosevelt St.

North	East	Units
272,640.970	185,882.715	meters

"WAY" an aluminum disk set in concrete found 210' ± east of 75<sup>th</sup> Ave. and 64' ± south of the east bound I-10 ramp.

North	East	Units
273,002.580	185,171.246	meters

Vertical control for the aerial targets was established using conventional leveling methods. The NGS monument "EVANS" was used as the project benchmark with a value of 1045.16 feet.

Monumentation for 75<sup>th</sup> Avenue was set by using the brass cap in hand hole located at the intersection of Van Buren Street and 75<sup>th</sup> Avenue, the hand hole found at the intersection of 75<sup>th</sup> Avenue and MC 85 and rebar found at the quarter sections. During the design phase it is suggested that hard design surveys be shot for the project and that the monumentation at the intersection of 75<sup>th</sup> Avenue and MC 85 be confirmed.



**Stantec**

## 10.0 ALTERNATIVE DISCRIPTIONS

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### 10.1 NO BUILD ALTERNATIVE

This option will leave 75<sup>th</sup> Avenue between MC 85 and Van Buren Street as a two-lane 7.8 meter (26-foot) roadway with northbound and southbound lanes and dirt shoulders.

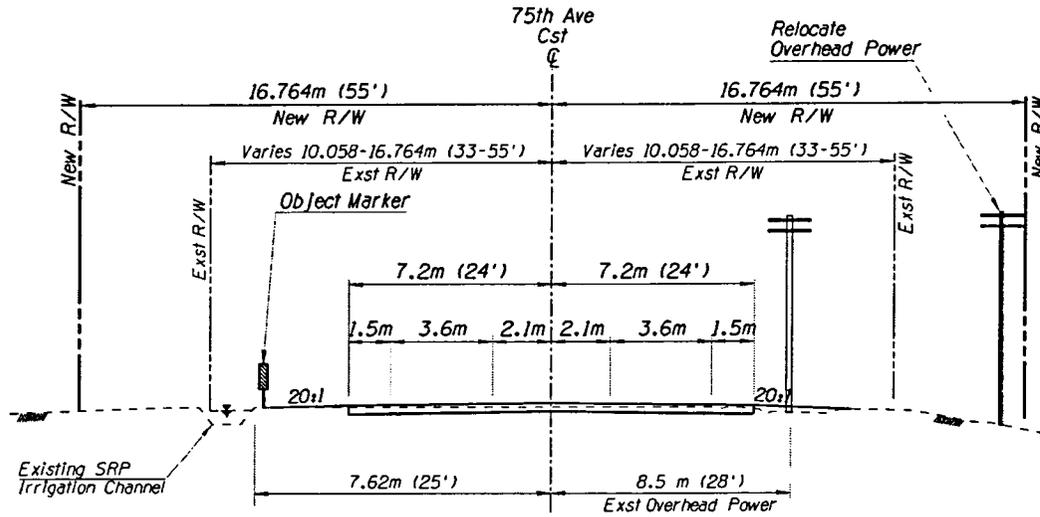
### 10.2 ALTERNATIVE A

Alternative A reviews the selected alternative described in the Candidate Assessment Report (CAR) written for MCDOT by Entranco. This reflects the 14.4 meter MCDOT Rural Collector Road. This typical section provides for a 3.6 meter (12') through lane in each direction, one 4.2 meter (14') continuous left turn lane and 1.5 meter (5') paved shoulder in each direction (Figure 10.2A). Improvements for this alternative will transition and match future conditions at the intersection of 75<sup>th</sup> Avenue and Van Buren (i.e. City of Phoenix's planned improvements). As noted earlier Target developers have plans to improve the eastern half of 75<sup>th</sup> Avenue from Van Buren Street to the RID bridge crossing. South of the UPRR, the majority of the existing curb, gutter and sidewalk along the eastern portion of 75<sup>th</sup> will remain undisturbed. In general, Alternative A improvements will provide for sawcutting at the centerline and widen to the west of the roadway centerline. Improving the intersection of MC 85 and 75<sup>th</sup> Avenue is not an option in this alternative, therefore, all improvements will tie back into existing conditions at the intersection of MC 85 and 75<sup>th</sup> Avenue.



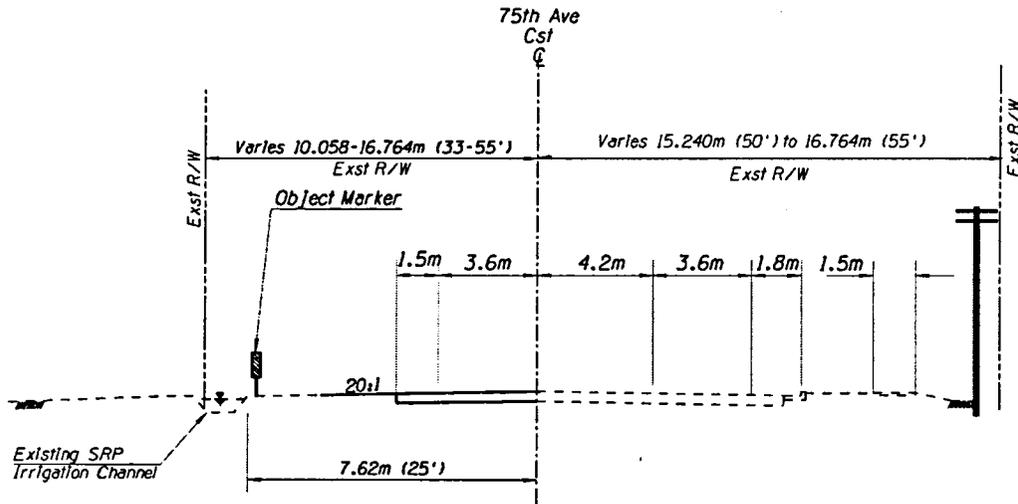
**Stantec**

Figure 10.2A: Alternative A Typical Section at UPRR Crossing



Alternative A  
3-Lane MCDOT Rural Minor Collector with Continuous Left Turn Lane

Figure 10.2B: Alternative A Typical Section



Alternative A  
MCDOT Rural Minor Collector with Left Turn Lane

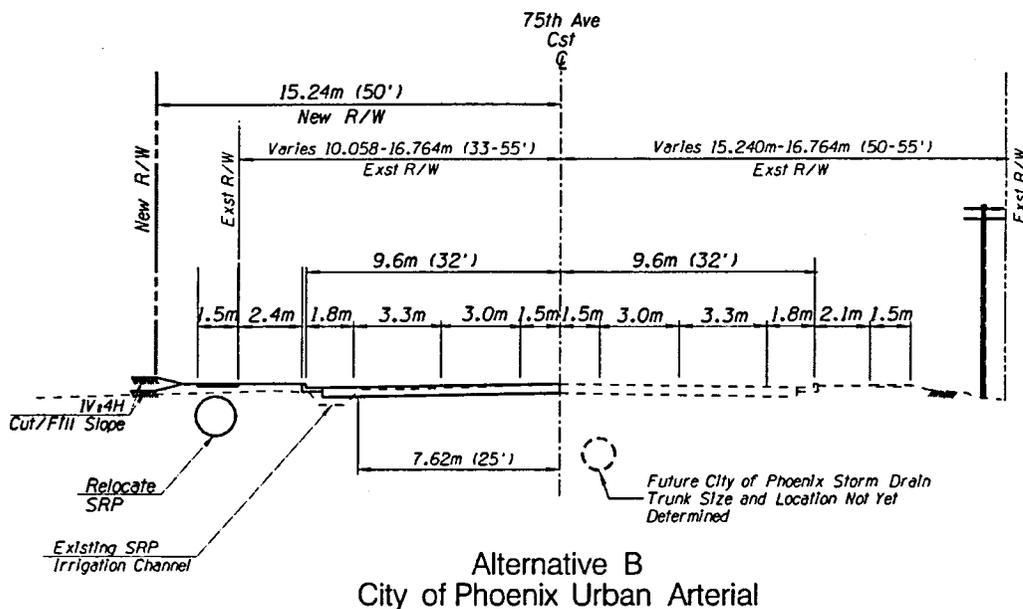


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### 10.3 ALTERNATIVE B

Alternative B assumes that Target half street improvements will be constructed and has a typical section matching that of the City of Phoenix's 19.2 meter (64 foot) arterial street, which provides for 3.0 meter (10 foot) inside through lanes in each direction, 3.3 meter (11 foot) outside through lanes in each direction, a 3.0 meter (10 foot) continuous left turn lane, 1.8 meter (6 foot) bike lanes in each direction, curb, gutter and sidewalk. The City of Phoenix has plans to improve all four legs of 75<sup>th</sup> Avenue and Van Buren Street to the 19.2 meter (64 foot) typical section and Target Distribution developers are also proposing a 19.2 meter typical section fronting their property. Alternative B's typical section will match these future improvements. Surrounding roads adjacent to the project are within the City of Phoenix's jurisdiction. Annexation of this remaining strip of roadway by the City of Phoenix would ensure that 75<sup>th</sup> Avenue would be built to the City's standards and allow for a continuous and cohesive roadway system.

Figure 10.3A: Alternative B Typical Section



### 10.4 ALTERNATIVE C: PREFERRED ALTERNATIVE

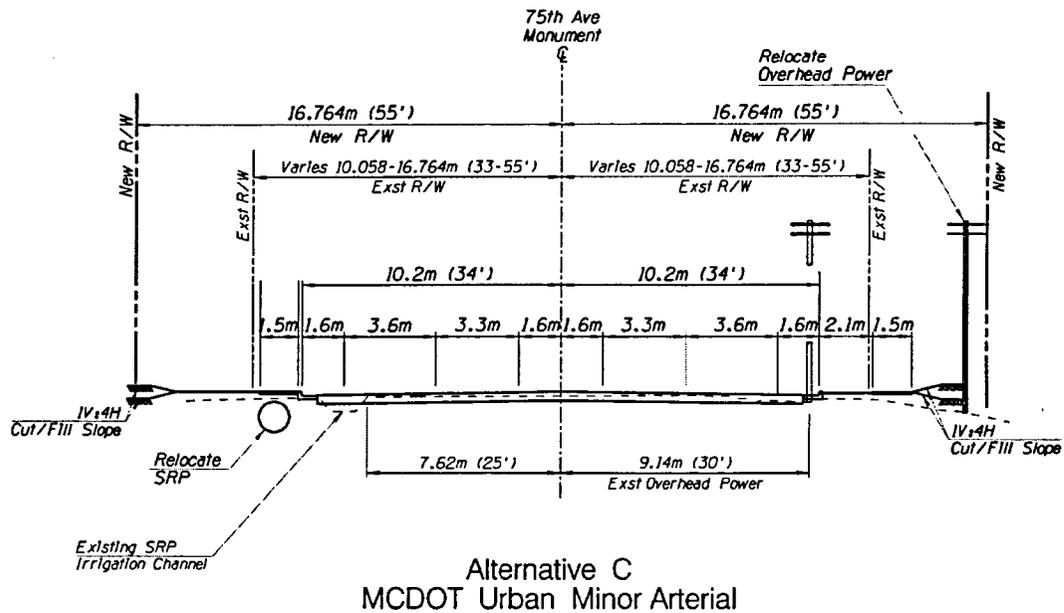
Alternative C has a typical section reflecting that of MCDOT's Urban Minor Arterial Road. Although 75<sup>th</sup> Avenue from MC85 to Van Buren Street is not included in MCDOT's planned bike network, MCDOT planning department requires that bike lanes be added to proposed improvements for 75<sup>th</sup> Avenue. Hence, slightly adjusting the Urban Minor Arterial Roadway lane configuration to include bike lanes will not only accommodate future traffic demands but also offers MCDOT's planning



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department the flexibility to add 75<sup>th</sup> Avenue into their bike network plan in the future. Modifying the lane configuration to include 1.65 meter (5.5 foot) bike lanes to the MCDOT Urban Minor Arterial Road typical section will still meet MCDOT's minimum 3.3 meter (11 foot) lane width criteria. The proposed 20.4 meter (68 foot) typical section consists of a 3.3 meter (11 foot) continuous left turn lane, inside through lanes of 3.3 meters (11 feet) in each direction, outside through lanes of 3.6 meters (12 feet) in each direction, bike lanes of 1.65 meters (5.5 feet) in each direction, curb, gutter and sidewalk.

Figure 10.4A: Alternative C Typical Section



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## 11.0 ALTERNATIVE ANALYSIS

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### 11.1.1 ALTERNATIVE A

Alternative A provides for MCDOT's 14.4 meter Rural Collector Road provides for a 3.6 meter (12') through lane in each direction, one 4.2 meter (14') continuous left turn lane and 1.5 meter (5') paved shoulder in each direction.

### 11.1.2 Drainage, RID Bridge Crossing and UPRR

Roadway drainage will sheet flow onto the dirt shoulder as it currently does. The required right of way will be 33.528 meters (110 feet). The existing RID bridge crossing is 12 meters (40 feet) long and 15 meters wide (50 feet). Although a 1.5 meter (5 foot) paved shoulder is included in the MCDOT Rural Collector Road typical section, an appropriate offset from the barrier of 2 meters (7.25 feet) will not be available. Due to the longitudinal cracks between T-beams MCDOT bridge department suggests that if improvements are required for the RID bridge crossing, reconstruction to accommodate the ultimate typical section is preferred. Coordination with UPRR will be required to widen the crossing. Utility conduits will be provided underneath the railroad crossing for convenient future access.

### 11.1.3 Utilities

In light of the future development proposed by Target Distribution Developers the SRP overhead power poles running along the east side of the roadway throughout the project limits will already have been relocated. If MCDOT approves this construction, relocation of these power poles will not be required for this alternative. Alternative A improvements have been designed so that widening will not encroach upon the existing SRP canal running along the western portion of the roadway (Refer to Figures 10.2A and 10.2B). The reconstruction of the RID bridge structure will conflict with an existing SWG line along the east side of the bridge. Conflicts are not anticipated with underground cable, sewer, water, petroleum, AT&T fiber optics, or telephone.

## 11.2 ALTERNATIVE B

Alternative B provides for the City of Phoenix's 19.2 meter (64 foot) arterial street, which provides for 3.0 meter (10 foot) inside through lanes in each direction, 3.3 meter (11 foot) outside through lanes in each direction, a 3.0 meter (10 foot) continuous left turn lane, 1.8 meter (6 foot) bike lanes in each direction, curb, gutter and sidewalk. This option looks at the possibility that the City of Phoenix will annex 75<sup>th</sup> Avenue between MC 85 and Van Buren Street once roadway improvements are made.



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### 11.2.1 Roadway Design

The alignment for Alternative B would hold the roadway centerline coincidental to the monument line throughout the project limits. From Van Buren Street to the RID bridge crossing, roadway improvements would sawcut at the section-line and widen to a face of curb width of 9.6 meters (32 feet) at a 2 percent cross slope, which would mirror the eastern portion of 75<sup>th</sup> Avenue. Catch basins will be added at natural sump locations to alleviate flooding. Due to the longitudinal cracks between T-beams, the RID bridge crossing will be reconstructed to a total width of 23.4 meters (77 feet) to accommodate roadway improvements including curb, gutter and sidewalk. The UPRR crossing will require widening to the ultimate typical section width of 22.5 meters (75 feet). Coordination with UPRR will be required to widen the crossing. Vertical elevations at the RID bridge crossing and the UPRR crossing will be held constant. A 127.5 meter (425 foot) vertical curve will be constructed at the UPRR crossing, the high point of the curve will match the existing elevation of the tracks. This curve was designed to allow for a smoother drive across the UPRR crossing, provide proper sight distance as well as maintain the crossing's existing conditions and integrity. The outfall for the overland flow conveyed through the Target Distribution Center is located north of the RID canal. The elevated nature of the RID canal channels overland flow west along the RID canal's northern boundary. Hence, the location of the FEMA floodplain delineated in Figure II-1: Existing FEMA floodplain. The elevated nature of the UPRR also routes overland flow west. Although the addition of a vertical curve will elevate the existing ground directly north of the UPRR crossing by approximately 0.395 meters (1.3 feet), proposed catch basins will capture roadway drainage and minimize any adverse drainage impacts due to roadway improvements. It is suggested that roadway and storm drain improvements be made concurrently. Curb and gutter improvements just south of the UPRR crossing may need to be reconstructed and a retaining wall provided due to the change in elevation introduced by the vertical curve. At Station 1+408.29 the existing face of curb dimension from the monument line is approximately 10.2 meters (34 feet), proposed improvements will taper to match existing curb, gutter and sidewalk. South of Station 1+408.29 the existing curb, gutter, sidewalk and drainage features along the east half of 75<sup>th</sup> Avenue will remain in place.

The east and west legs of the intersection of MC 85 and 75<sup>th</sup> Avenue exist as a 10.2-meter (34 foot) five lane typical section including left turn lanes. Since widening will occur west of the section-line, improvements will be made to the northwest and southwest corners of the intersection. Improvements made south of 75<sup>th</sup> Avenue and MC 85 will be minor improvements only to facilitate the merging of traffic to existing conditions. Full improvements made to the south leg of 75<sup>th</sup> Avenue are anticipated to occur with the MC 85 and 75<sup>th</sup> Avenue intersection improvement project. Refer to Appendix A for Alternative B plan and profile sheets.



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### 11.2.2 Drainage Design

Roadway drainage for the eastern half of 75<sup>th</sup> Avenue from Van Buren Street to the RID bridge crossing will be handled by Target Developers as part of their agreement with the City of Phoenix. Street flow for this portion will be collected in scuppers or catch basins and be conveyed to onsite retention basins. Intercepting street runoff for the remaining portion of the project will be addressed below.

As noted earlier, the City of Phoenix (COP) has storm drain improvements for 75<sup>th</sup> Avenue between the Papago Freeway and the Salt River programmed for construction into their 2002 to 2003 fiscal year Capital Improvement Plan. A recap of the different options COP is reviewing are as follows: Option one evaluates the construction of a storm drain system along 75<sup>th</sup> Avenue beginning at the Papago Freeway and outfalling into the Salt River. Option two looks at constructing a major storm drain trunk, which would begin north of the Papago Freeway and outfall into Flood Control District of Maricopa County's proposed regional retention system. Since Alternative B assumes that the City of Phoenix will annex the roadway, drainage control for Alternative B will depend directly on which option COP chooses to construct. At this time COP has made no final decisions.

Roadway drainage for 75<sup>th</sup> Avenue between the projects limits, excluding the half street flow which Target has accounted for, will be collected by catch basins designed to COP standards, a 2-year storm event, and conveyed to the Salt River via the future storm drain system along 75<sup>th</sup> Avenue for option one. Plan and profile sheets for Alternative B located in Appendix A depict drainage option one. If COP chooses to partner with Flood Control District on their regional retention system, option two, roadway drainage north of the UPRR will be collected in the future storm drain system and conveyed to the regional retention basin. A separate storm drain lateral will collect roadway drainage south of the UPRR and convey it to the regional retention system. Currently, scuppers are located along the east side of 75<sup>th</sup> Avenue south of UPRR. These scuppers allow street runoff to flow into landscaped areas. These existing drainage control elements will not be disturbed. Although Alternative B drawings depict drainage option one, at this stage of the design there are still too many unknown variables with the drainage design. In order to provide for the most efficient and cost effective resolution to the drainage matter, coordination between the Maricopa County Flood Control District, MCDOT and the City of Phoenix is required to resolve funding and scheduling issues.

### 11.2.3 Utility Relocations

The active SRP open canal running along the west side of 75<sup>th</sup> Avenue throughout the project limits will have to be piped. Existing streetlights along the west side of 75<sup>th</sup> Avenue north of the UPRR are close to the proposed sidewalk, design field surveys will determine whether relocation of street lighting is necessary. Due to the location of existing street lighting, a landscaped division between the back of curb and the sidewalk was not provided within this area. Target Distribution developers will have



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removed SRP power poles located along the eastern side of 75th Avenue. The existing 50mm (2 inch) gas line which runs adjacent to the RID bridge will require relocation. Caution needs to be taken near the AT&T fiber optic line crossing 75<sup>th</sup> Avenue just north of the RID canal. Utility conduits will be provided underneath the railroad crossing for convenient future access.

### 11.3 ALTERNATIVE C

Alternative C provides for MCDOT's Urban Minor Arterial Road. The proposed 20.4 meter (68 foot) typical section consists of a 3.3 meter (11 foot) continuous left turn lane, inside through lanes of 3.3 meters (11 feet) in each direction, outside through lanes of 3.6 meters (12 feet) in each direction, bike lanes of 1.65 meters (5.5 feet) in each direction, curb, gutter and sidewalk.

#### 11.3.1 Roadway Design

Although plans for half-street improvements along the eastern half of 75<sup>th</sup> Avenue between Van Buren Street and the RID bridge are currently being designed, roadway improvement plans have yet to be constructed or approved by MCDOT's permitting department. Hence, Stantec must base its' recommended Alternative on existing conditions as of June 2001, not future conditions, and in accordance with MCDOT design criteria and needs. Alternative C's alignment will propose that the monument line and the roadway centerline be coincidental. At Station 1+000.00, the beginning of the project, roadway improvements will sawcut at the construction centerline and widen to the west to a width of 10.2 meters (34 feet) at a 2% slope. This would match existing improvements along the eastern portion of 75<sup>th</sup> Avenue between station 1+000.00 to Station 1+408.29 which reflect a 10.2 meter (34 feet) face of curb dimension to the monument line. Roadway improvements between Station 1+408.27 to Station 2+598.29 will consists of removing the existing two-lane roadway and constructing MCDOT's Urban Minor Arterial typical section. Slight modifications to the existing vertical alignment will be made. Vertical elevations at the RID bridge crossing and the UPRR crossing will be held constant. A 127.5-meter (425 foot) vertical curve will be constructed at the UPRR crossing, the high point of the curve will match the existing elevation of the tracks. This curve was designed to allow for a smoother drive across the UPRR crossing, provide proper sight distance as well as maintain the crossing's existing conditions and integrity. The outfall for the overland flow conveyed through the Target Distribution Center is located north of the RID canal. The elevated nature of the RID canal channels the overland flow west along the RID canal's northern boundary. Hence, the location of the FEMA floodplain delineated in Figure II-1: Existing FEMA floodplain. The elevated nature of the UPRR also routes overland flow west. Although the addition of a vertical curve will elevate the existing ground directly north of the UPRR crossing by approximately 0.395 meters (1.3 feet), proposed catch basins will capture roadway drainage and minimize adverse drainage impacts due to roadway improvements. It is suggested that roadway and storm drain improvements be made concurrently. Curb and gutter improvements just south of the UPRR crossing will need to be reconstructed and a retaining wall provided due to



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the change in elevation introduced by the vertical curve. The proposed vertical grade will tie back into the existing grade at Station 1+408.29. South of this point, the existing curb, gutter, sidewalk and drainage improvements along the east half of 75<sup>th</sup> Avenue will be salvaged. Minimizing reconstruction of the eastern portion of 75<sup>th</sup> Avenue south of the railroad tracks will help avoid utility conflicts. There is an existing transmission power pole located at approximately Station 1+227.00, which will need to be avoided.

### 11.3.2 Bridge Structure Design

Andrew Wojakiewicz from the MCDOT bridge department suggests reconstructing the existing bridge superstructure while widening the bridge. Although the overall condition of the bridge has a good rating as indicated in the year 2000 bridge inspection report, longitudinal cracks between T-beams reflect the wheel fraction coming to one beam is, perhaps, larger than theoretical. Since the pavement is actually a composite slab working with the prestress beams, the pattern of transverse and random cracks is putting a question mark on the supposedly good condition of this structure. Hence, alternative discussions will recommend widening and reconstructing the bridge.

The bridge structure crossing the RID canal at approximately the midsection of 75<sup>th</sup> Avenue will be reconstructed to an over all width of 24.3 meters (81 feet). The concrete flume on the west will also have to be reconstructed and the gas line on the east will have to be relocated. During the design phase coordination with RID will be required.

### 11.3.3 Intersection of MC 85 and 75<sup>th</sup> Avenue

The east and west legs of the intersection of MC 85 and 75<sup>th</sup> Avenue exist as a 10.2 meter (34 foot to face of curb ) five lane typical section including left turn lanes. This configuration will remain the same for this project. At the intersection of MC 85 and 75<sup>th</sup> Avenue widening will occur west of the north-south monument line. Roadway improvements along 75<sup>th</sup> Avenue will not carry through the intersection, thus improvements will be made to the northwest and southwest corners of the intersection only. Improvements south of the intersection are required to facilitate the merging of traffic to existing conditions south of MC 85. The Maricopa Association of Governments considers MC 85 between SR 85 in Buckeye and I-17 in Phoenix a Road of Regional Significance (RRS). With this designation, MC 85 will have an ultimate cross section which would provide for three through lanes in each direction. The traffic analysis section of this report studies the most optimal configuration for MC 85 and concluded a fully built out intersection consisting of double left turn lanes, exclusive right turn lanes, three through lanes and three departure lanes (Refer to Exhibit 7-5 in the traffic analysis section). Based on the optimal configuration, the overall intersection would function at a level of service of "C" under year 2010 conditions and a level of service "D" under 2020 conditions. Due to the RRS designation and future traffic counts this intersection will require upgrading in the



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near future. Since extensive enhancements will be required for this intersection it would be more efficient that full improvements to the south leg of 75<sup>th</sup> Avenue be completed with the intersection improvement project. Currently, the overall intersection functions with a level of service of "B" in the AM hours and a level of service of "A" in the PM peak hours but future traffic counts show that improvement will be required prior to the year 2010.

#### 11.3.4 Intersection of Van Buren Street and 75<sup>th</sup> Avenue

As noted earlier, the City of Phoenix will improve the intersection of Van Buren Street and 75<sup>th</sup> Avenue. This intersection resides within the jurisdiction of COP and permitting will not be an issue. With this knowledge, all roadway improvements to 75<sup>th</sup> Avenue will match into the COP's 19.2-meter (64 foot) Urban Arterial typical section at this intersection.

#### 11.3.5 Drainage Design

The construction of this roadway will consist of collecting, conveying and retaining storm water runoff generated by improved portions of 75<sup>th</sup> Avenue between the project limits. Curb and gutter will direct street runoff into catch basins. These drainage features will deliver runoff to localized retention basins, the first located at the northwest corner of 75<sup>th</sup> Avenue and the RID bridge crossing and the second located at the northwest corner of 75<sup>th</sup> Avenue and MC 85. Requirements met for these drainage features are as follows:

1. Roadway catch basins, storm drains and laterals were designed for the 10-year storm event, in accordance with the Flood Control District criteria.
2. Catch basin locations were based on maintaining one dry lane of 3.6 meters (12 feet) available for travel and sump locations.
3. Retention basin volumes were calculated for the 100-year, 2-hour storm event, in accordance with the Flood Control District of Maricopa County. The maximum water depth in retention basins is 0.9 meters (3 feet) the maximum grading depth is 1.2 meters (4 feet) providing 0.3 meters (1 ft) of freeboard.

Alternative A requires the construction of a storm drain line along 75<sup>th</sup> Avenue. A 600 mm (24 inch) storm drain line will collect roadway runoff for the western portion of the roadway north of the UPRR. Street drainage will outfall into a 16mx82mx1.2m trapezoidal basin located at the northwest corner of the RID bridge and 75<sup>th</sup> Avenue. Grading for the basin will provide a 0.30 m (1 foot) of freeboard. ROW value for this basin should be reasonably valued due to the location. This basin will fall within the FEMA floodplain. A 750 mm (30 inch) storm drain line will collect street drainage south of the UPRR and outfall into a 39mx59mx1.2m trapezoidal basin located at the northwest corner of MC 85 and 75<sup>th</sup> Avenue. A residential home is located on this



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corner of the intersection, due to roadway improvements it is likely that full ROW acquisition for this parcel will be required. This site is a convenient location for a retention basin not only for hydraulic purposes but also due to ROW acquisition.

The City of Phoenix and Flood Control District have funds allotted for potential projects to improve drainage problems within the project limits. Since storm drain facilities currently do not exist within the project limits; catch basins will be installed to alleviate roadway flooding. A site visit in February showed Target Developers in the process of grading onsite facilities and retention basins. According to the Preliminary Drainage Study for the Target Distribution Center, these retention basins will contain onsite flows as well as half-street runoff. Hence, half-street runoff along the eastern portion of 75<sup>th</sup> Avenue from Van Buren Street to the RID bridge will be collected into catch basins and routed to the appropriate retention basins located on Target's site. Half-street runoff along the western portion of 75<sup>th</sup> Avenue throughout the project limits will be captured in catch basins and conveyed to one of the two localized trapezoidal retention basins via storm drains. From the beginning of the project to Station 1+408.27 drainage elements along the eastern half of 75<sup>th</sup> Avenue will remain intact. Refer to Appendix A for Alternative C's plan and profile sheets depicting basin locations. Refer to Appendix C for retention volume and catch basin sizing calculations.

#### **11.4 NO BUILD ALTERNATIVE**

This alternative would leave 75<sup>th</sup> Avenue as a 7.8 meter (26 foot) two-lane north-south bound rural roadway. The existing truck and passenger vehicle volume along this strip of roadway is 9,540 vehicles per day. This existing traffic volume for present roadway conditions already exceeds MCDOT's maximum daily volume of 7,000 vpd. The estimated level of service of 75<sup>th</sup> Avenue is "D" and the high truck traffic volume inundating this two-lane roadway introduces roadway hazards that will require attention. Furthermore, existing street drainage sheet flows and will either pond on the side of the road or will be captured in the SRP canal, which is not a conveyance port for storm water flows. The existing pavement is in a deteriorating condition, which could lead to potential vehicular incidents.

#### **11.4 ALTERNATIVE COMPARISON AND CONCLUSIONS**

##### **11.4.1 Alternative A: Conclusion**

This alternative was the recommended alternative referenced in the Candidate Assessment Report prepared in February 1998 by Entranco. Although this is a cost-effective solution to enhancing the safety of the existing roadway, it does not provide an adequate level of service for current traffic volume. Nor will it correct existing drainage problems within the corridor. Additionally, in light of improvements proposed by the City of Phoenix and Target Distribution developers Alternative A's proposed typical section would not be symmetrical to what is proposed for the



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eastern portion of 75<sup>th</sup> Avenue. For these reasons Alternative A was eliminated from further discussion.

**11.4.2 Alternative B: Conclusion**

Since MCDOT planning department would like the ability to provide for bike lanes to 75<sup>th</sup> Avenue between the project limits, we are not recommending the City of Phoenix's Urban Arterial typical section. The high volume of truck traffic in this area is not conducive to the narrow lane configuration proposed by Alternative B's typical section. Not only does this lane configuration pose unsafe conditions for motor vehicle drivers but also for the cyclists. Although eliminating bike lanes would in turn widen the lane configuration and provide for a safer roadway, this option was eliminated due to the provision of bike lanes requested by MCDOT. This alternative was added to the DCR to provide options for the potential of the City of Phoenix annexing 75<sup>th</sup> Avenue between MC 85 and Van Buren Street and thereby partnering with MCDOT to ensure that the construction of this roadway occurs.

**11.4.3 Alternative C: Conclusion**

If annexation of this strip of roadway by the City of Phoenix does not occur, then Alternative C the recommended alternative will provide improvements which will meet all of the MCDOT criteria. This typical section provides adequate travel lanes for current and future traffic conditions, gives MCDOT planning department the flexibility to provide bike lanes, provides for a storm drain system which will improve current flooding conditions and increase safety for both pedestrians and vehicles.

**11.5.4 No Build: Conclusion**

As mentioned previously, existing conditions along 75<sup>th</sup> Avenue within the project corridor show a roadway performing at a level of service below MCDOT standards, deteriorating pavement conditions, unsafe conditions for both pedestrians and vehicles and poor drainage control. Hence, to meet future demands, enhance safety and alleviate drainage problems the improvement of 75<sup>th</sup> Avenue between MC 85 and Van Buren Street is imperative. The No-Built Alternative is not recommended, therefore, has been eliminated from further discussion.

**11.6 COMPARISON MATRIX**

Alternative	Typical Section	Drainage	Traffic	Partnering Potential	ROW	Costs



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A	Three lane Roadway	No Improvements	Does not enhance LOS or reduce traffic incidents	Little to None	3.544 Acres	\$909,633
B	Five Lane 19.2 meter (64') Roadway	Connect to COP Storm Drain	Enhances LOS	High Potential with COP, FCD, SRP and UPRR	1.624 Acres	\$3,183,165
C	Five Lane 20.4 meter (68') Roadway	2 Localized Retention Basins	Enhances LOS and increases safety	Medium-High Potential with COP, FCD, SRP	4.470 Acres	\$4,940,519
No-Build	Existing Two Lane Roadway	No Improvements	Does not enhance LOS or reduce traffic incidents	None	0 Acres	\$0

### 11.5 SUMMARY RECOMMENDATION

The recommended alternative is Alternative C because it meets all of MCDOT criteria and provides for current and future growth demands. Although Alternative C is the recommended alternative, it is not the most cost-effective. Alternative B offers the ability to partner with the City of Phoenix which would distribute the weight of design and construction costs for this project. Partnering would not only increase the potential that funds will be available for this project but also presents an opportunity for the two agencies to work collectively together to achieve a mutual goal. Further coordination between the MCDOT and the City of Phoenix to agree upon a typical section and a drainage control option will be necessary.



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## 12.0 Utility Information

### 12.1 GENERAL

Roosevelt Irrigation District (RID) Canal and Union Pacific Rail Road (UPRR) cross 75<sup>th</sup> Avenue near the mid-section. RID has a dirt maintenance road which runs east-west parallel to the canal and also crosses 75<sup>th</sup> Avenue near the RID bridge structure. SRP Canal runs along the western side of 75<sup>th</sup> Avenue throughout the project limits.

Existing utilities were either located in the field or from utility maps. The following table summarizes existing utility locations within the project corridor. Utility relocation are dependent upon alternative options, refer to specific alternative for relocation requirements.

**Table 12.1A: 75th Avenue Existing Utilities**

UTILITY OWNER	UTILITY DESCRIPTION	UTILITY LOCATION
City of Phoenix	36" Sanitary Sewer	Runs north-south between MC 85 and Van Buren Street. Offsets Range from: 1.35 meters (4.5 feet) west of sectionline, 0 meters, and 0.6 meters (2 feet) east of sectionline.
City of Phoenix	12" Water	Runs north-south between MC 85 and Van Buren Street. Offset is 10.0 meters (33 feet) east of the sectionline.
City of Tolleson	12" Water	Runs north-south between MC 85 and Van Buren Street. Offset is approximately 6.1 meters (20 feet) west of the sectionline.
Kinder Morgan Energy/Williams Communications	12" Petroleum presently used as a fiber optic conduit.	Runs north-south between MC 85 to UPRR approximately 8.2 meters (27 feet) east of the sectionline.
Kinder Morgan Energy	6" Petroleum. According to KME representatives this is a shallow line.	Runs east-west parallel and north of the RID canal. Then jogs north on 75 <sup>th</sup> Avenue at an offset of 8.2 meters (27 feet) east of the sectionline.
Kinder Morgan Energy	20" Petroleum. According to KME representatives this is a deep line.	Runs east-west parallel to UPRR. Crosses 75 <sup>th</sup> Avenue at the UPRR.



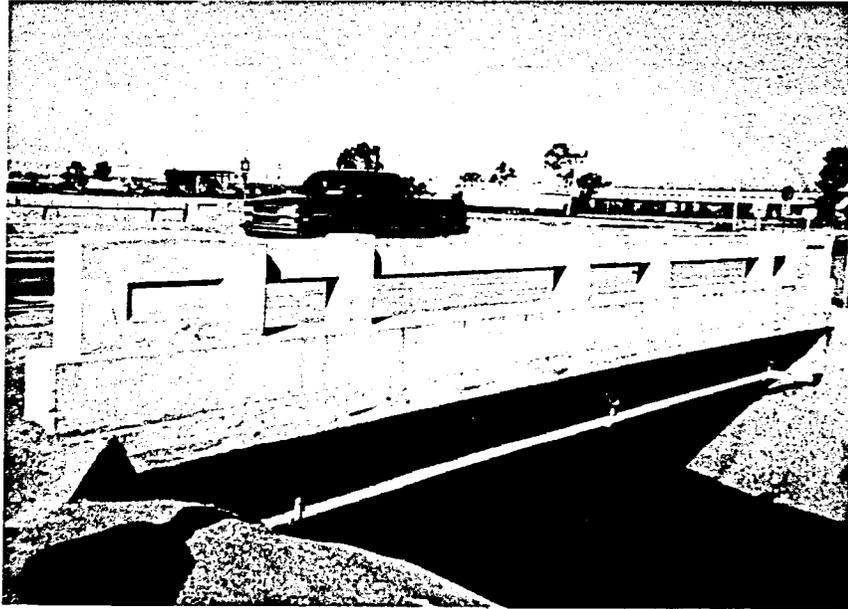
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Southwest Gas	Underground Gas	50mm (2 inch) Gas line runs north-south between MC 85 to Van Buren Street. Offsets vary between 5.2 meters (17 feet) and 7 meters (23 feet) east of the sectionline. This line crosses the RID canal via supporting hooks attached to the bridge structure (Refer to Picture 1). A secondary gas line runs north-south between the mid-section north to Van Buren Street at an offset of 15.2 meters (50 feet).
Salt River Project	Overhead Power	Runs north-south along the east side of 75 <sup>th</sup> Avenue at an approximate offset of 8.2 meters (27 feet) east of the sectionline. A secondary line of overhead power runs east-west parallel to the UPRR. Within the corridor along the east side of the roadway near the Freezer Distribution Facility exists a major transmission power pole.
Salt River Project	Concrete Irrigation Canal	Runs north-south along the west side of 75 <sup>th</sup> Avenue throughout the entire corridor limits. An irrigation well/pump site exists south of the RID canal crossing (Refer to Picture 2).
Roosevelt Irrigation District	Concrete Irrigation Canal	Runs east west and crosses 75 <sup>th</sup> Avenue near the mid-section.
	Street Lighting	Runs north-south between the mid-section line and Van Buren Street at an approximate offset of 12 meters (39 feet) left.
AT&T	Buried Fiber Optic Cable	Runs east-west north of and parallel to the RID canal. Runs along the northern RID maintenance road.
U S West	Underground Telephone	Runs north-south along the east side of 75 <sup>th</sup> Avenue throughout the project limits. Fiber optic cables exist north of Van Buren Street and terminate at a junction box near the southeast corner of Van Buren and 75 <sup>th</sup> Avenue.

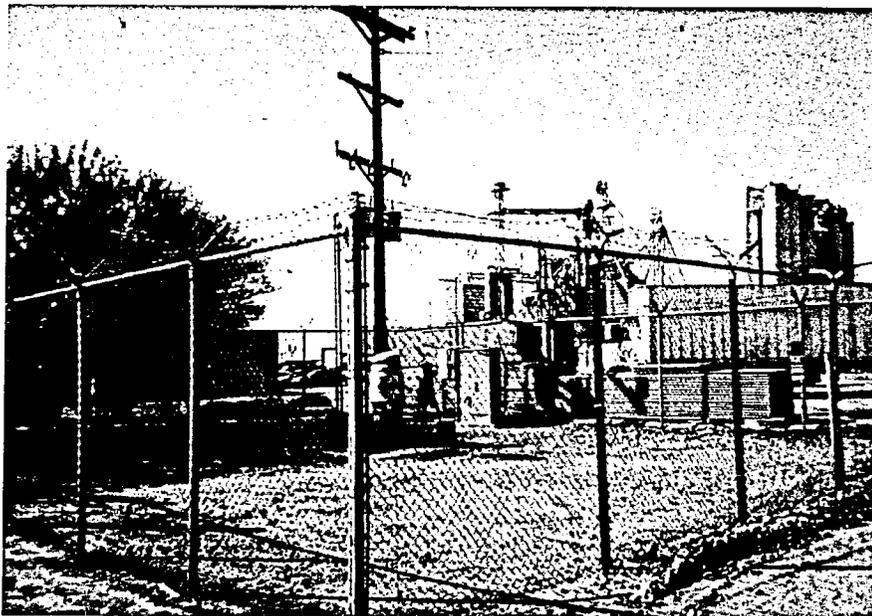


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**Utility Picture 1: Southwest Gas Line Crossing the RID Canal**



**Utility Picture 2: SRP Well Site Located South of the RID Canal Crossing on the West Side of 75<sup>th</sup> Ave.**



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## 13.0 Cost Estimates

### 13.1 PRELIMINARY CONSTRUCTION COSTS

<i>Alternative: A Grade, Drain &amp; Pave (or Penetrate &amp; Chip)</i>					
<i>Item #</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Unit Cost</i>	<i>Total</i>
107.01100	N.P.D.E.S.	L.S.	1	\$4,000.00	\$ 4,000.00
107.09200	Community Relations	Allowance	1	\$15,000.00	\$ 15,000.00
205.03000	Roadway Excavation	CM	3,506	\$4.50	\$ 15,777.00
301.00000	Subgrade Preparation	SQM	11,448	\$2.75	\$ 31,482.00
321.01300	New Asphalt Pavement per Structural Section 5	SQ M	11,448	\$27.55	\$ 315,392.40
336.08100	Pavement Sawcut	M	1,590	\$6.50	\$ 10,335.00
350.01110	Removal of Existing Improvements	L.S.	1	\$20,000.00	\$ 20,000.00
402.00000	Traffic Signing & Striping - 3 lanes	M	1,590	\$4.25	\$ 6,757.50
		Subtotal			\$ 418,743.90
110.01000	Mobilization @ 5%	L.S.	1	\$20,937.00	\$ 20,937.00
401.00000	Traffic Control @ 3%	L.S.	1	\$12,562.00	\$ 12,562.00
		Subtotal Construction			\$ 452,242.90
		Contingency		20%	\$ 90,448.58
		Total			\$ 542,691.48



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<i>Alternative: B Grade, Drain &amp; Pave (or Penetrate &amp; Chip)</i>					
<i>Item #</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Unit Cost</i>	<i>Total</i>
107.01100	N.P.D.E.S.	LS.	1	\$4,000.00	\$ 4,000.00
107.09200	Community Relations	Allowance	1	\$15,000.00	\$ 15,000.00
205.03000	Roadway Excavation	CM	4,675	\$4.50	\$ 21,037.50
301.00000	Subgrade Preparation	SQM	26,206	\$2.75	\$ 72,067.75
321.01300	New Asphalt Pavement per Structural Section 5	SQM	26,206	\$27.55	\$ 721,987.86
336.08100	Pavement Sawcut	M	1,293	\$6.50	\$ 8,407.36
340.01120	Conc. VC & G	M	2,147	\$34.50	\$ 74,071.50
340.01200	Mountable Curb for RID Access Road	M	29	\$35.00	\$ 1,015.00
340.00000	Conc SW Ramp MCDOT Std. Det. 2031-A	EA	8	\$800.00	\$ 6,400.00
340.06950	Concrete Sidewalk Std Det 230	SQM	3,264	\$32.00	\$ 104,448.00
340.09750	Concrete Driveway w/5 Wings, Std. Det. 250	EA	3	\$600.00	\$ 1,800.00
340.95000	Return Type Driveway Entrance MCDOT CH-1	EA	3	\$6,500.00	\$ 19,500.00
350.01110	Removal of Existing Improvements	LS.	1	\$20,000.00	\$ 20,000.00
402.00000	Traffic Signing & Striping - 5 lanes	M	1,752	\$6.00	\$ 10,514.64
402.00000	Traffic Signal Relocation NW & SW Corner MC 85 & 75th Ave Intersection	EA	1	\$60,000.00	\$ 60,000.00
402.00000	Interconnect/Traffic Signals	M	1,609	\$27.00	\$ 43,443.00
505.06125	Catch Basin - Curb Inlet	EA	12	\$3,600.00	\$ 43,200.00
618.02318	460 mm (18") RGRCP, Class III	M	121	\$138.00	\$ 16,698.00
	Bridge < 100'	EA	1	\$145,945.80	\$ 145,945.80
		Subtotal			\$ 1,069,734.98
110.01000	Mobilization @5%	LS.	1	\$53,487.00	\$ 53,487.00
401.00000	Traffic Control @3%	LS.	1	\$32,092.00	\$ 32,092.00
		Subtotal Construction			\$ 1,155,313.98
		Contingency		20%	\$ 231,062.80
		Total			\$ 1,386,376.77



**Stantec**



## 13.2 ITEMIZED PAVEMENT COST

Unit Cost Derivation for Arterial Section Shown:		Metric	Actual	Used	See
1	Aggregate Base Thickness 125 mm	125 mm	9.843"	5"	Computations
	Lime Stabilized Subgrade 400 mm	400 mm	15.748"	16"	Below
	Asphalt Concrete Thickness 150 mm	150mm	5.906"	6"	
<i>Item #</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Unit Cost</i>	<i>Total</i>
310.07500	Aggregate Base (5")	Ton	0.2625	\$11.80	\$3.10
310.07160	Lime Stabilized Subgrade (16")	Ton	0.8399	\$8.50	\$7.14
315.07000	Bituminous Prime Coat (0.4 gal per SY)	Ton	0.0016	\$310.00	\$0.50
	Tack Coat	SY	1	\$0.18	\$0.18
321.03100	Asphalt Concrete, C 3/4 (6")	Ton	0.3283	\$36.50	\$11.98
333.07100	Fog Seal (Diluted 50/50; 0.1 gal per SY)	Ton	0.0004	\$310.00	\$0.12
	Pavement Cost Per SY				\$23.02
	Pavement Cost Per SQ M				\$27.53
Rounded	st Per SQ M for 150 mm over 125 mm over 400 mm			Total	\$27.55



**Stantec**

## 13.3 PROJECT COST ESTIMATE SUMMARY

Project Name & Terrain: 75TH AVENUE BETWEEN MC 85 TO VAN BUREN STREET  
Report or Work Order No. 68986

## 2001 DCR PRELIMINARY SUMMARY COST ESTIMATES (Current Dollars)

COST CATEGORIES	Factors	No Build	Low Cost Alternative A	Full Cost Alternative B	Full Cost Alternative C
Construction		\$0	\$ 542,691.48	\$ 1,386,376.77	\$2,476,342.65
Design (10% TO 15%)	10%	\$0	\$54,269	\$138,638	\$247,634
Construction Management	15%	\$0	\$81,404	\$207,957	\$371,451
Right-of-Way (\$50K/Acre)		\$0	\$177,000	\$82,500	\$225,000
Utility Relocation		\$0	\$0	\$1,229,057	\$1,372,457
Administration (8% TO 13%)	10%	\$0	\$54,269	\$138,638	\$247,634
<b>Total</b>		\$0	\$909,633	\$3,183,165	\$4,940,519

PRELIMINARY SUMMARY COST ESTIMATES (Adjusted for Inflation)

Assumed Annual Inflation Rate = 2.90%  
Assumed Number of Years = 5

Adjusted Construction Cost	\$0	\$626,080	\$1,599,404	\$2,856,851
Design	\$0	\$62,608	\$159,940	\$285,685
Construction Management	\$0	\$93,912	\$239,911	\$428,528
Right-of-Way	\$0	\$204,197	\$95,177	\$259,573
Utility Relocation	\$0	\$0	\$1,417,911	\$1,583,345
Administration	\$0	\$62,608	\$159,940	\$285,685
<b>Adjusted Total</b>	\$0	\$1,049,405	\$3,672,283	\$5,699,667



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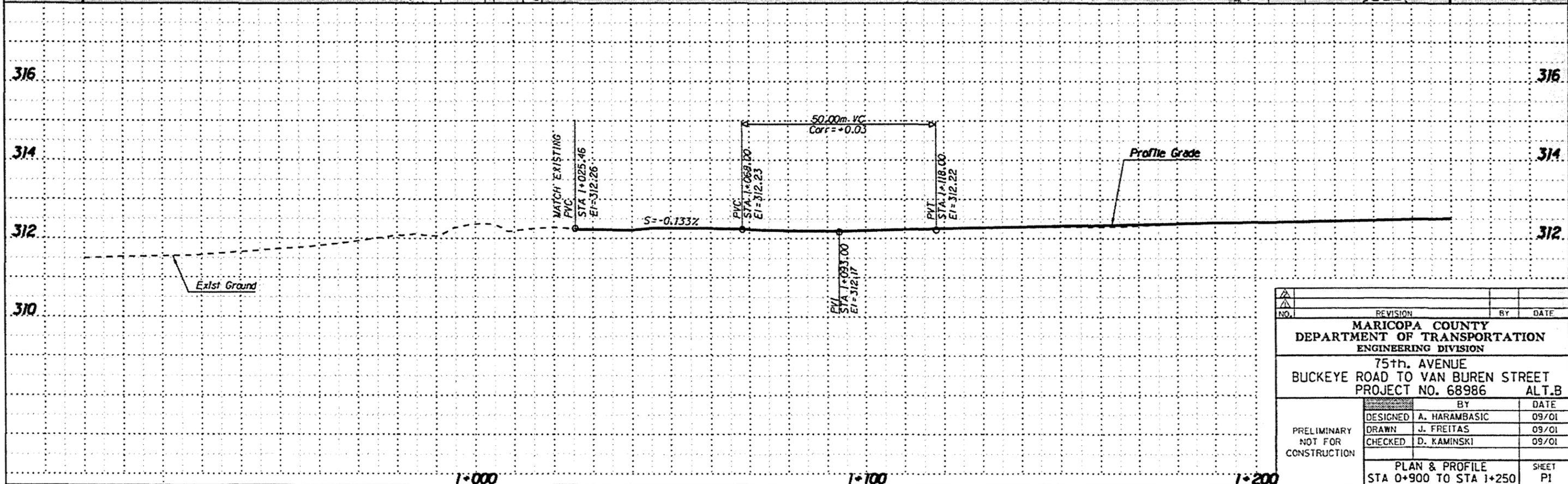
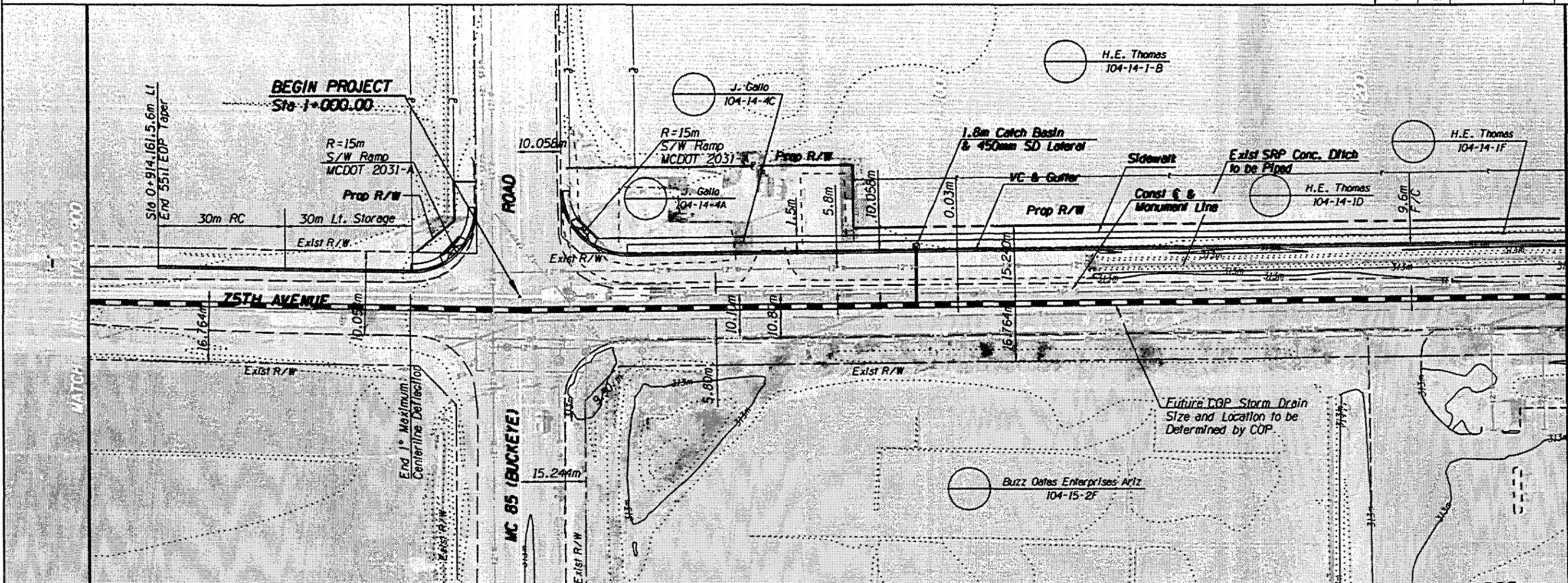
**Appendix A: Alternative B- Plan and Profile Sheets**



**Stantec**

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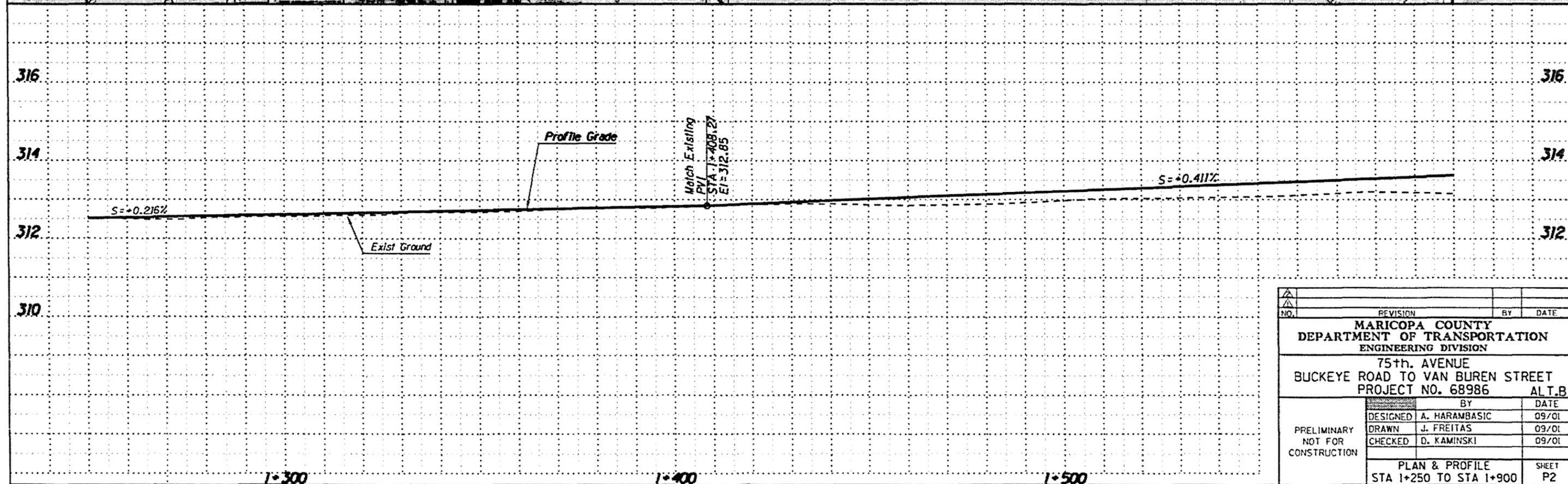
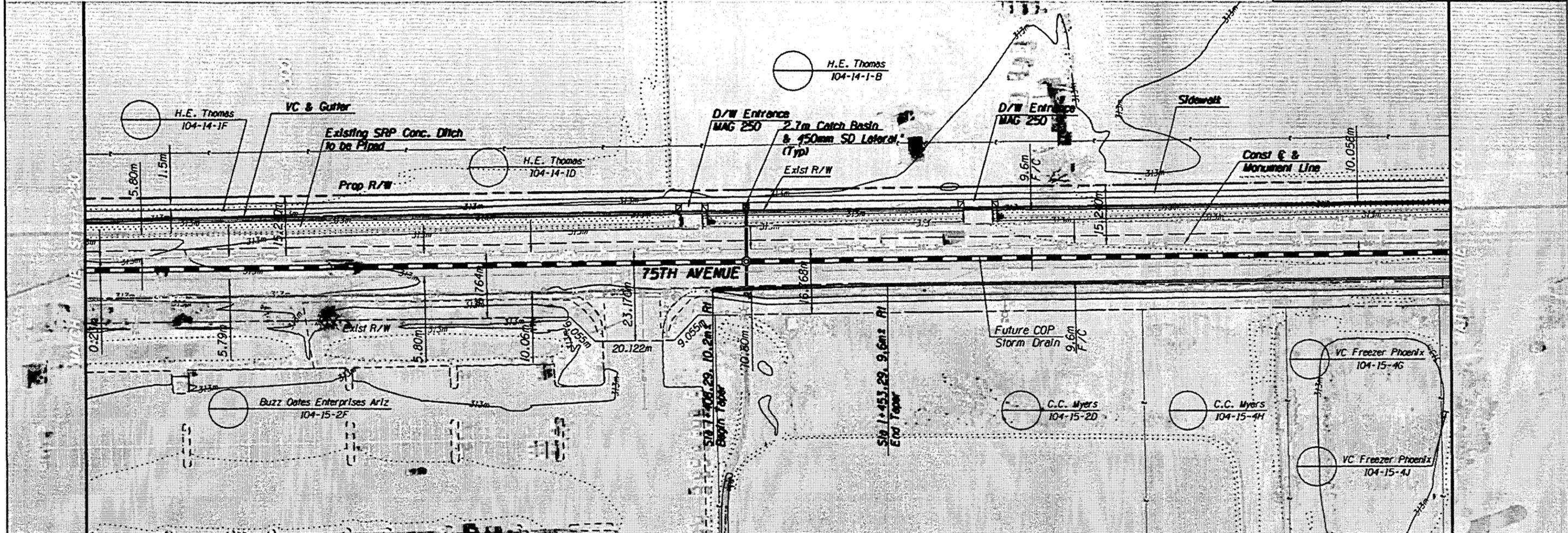


REVISION NO.	BY	DATE
<b>MARICOPA COUNTY</b> <b>DEPARTMENT OF TRANSPORTATION</b> <b>ENGINEERING DIVISION</b>		
<b>75th AVENUE</b> <b>BUCKEYE ROAD TO VAN BUREN STREET</b> <b>PROJECT NO. 68986 ALT.B</b>		
DESIGNED	A. HARAMBASIC	09/01
DRAWN	J. FREITAS	09/01
CHECKED	D. KAMINSKI	09/01
PLAN & PROFILE STA 0+900 TO STA 1+250		SHEET P1

TRACS NO.

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9	AZ.	68986			



NO.	REVISION	BY	DATE

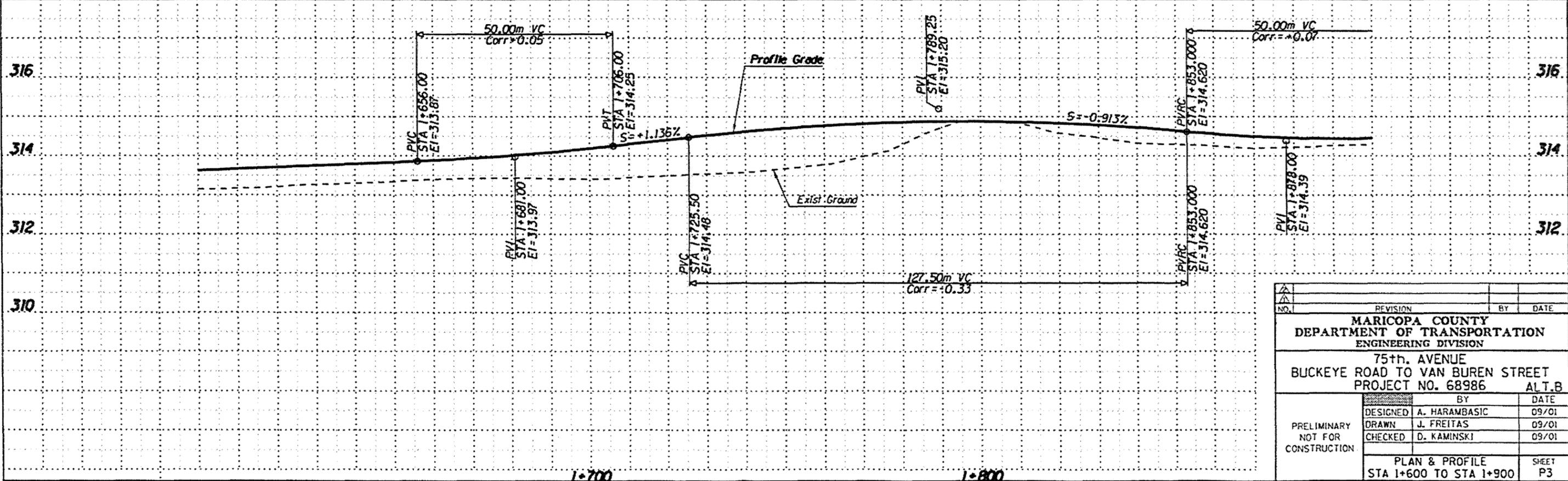
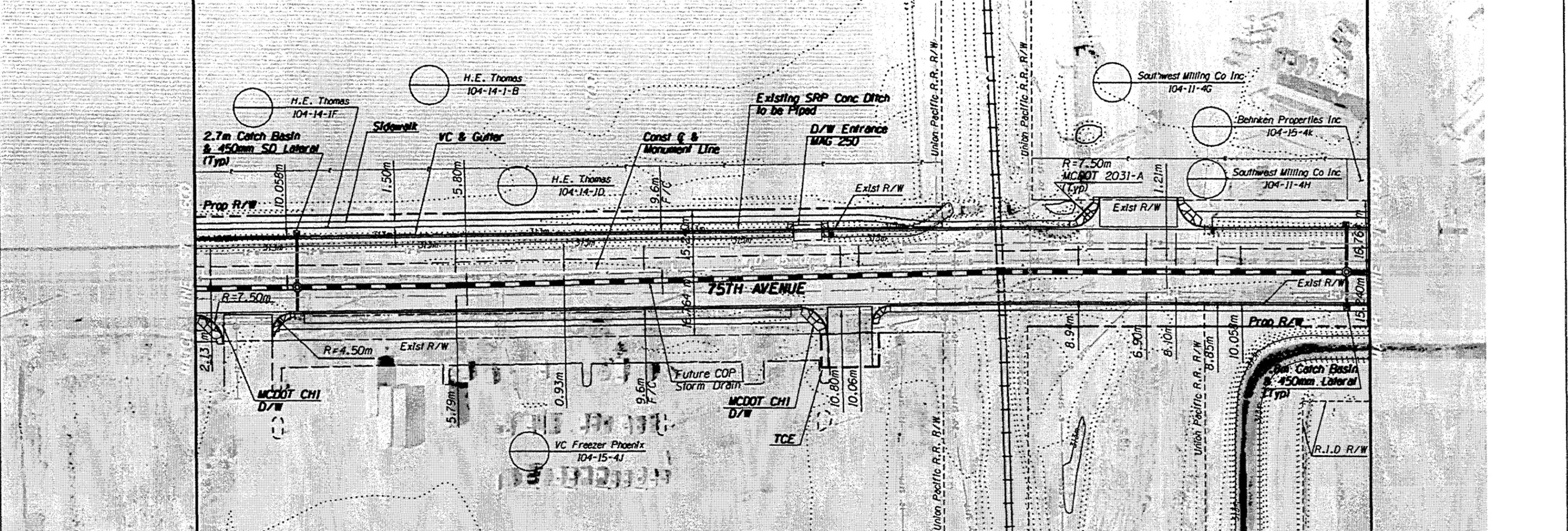
**MARICOPA COUNTY**  
 DEPARTMENT OF TRANSPORTATION  
 ENGINEERING DIVISION

75th. AVENUE  
 BUCKEYE ROAD TO VAN BUREN STREET  
 PROJECT NO. 68986 ALT.B

PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
	DRAWN	J. FREITAS	09/01
	CHECKED	D. KAMINSKI	09/01
	PLAN & PROFILE STA 1+250 TO STA 1+900		SHEET P2

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 DEPARTMENT OF TRANSPORTATION  
 ENGINEERING DIVISION

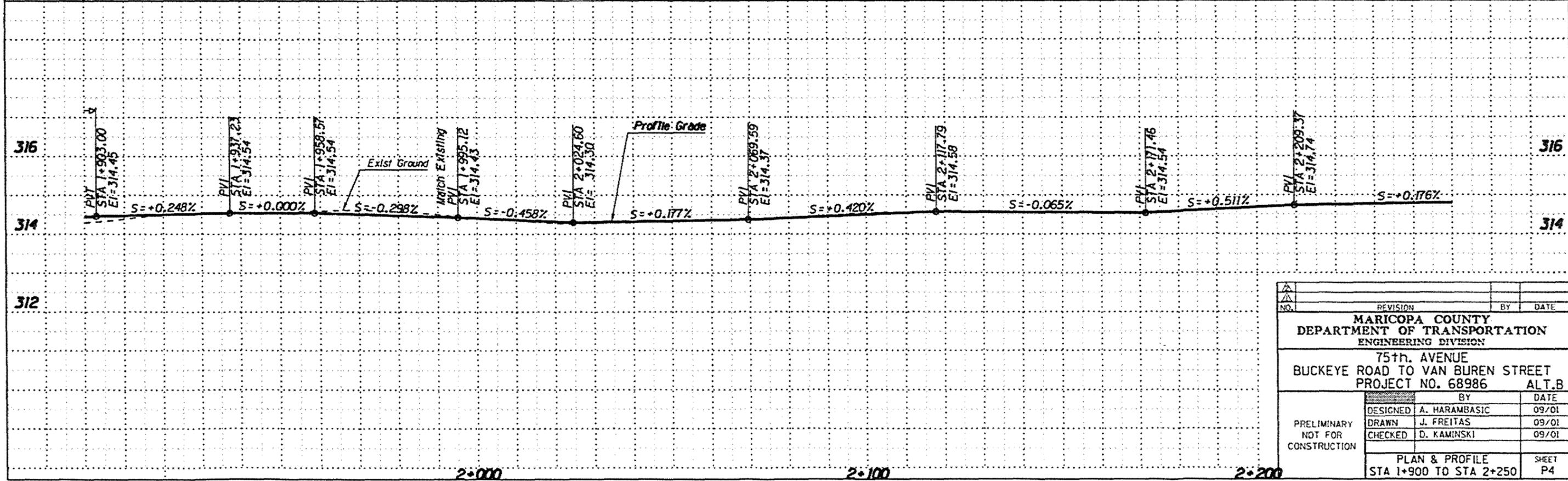
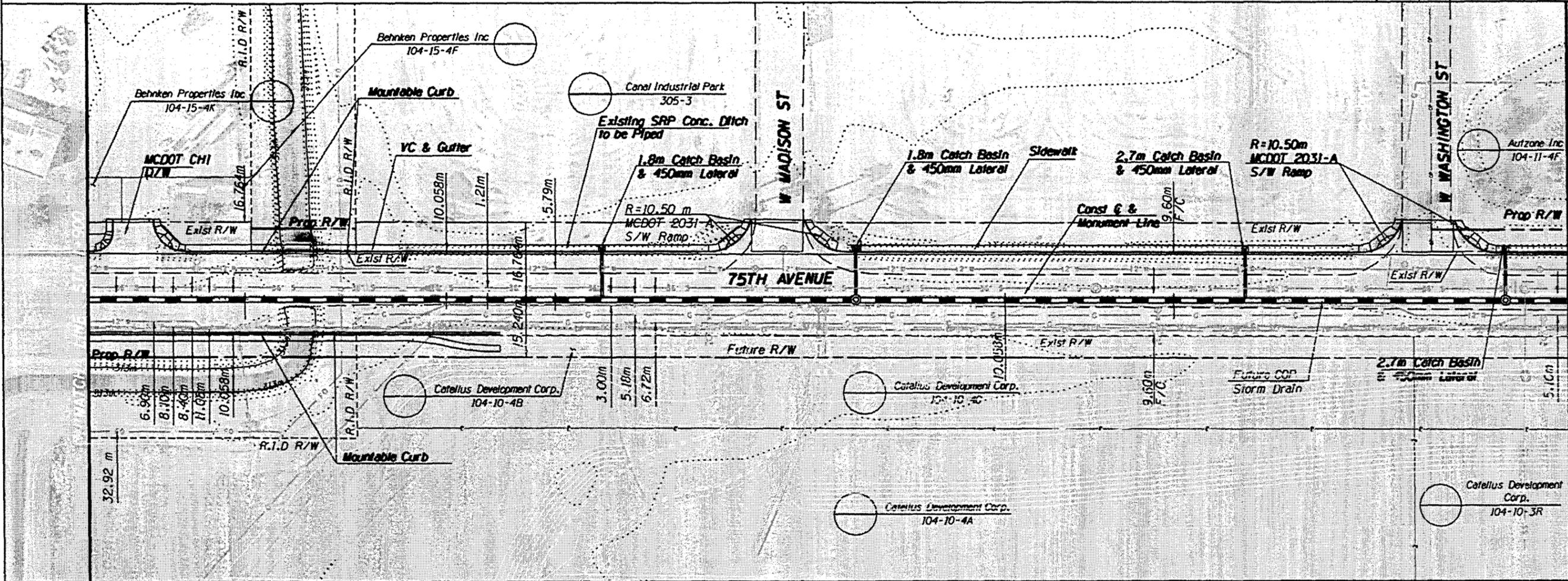
75th AVENUE  
 BUCKEYE ROAD TO VAN BUREN STREET  
 PROJECT NO. 68986 ALT.B

PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
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	CHECKED	D. KAMINSKI	09/01
	PLAN & PROFILE STA 1+600 TO STA 1+900		SHEET P3

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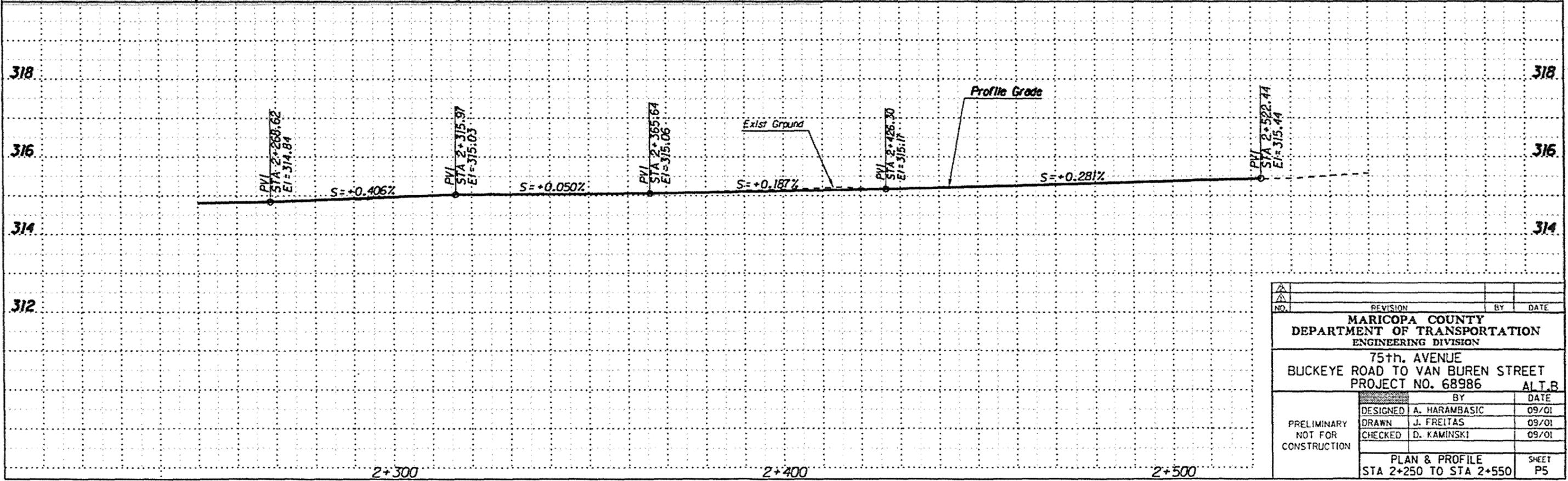
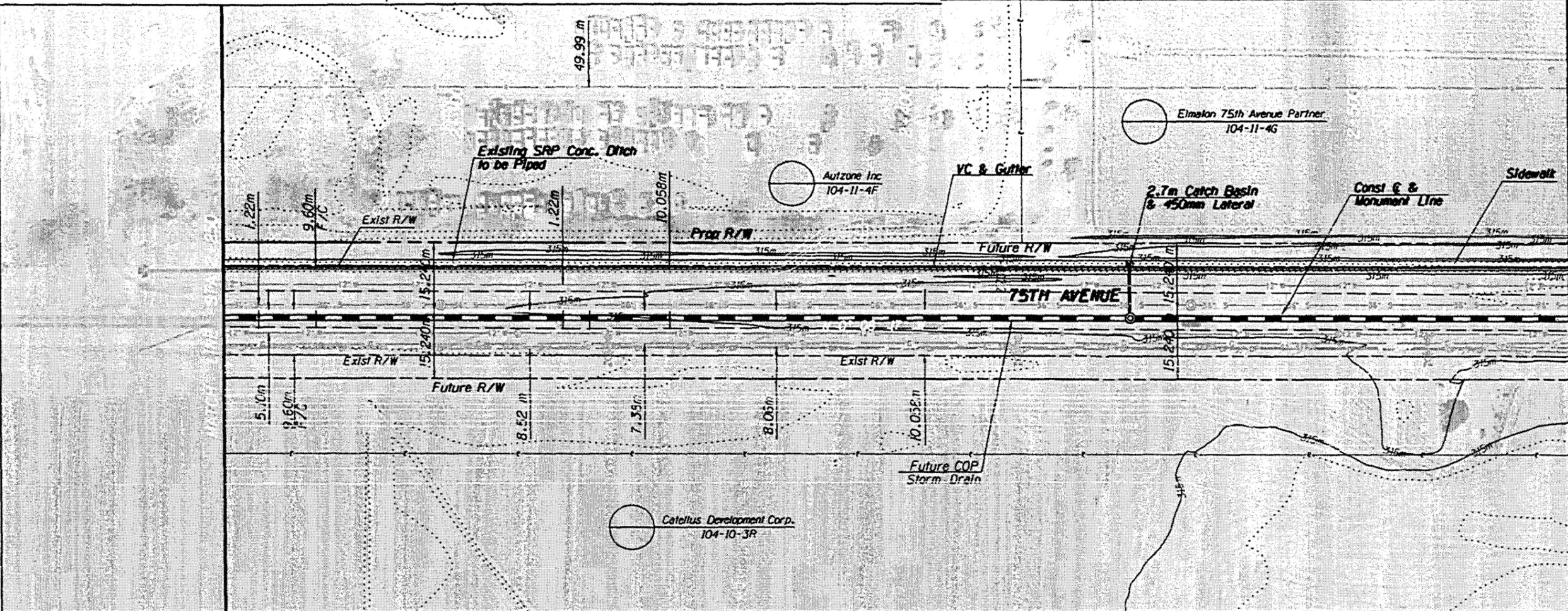


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<b>MARICOPA COUNTY</b> <b>DEPARTMENT OF TRANSPORTATION</b> <b>ENGINEERING DIVISION</b>			
<b>75th AVENUE</b> <b>BUCKEYE ROAD TO VAN BUREN STREET</b> <b>PROJECT NO. 68986 ALT.B</b>			
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
	DRAWN	J. FREITAS	09/01
	CHECKED	D. KAMINSKI	09/01
	PLAN & PROFILE STA 1+900 TO STA 2+250		SHEET

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9	AZ.	68986			



NO.	REVISION	BY	DATE

MARICOPA COUNTY  
 DEPARTMENT OF TRANSPORTATION  
 ENGINEERING DIVISION

75th. AVENUE  
 BUCKEYE ROAD TO VAN BUREN STREET  
 PROJECT NO. 68986 ALT. B

DESIGNED	A. HARAMBASIC	09/01
DRAWN	J. FREITAS	09/01
CHECKED	D. KAMINSKI	09/01

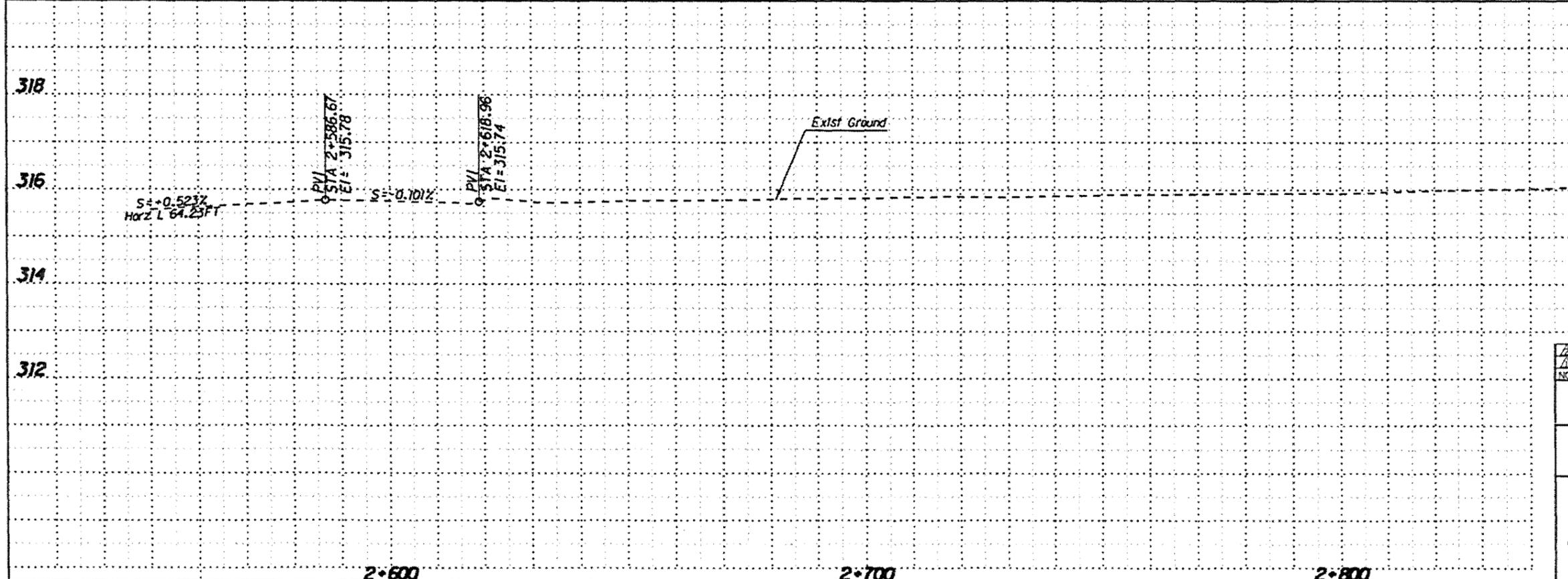
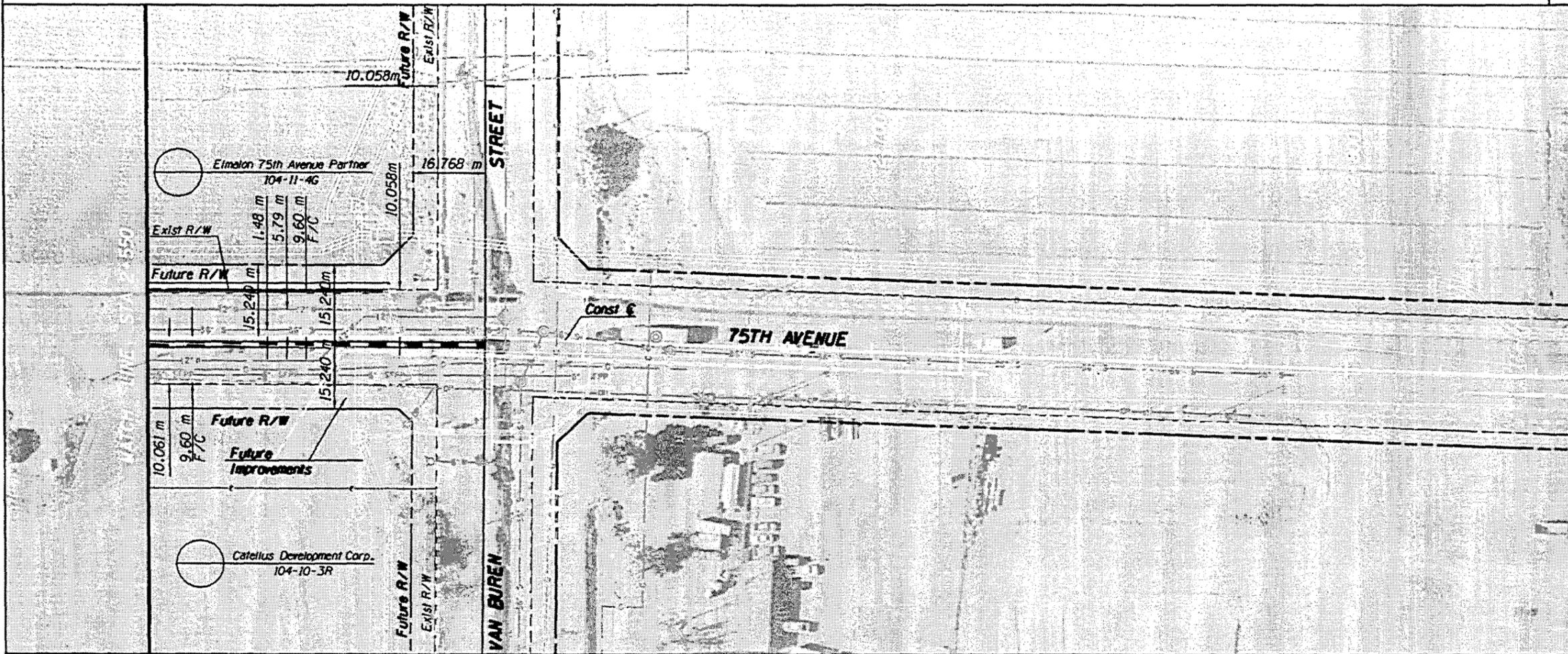
PLAN & PROFILE  
 STA 2+250 TO STA 2+550 SHEET P5

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**MARICOPA COUNTY**  
**DEPARTMENT OF TRANSPORTATION**  
**ENGINEERING DIVISION**

75th. AVENUE  
 BUCKEYE ROAD TO VAN BUREN STREET  
 PROJECT NO. 68986 ALT B

PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
	DRAWN	J. FREITAS	09/01
	CHECKED	D. KAMINSKI	09/01

PLAN & PROFILE  
 STA 2+550 TO STA 2+850

SHEET  
 P6

TRACS NO.

**Appendix B: Alternative C- Plan and Profile Sheets**

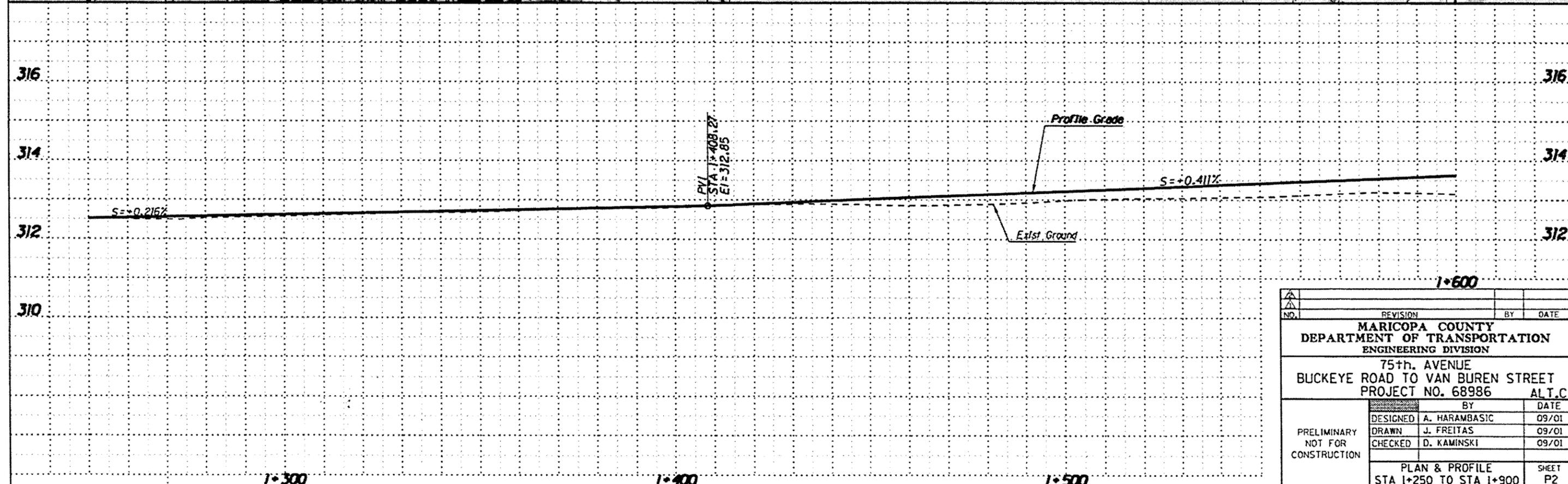
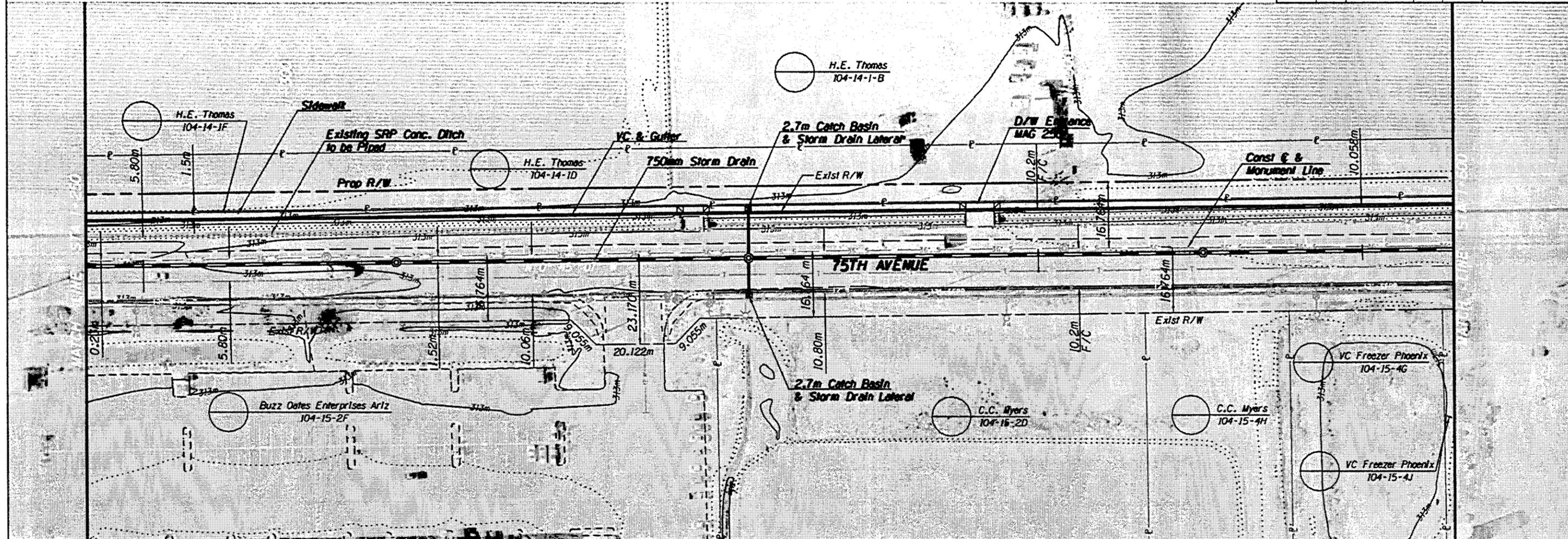


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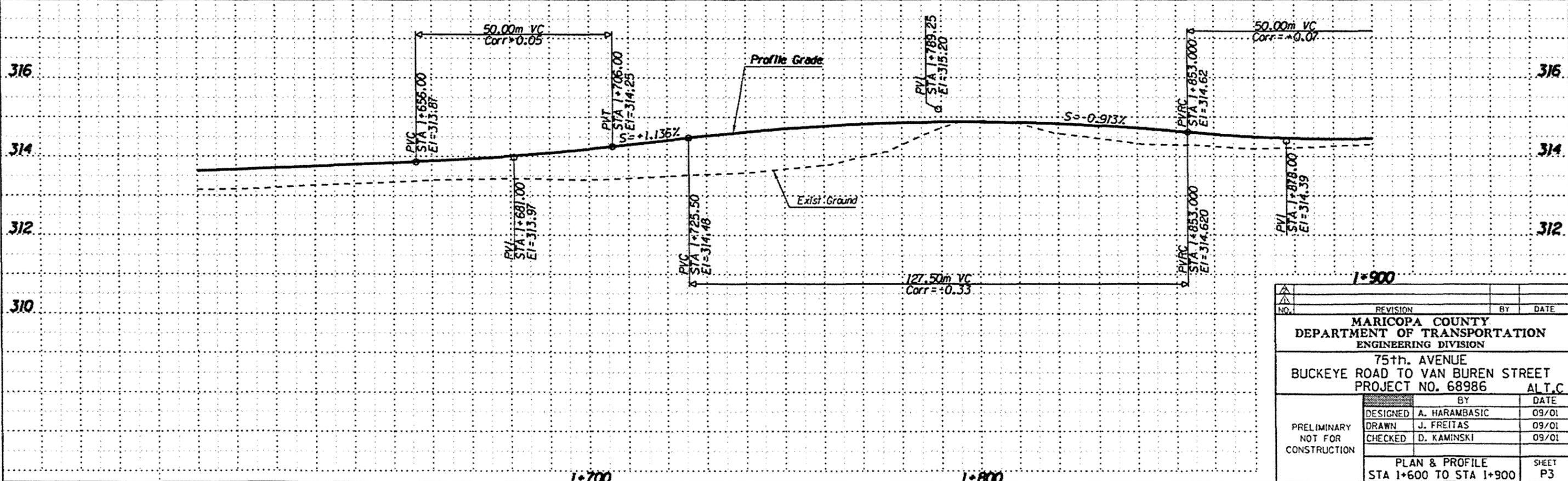
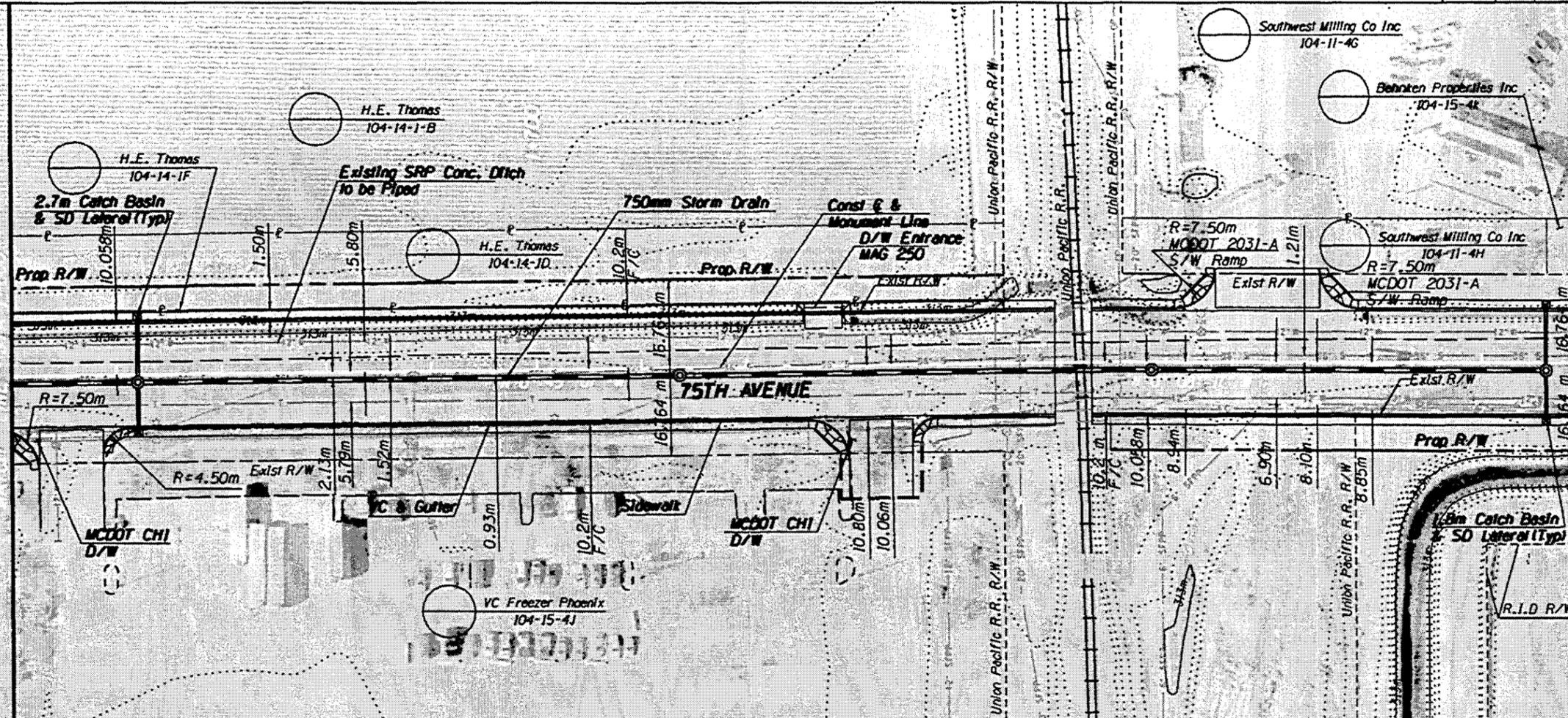
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9	AZ.	68986			



NO.	REVISION	BY	DATE
<b>MARICOPA COUNTY</b> <b>DEPARTMENT OF TRANSPORTATION</b> <b>ENGINEERING DIVISION</b>			
<b>75th AVENUE</b> <b>BUCKEYE ROAD TO VAN BUREN STREET</b> <b>PROJECT NO. 68986</b>			
			ALT.C
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
	DRAWN	J. FREITAS	09/01
	CHECKED	D. KAMINSKI	09/01
	PLAN & PROFILE		SHEET
			STA 1+250 TO STA 1+900

TRACS NO.

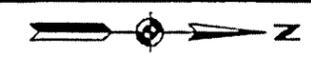
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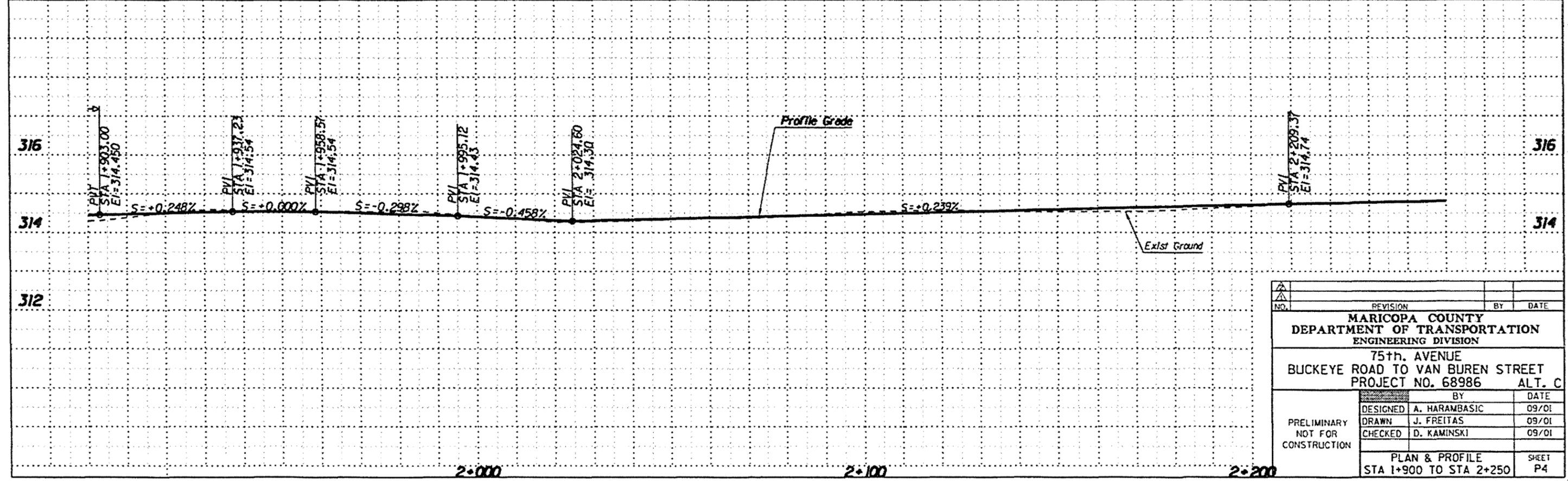
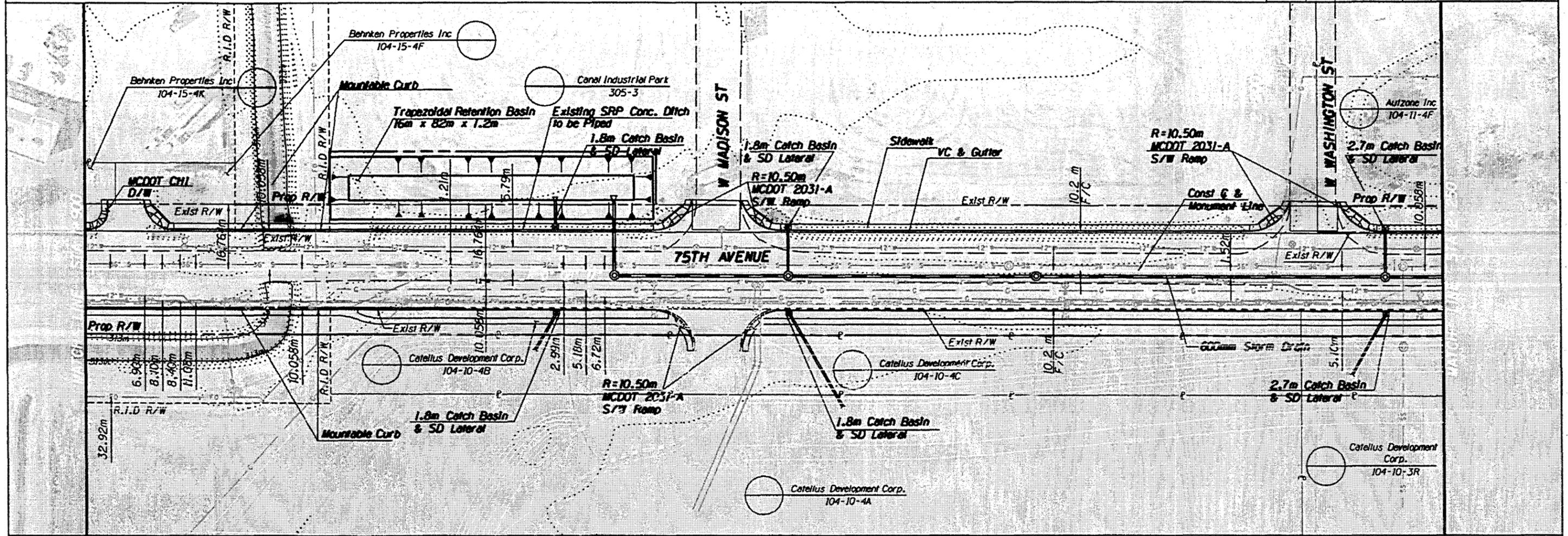
NO.	REVISION	BY	DATE
<b>MARICOPA COUNTY</b> <b>DEPARTMENT OF TRANSPORTATION</b> <b>ENGINEERING DIVISION</b>			
<b>75th. AVENUE</b> <b>BUCKEYE ROAD TO VAN BUREN STREET</b> <b>PROJECT NO. 68986</b>			
			ALT.C
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
	DRAWN	J. FREITAS	09/01
	CHECKED	D. KAMINSKI	09/01
	PLAN & PROFILE STA 1+600 TO STA 1+900		SHEET

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9	AZ.	68986			



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**MARICOPA COUNTY**  
 DEPARTMENT OF TRANSPORTATION  
 ENGINEERING DIVISION

75th. AVENUE  
 BUCKEYE ROAD TO VAN BUREN STREET  
 PROJECT NO. 68986 ALT. C

DESIGNED	A. HARMBASIC	09/01
DRAWN	J. FREITAS	09/01
CHECKED	D. KAMINSKI	09/01

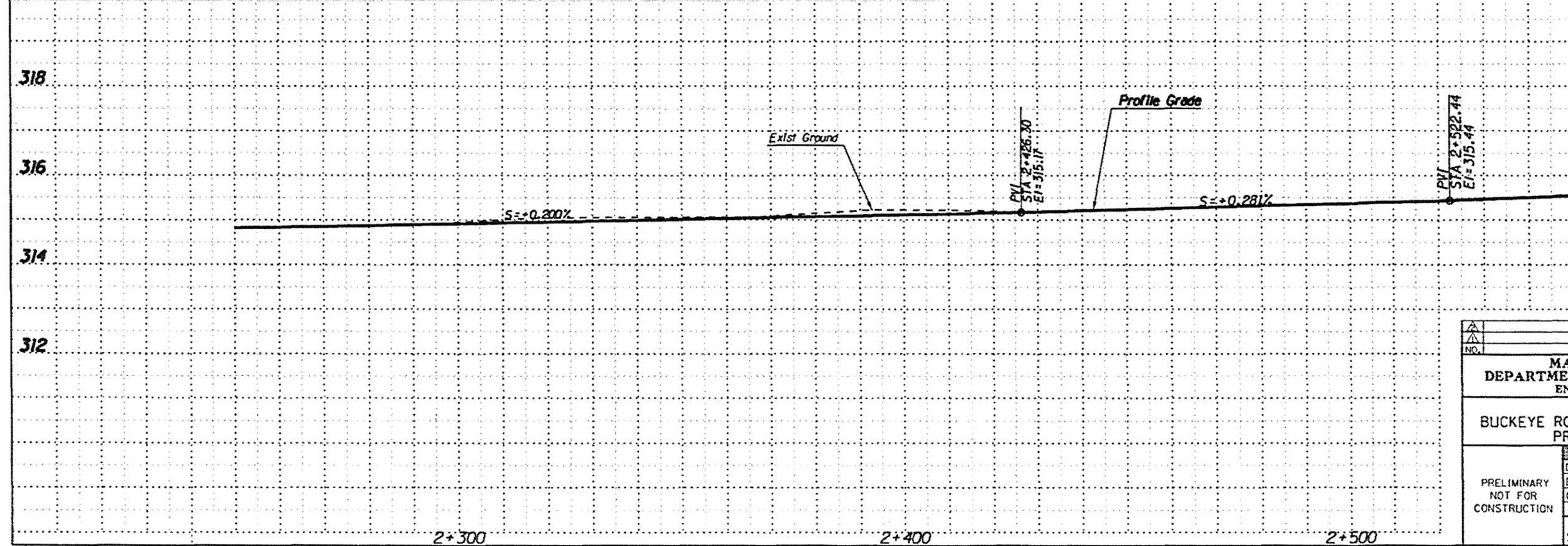
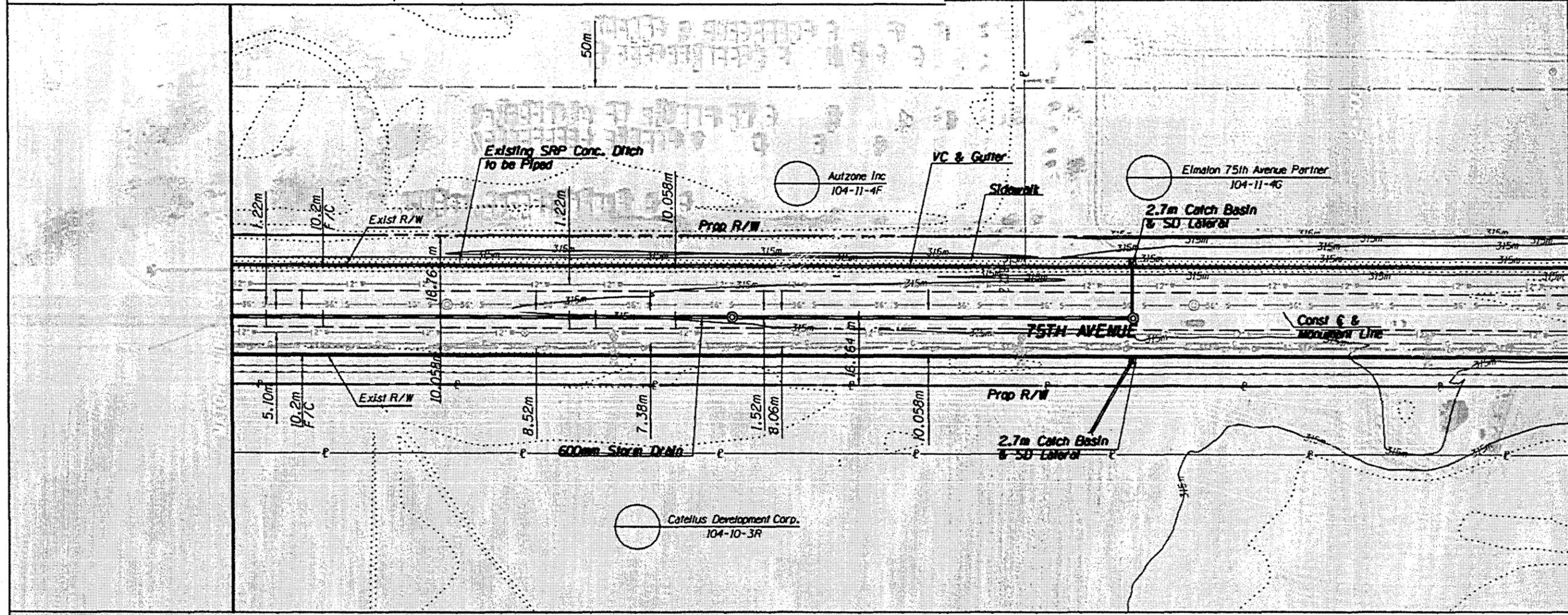
PLAN & PROFILE  
 STA 1+900 TO STA 2+250 SHEET P4

TRACS 80

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9	AZ.	68986			



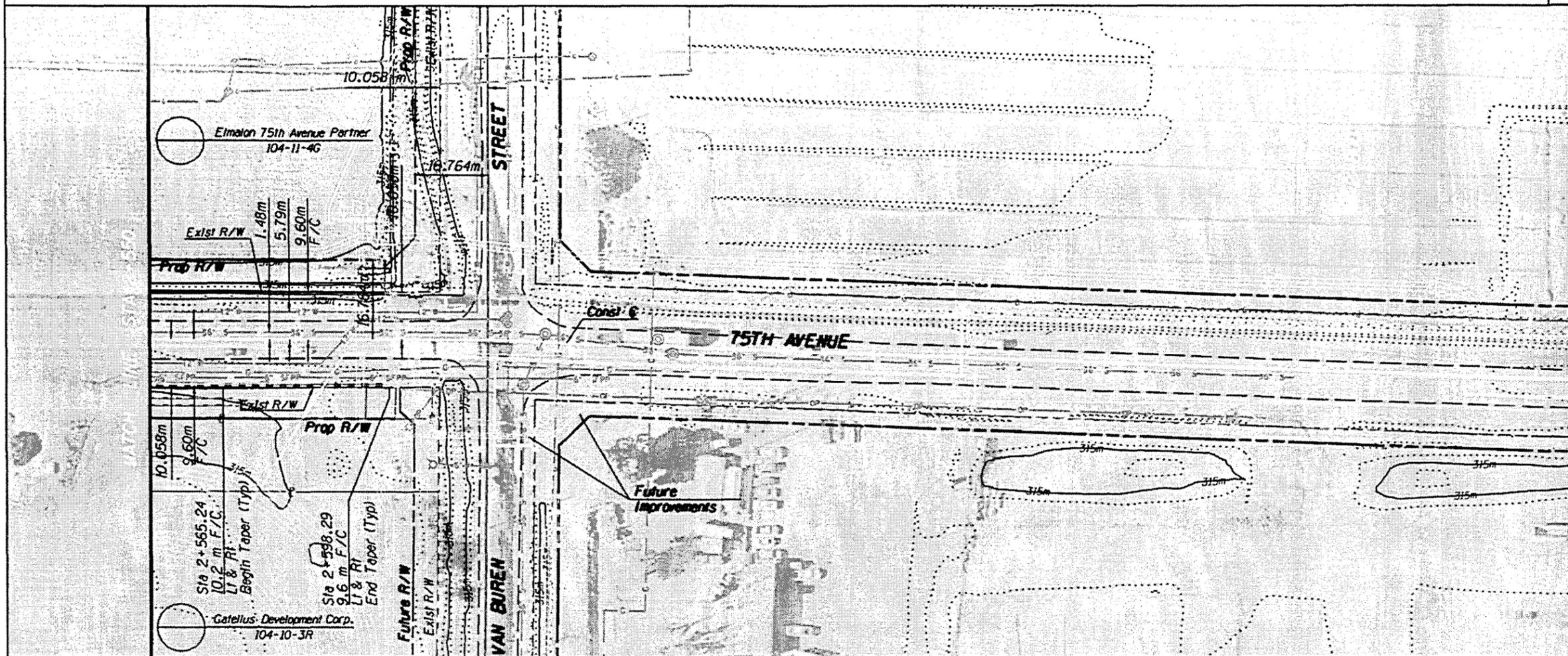
NO.	REVISION	BY	DATE
<b>MARICOPA COUNTY</b> <b>DEPARTMENT OF TRANSPORTATION</b> <b>ENGINEERING DIVISION</b>			
<b>75th AVENUE</b> <b>BUCKEYE ROAD TO VAN BUREN STREET</b> <b>PROJECT NO. 68986</b>			
			ALT. C
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
	DRAWN	J. FREITAS	09/01
	CHECKED	D. KAMINSKI	09/01
	PLAN & PROFILE STA 2+250 TO STA 2+550		SHEET P5

TRACS NO.

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F.W.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	RECORD DRAWING
9	AZ.	68986			



NO.	REVISION	BY	DATE

**MARICOPA COUNTY**  
**DEPARTMENT OF TRANSPORTATION**  
**ENGINEERING DIVISION**

75th. AVENUE  
 BUCKEYE ROAD TO VAN BUREN STREET  
 PROJECT NO. 68986 ALT. C

PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	A. HARAMBASIC	09/01
	DRAWN	J. FREITAS	09/01
	CHECKED	D. KAMINSKI	09/01

PLAN & PROFILE  
 STA 2+550 TO STA 2+850 SHEET  
P6

2+600

2+700

2+800

TRACS NO

**Appendix C: Roadway Drainage Calculations**

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**Stantec**



Stantec

75<sup>th</sup> Ave DCR  
Retention Basin Calc. & Catch Basin Calc.  
6-4-01

1/7  
CB#1 sta 2+450.00 @ grade

contributing area: (sta 2+040 to 2+450) (16.764<sup>±</sup> ±) 20W to 10W

$$A = 6370.32 \text{ m}^2 = 1.574 \text{ Acre} \Rightarrow 0.787 \text{ Acre per scupper}$$

$$Q = CIA = (0.85)(4.5)(0.787 \text{ Acre}) = 3.01 \text{ CFS}$$

10 min = Tc 10 yr storm

$$Q = 3.01 \text{ CFS per CB}$$

Volume Calc:

$$V = C * P/12 * A$$

$$V = \text{Acre-Feet}$$

C = runoff coeff

P = rainfall depth ~ 10 yr 2 hr

A = drainage area

$$V = (0.94)(2.9/12)(0.787 \text{ AC}) = 0.1788 \text{ AC-FT}$$

Designed by: ATH

Checked by:



Stantec

75<sup>th</sup> Ave DCR  
6-4-01  
Basin Calcs

2/7

— Sta 2+235 CB# 2 at Grade

$$\text{Area} = (2+450 \text{ to } 2+235)(33.528\text{m})$$

$$\text{Area} = 7208.52\text{m}^2 = 1.78\text{acre} = 0.891\text{ac/scupper}$$

$$Q = CIA = 0.85 \times 4.5^{\frac{2.9}{12}} \times 0.891\text{Ac} = 3.41\text{CFS}$$

$$\text{Volume} = (C)^{\frac{P}{12}}(A) = (0.94)^{\frac{2.9}{12}}(0.891) = 0.202\text{AC-FT}$$

— CB# 3 Sta 2+080.00 @ grade

$$\text{Area} = (2+235 \text{ to } 2+080)(33.528\text{m}) =$$

$$\text{Area} = 5197\text{m}^2 = 1.284\text{Ac} \Rightarrow 0.642\text{ac/CB}$$

$$Q = CIA = (0.85)(4.5^{\frac{2.9}{12}})(0.642\text{ac}) = 2.456\text{CFS}$$

$$\text{Volume} = (C)^{\frac{P}{12}}(A) = (0.94)^{\frac{2.9}{12}}(0.642\text{Ac}) = 0.146\text{AC-FT}$$

Designed by: ATH

Checked by:



Stantec

75<sup>th</sup> Ave DCR  
Basin Calcs  
6-4-01

3/1

- CB# 4 Sta 2+024.60 Sump

$$\begin{aligned} \text{Contributing Area}_1 &= (\text{Sta } 1+926.56 \text{ to Sta } 2+024.60) \\ &\quad * (33.528\text{m}) = \\ &= 3287\text{m}^2 = 0.812 \text{ acre} \end{aligned}$$

$$\begin{aligned} \text{Area}_2 &= (2+024.60 \text{ to } 2+080)(33.528\text{m}) = \\ &= 1,857.45\text{m}^2 = 0.459 \text{ Acre} \end{aligned}$$

$$\begin{aligned} \text{Area}_{\text{total}} &= 0.812 \text{ acre} + 0.459 \text{ acre} = 1.27 \text{ Acre} \\ &= 0.636 \text{ Acre per CB} \end{aligned}$$

$$Q = CIA = (0.85)(4.5)(0.636) = 2.43 \text{ CFS}$$

$$\text{Volume} = (0.94)(2.9/12)(0.636) = 0.146 \text{ acre-ft}$$

1  
2

- CB# 5 Sta 1+892.28 Sump

$$\begin{aligned} \text{Area}_1 &= (\text{Sta } 1+796.28 \text{ to } 1+892.28)(33.528\text{m}) \\ &= 3219\text{m}^2 = 0.795 \text{ acre} \end{aligned}$$

$$\begin{aligned} \text{Area}_2 &= (\text{Sta } 1+892.28 \text{ to } 1+926.56)(33.528) \\ &= 1149\text{m}^2 = 0.284 \text{ acre} \end{aligned}$$

$$A_T = 1.079 \text{ acre} = 0.540 / \text{CB}$$

Designed by:

Checked by:



Stantec

75<sup>th</sup> Ave DCR  
BASIN CALCS  
6-4-01

4/7

$$Q = CIA = (0.85)(4.5)(0.540) = 2.065 \text{ CFS}$$

$$V = \underset{\text{East}}{(0.94)} \left( 2.9/12 \right) (0.54) = 0.123 \text{ acre-ft}$$

- CB# 5 Sta 1+625.00 @ Grade

$$\text{Area}_1 = (\text{Sta } 1+625 \text{ to } 1+796.28)(33.528\text{m})$$

$$= 5,743 \text{ m}^2 = 1.42 \text{ Acre} = 0.71 \text{ Acre per CB}$$

$$Q = CIA = 0.85 \times 4.5 \times 0.71 = 2.72 \text{ CFS per CB}$$

$$V = (0.94)(2.9/12)(0.71) = 0.161 \text{ ac-ft}$$

Designed by:

Checked by:



Stantec

75<sup>th</sup> Ave DCR  
BASIN CALCS  
6-4-01

5/7

CB#7 Sta 1+411.27 @ grade

$$\begin{aligned} \text{Area}_1 &= (1+625 \text{ to } 1+411.27)(33.528\text{m}) \\ &= 7166 \text{ m}^2 = 1.77 \text{ AC} = 0.89 \text{ AC per CB} \end{aligned}$$

$$Q = CIA = (0.85)(4.5)(0.89) = 3.40 \text{ CFS}$$

$$V = (0.94)(2.9/2)(0.89) = 0.202 \text{ AC-FT}$$

CB# 8 Sta 1+093.54 Sump

$$\begin{aligned} \text{Area}_1 &= (1+093.54 \text{ to } 1+411)(16.764) \\ &= 5322 \text{ m}^2 = 1.315 \text{ AC} \end{aligned}$$

$$\begin{aligned} \text{Area}_2 &= (1+093.54 \text{ to } 1+025.46)(16.764) \\ &= 1,141 \text{ m}^2 = 0.282 \text{ Acre} \end{aligned}$$

$$A_T = 1.60 \text{ AC}$$

$$Q = CIA = (0.85)(4.5)(1.60) = 6.10 \text{ CFS}$$

Designed by:

Checked by:



Stantec

75<sup>th</sup> Ave DCR  
BASIN CALCS  
6-4-01

Let

$$V = (0.94) \left( \frac{29}{12} \right) (1.6) = 0.363 \text{ AC-FT}$$

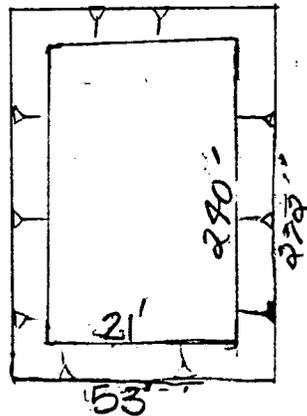
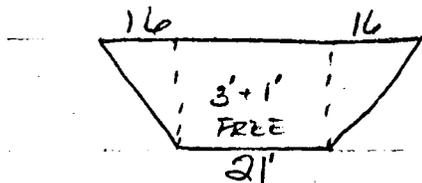
Total Volume Req'd to hold 100 yr 2hrs storm event for roadway drainage only.

CB# 1 =	0.1788 AC-FT	(west side only) (east side to target)
CB# 2 =	0.202 AC-FT	(west side only)
CB# 3 =	0.146 AC-FT	(west side only)
CB# 4 =	0.146 AC-FT	(west side only)
CB# 5 =	0.246 AC-FT	(both east & west)
CB# 6 =	0.322 AC-FT	(both east & west)
CB# 7 =	0.404 AC-FT	(Both east & west)
CB# 8 =	0.363 AC-FT	(west side only) (east side goes to exist improvements)
	<u>2.0 AC-FT</u>	

$$\text{Basin 1: } CB\#1 + CB\#2 + CB\#3 + CB\#4 = 0.673 \text{ AC-FT}$$

$$\text{Volume: } \left( \frac{1}{2} \right) (53' + 21') (3') (2.40') = 0.674 \text{ AC-FT}$$

use 3' depth + 1' FREE BOARD



Exist = 314.40m  
Basin Floor = 313.18m

S = 0.0020<sup>m</sup>/m  
MH #1 to outlet

Designed by:

Checked by:



Stantec

Project: 75<sup>th</sup> AVE DCR  
 Notes: Retention Basin Calc.  
 Computed By: ATH Date: 8/20/01 Checked By: Date:

Project Number: 81740107  
 Scale:  
 Page of Page(s)  
 Date:

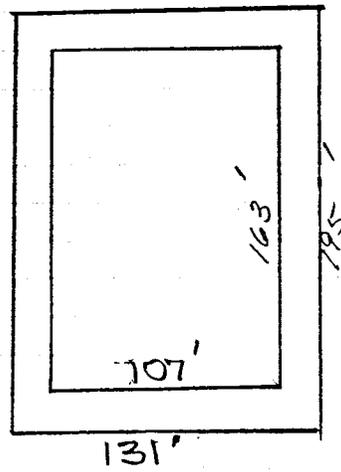
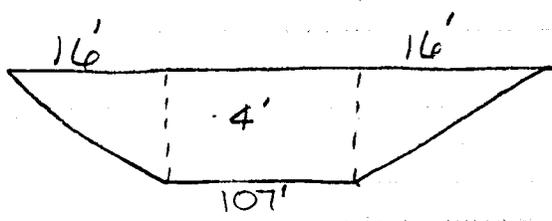
1/7

Basin #2: CB# 5 + CB# 6 + CB# 7 + CB# 8  
 Vol. = 1.34 AC-FT

$$Vol = (\frac{1}{2})(131' + 107')(3')(163') = 1.34 AC-FT$$

$$= \frac{1}{2}(b_1 + b_2)(h)(L)$$

3' depth + 1' Freeboard



Exist = 311.610m  
 Basin Floor = 310.39m

TO DEEP OF BASIN  
 FOR FULL RUN @ 0.25% TO  
 4' RIDGEM = 311.50m



Stantec

Project: 75<sup>th</sup> Ave DrR

Project Number: 81740106

Notes: Storm Drain Calc's

Scale:

Computed By: ATH

Date: 8 21 01

Checked By:

Page of Page(s)

Date:

Basin 1: 10yrs Flow

CB# 1 = 3.01 CFS

CB# 2 = 3.41 CFS

CB# 3 = 2.46 CFS

CB# 4 = 2.43 CFS

TOTAL = 11.31 CFS SIZE FULL FLOW

Full Flow diameter @ S=0.0028 m/m = 24" = 600mm

V = 3.76 ft/sec

n = 0.013 concrete

Q = 11.31 CFS

Q Lip TC 25-V

CB# 1: 315.24 - 9.77(0.02) + 152 - 0.762 - (12.4)(.02) = 314.19

outlet = Basin Floor = 313.18m

length of run = 436.21m

slope = (314.19m - 313.18m) / 436.21m = 0.0023 m/m

Basin 2: 10yr Flow

CB# 5 = 2.065 CFS

CB# 6 = 5.44 CFS

CB# 7 = 6.80 CFS

CB# 8 = 6.10 CFS

20.41 CFS

Q  
CB# 5 (1 + 892.28): 314.439 - 9.77(.02) + 152 - 1.067m - (12.4)(.02) = 313.081m

Basin Floor = 310.39m

length of run = 850m

Slope = 0.0031 m/m

Full Flow diameter @ S=0.0031 m/m = 30" = 750mm



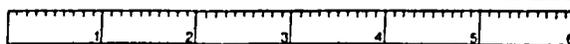
## Appendix D: Right of Way Maps

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**Stantec**

1-800-34-J-7 34

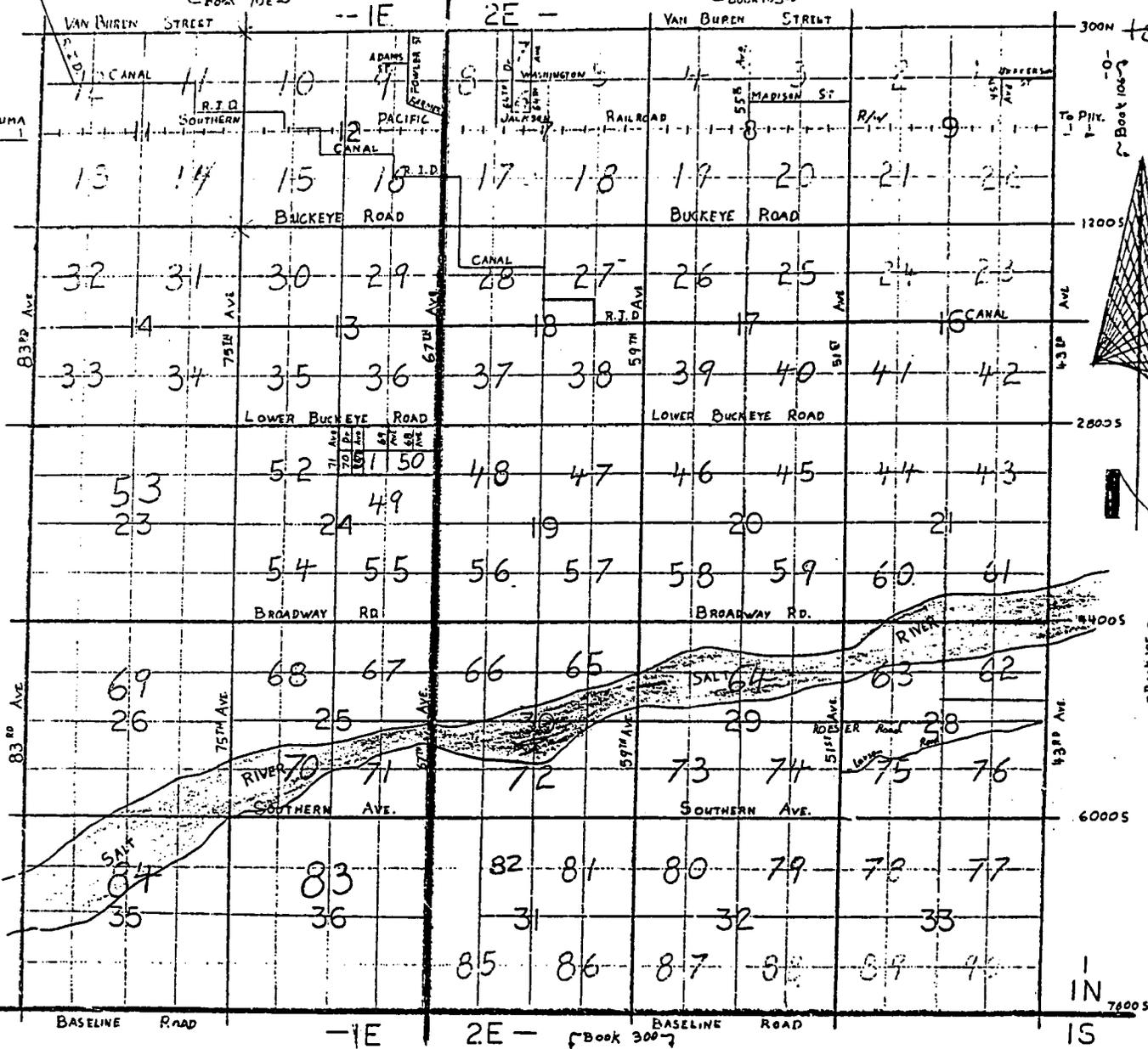


SCALE IN 1/16 OF AN INCH

75th Avenue

PT IN 1E SECS 11-14 23-26 35-36 P. IN 2E SECS 7-9 16-21 28-33

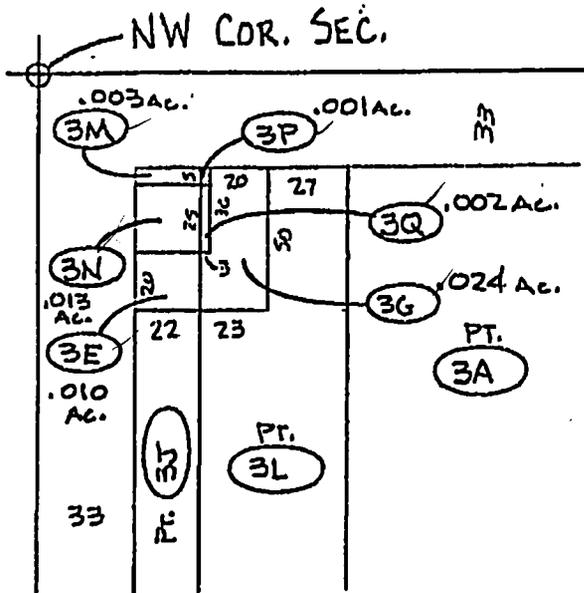
BOOK 104 OLD US



1-800-345-7334

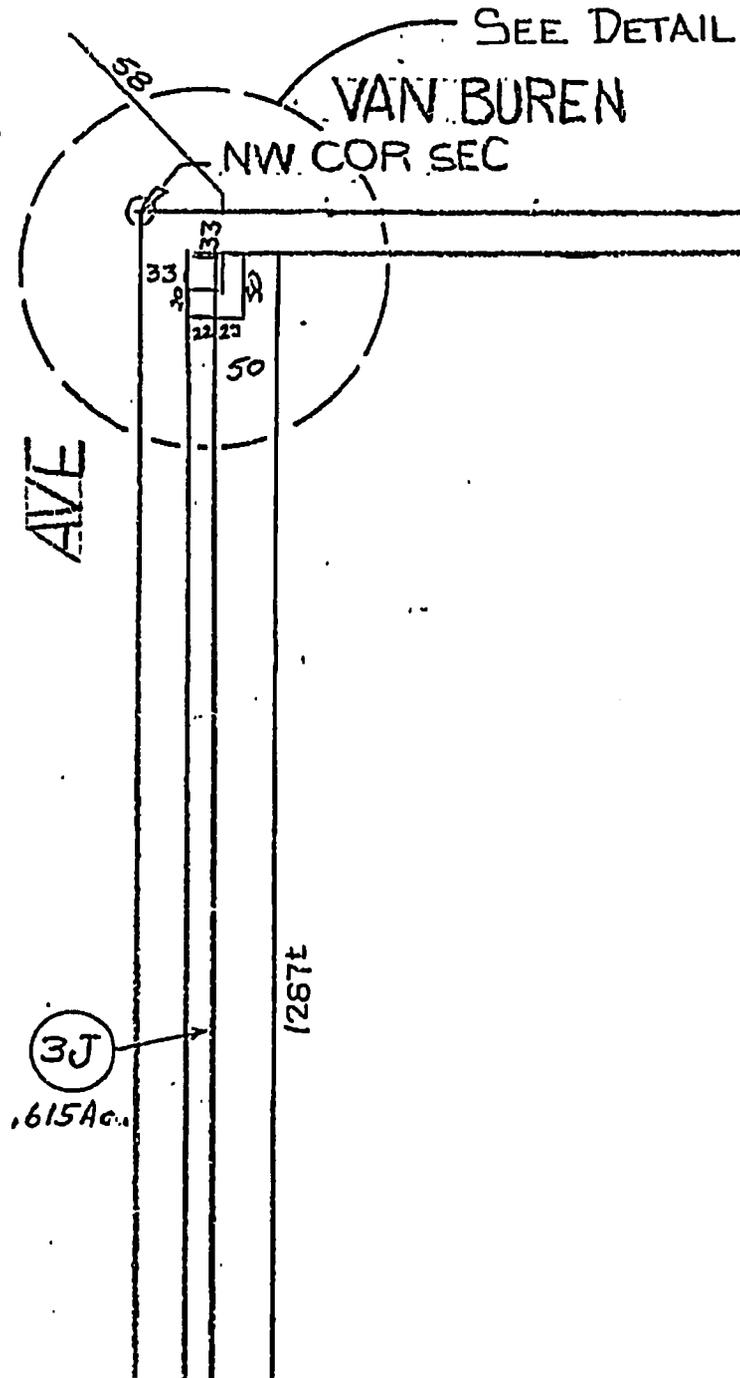


SCALE IN 1/16 OF AN INCH



DETAIL "A"

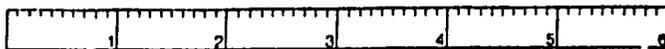
NORTH  
1" = 100'



MARICOPA COUNTY ASSESSORS OFFICE					
SCALE 1" = 240'					
REVISIONS:					
Date	Was	Is	Drawn	By	Check
			ANNEX.	M.S.	



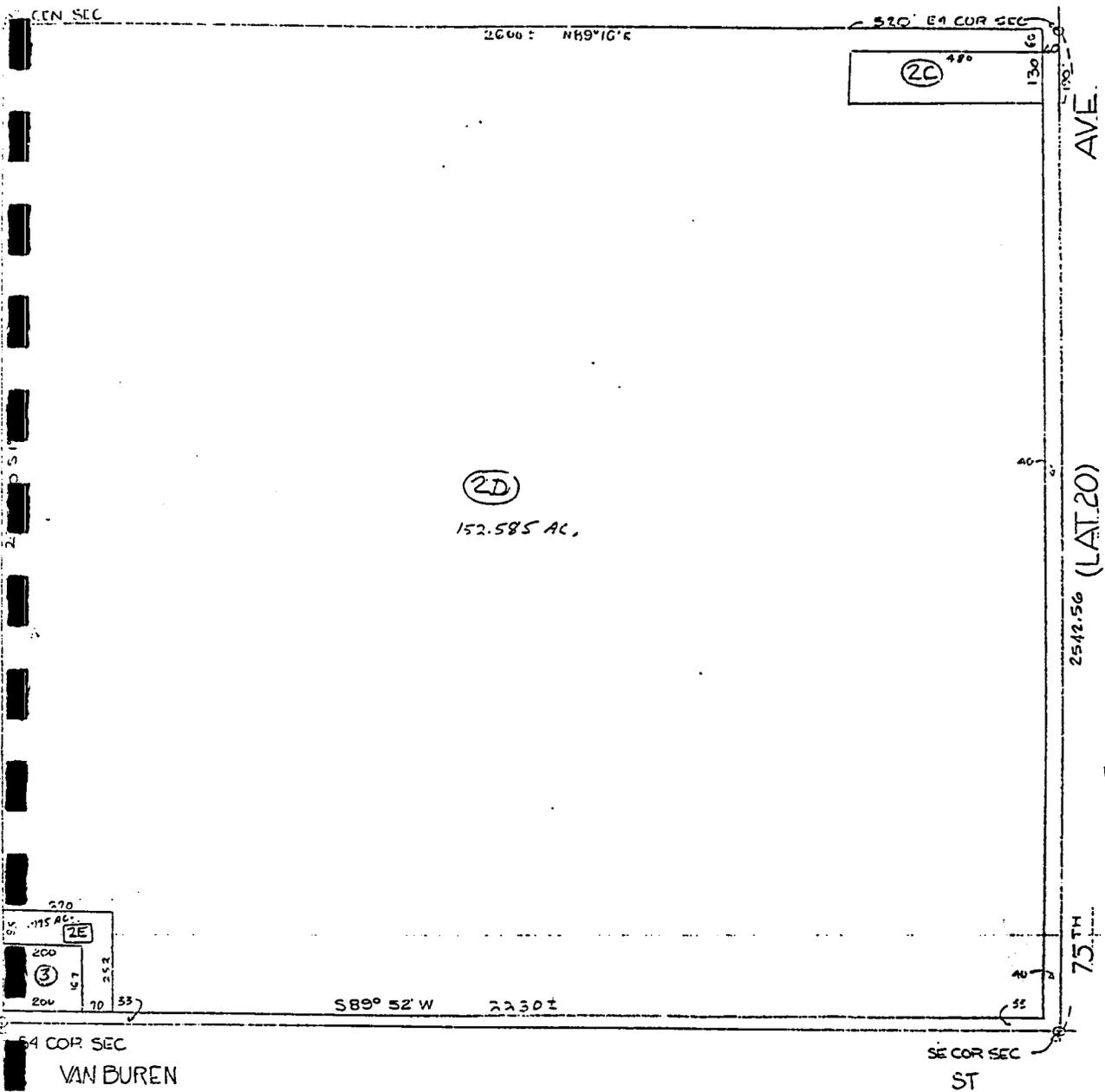
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SCALE IN 1/10 OF AN INCH

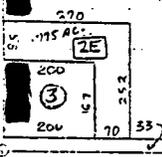
SE 1/4 SEC 2 T1N R1E

BOOK 102  
MAP 43



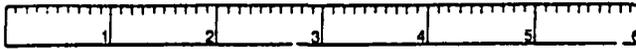
SCALE  
1"=240'

INFORMATION  
OBTAINED FROM  
SURVEY BY F.N.  
HOLMPQIST JOB 1635



64 COR SEC  
VAN BUREN

SE COR SEC  
ST



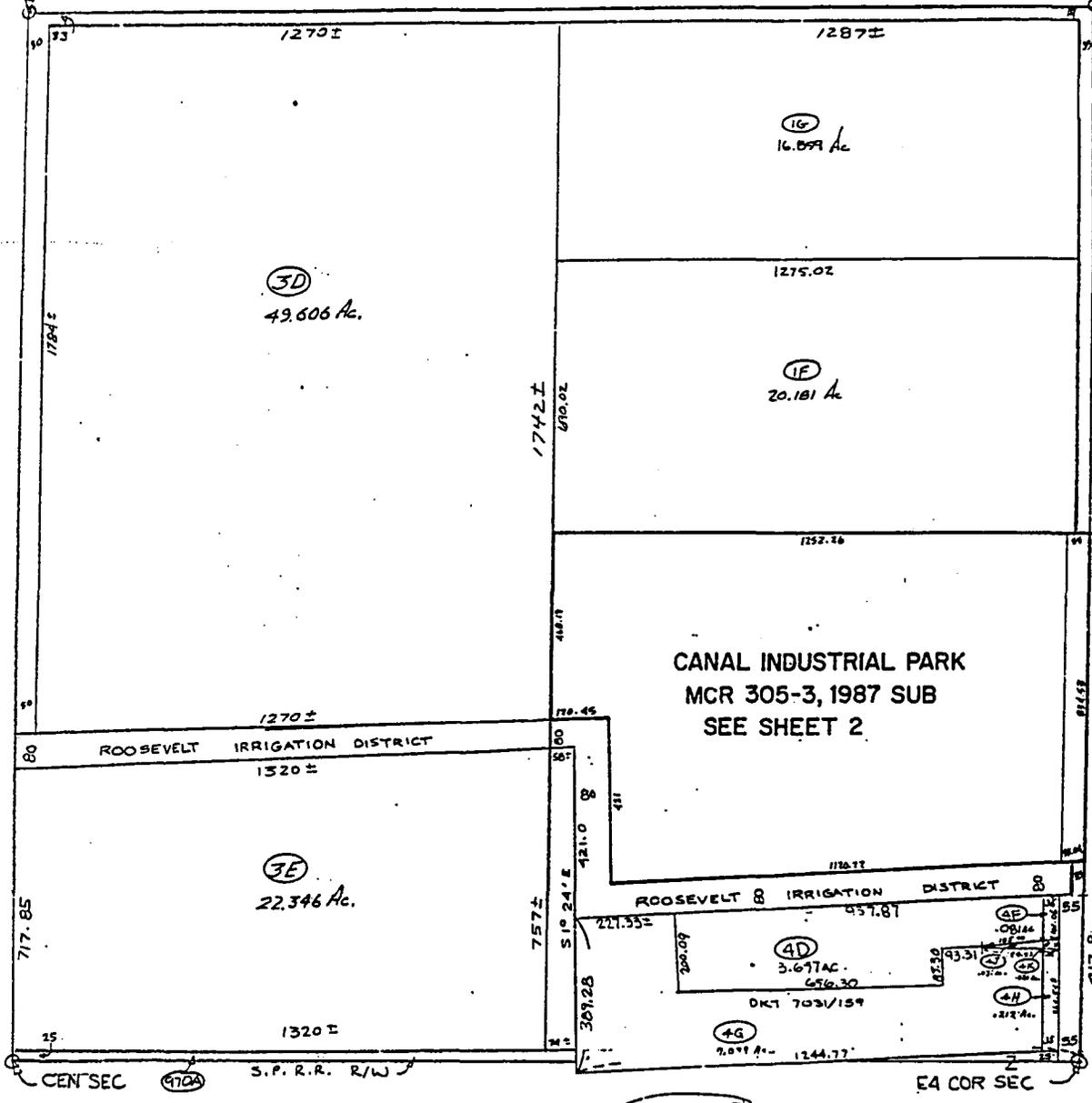
NE4 SEC. II-TIN RIE

BOOK 104  
MAP 11  
Sheet 1 of 2

ST  
NE COR SEC

VAN BUREN  
N4 COR SEC

NO.	ACRES	AREA	PERCENT
1	16.059	16.059	100.00
2	20.181	20.181	100.00
3	49.606	49.606	100.00
4	22.346	22.346	100.00
5	3.677	3.677	100.00
6	2.011	2.011	100.00
7	12.447	12.447	100.00
8	0.014	0.014	100.00
9	0.014	0.014	100.00
10	0.014	0.014	100.00
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12	0.014	0.014	100.00
13	0.014	0.014	100.00
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100	0.014	0.014	100.00

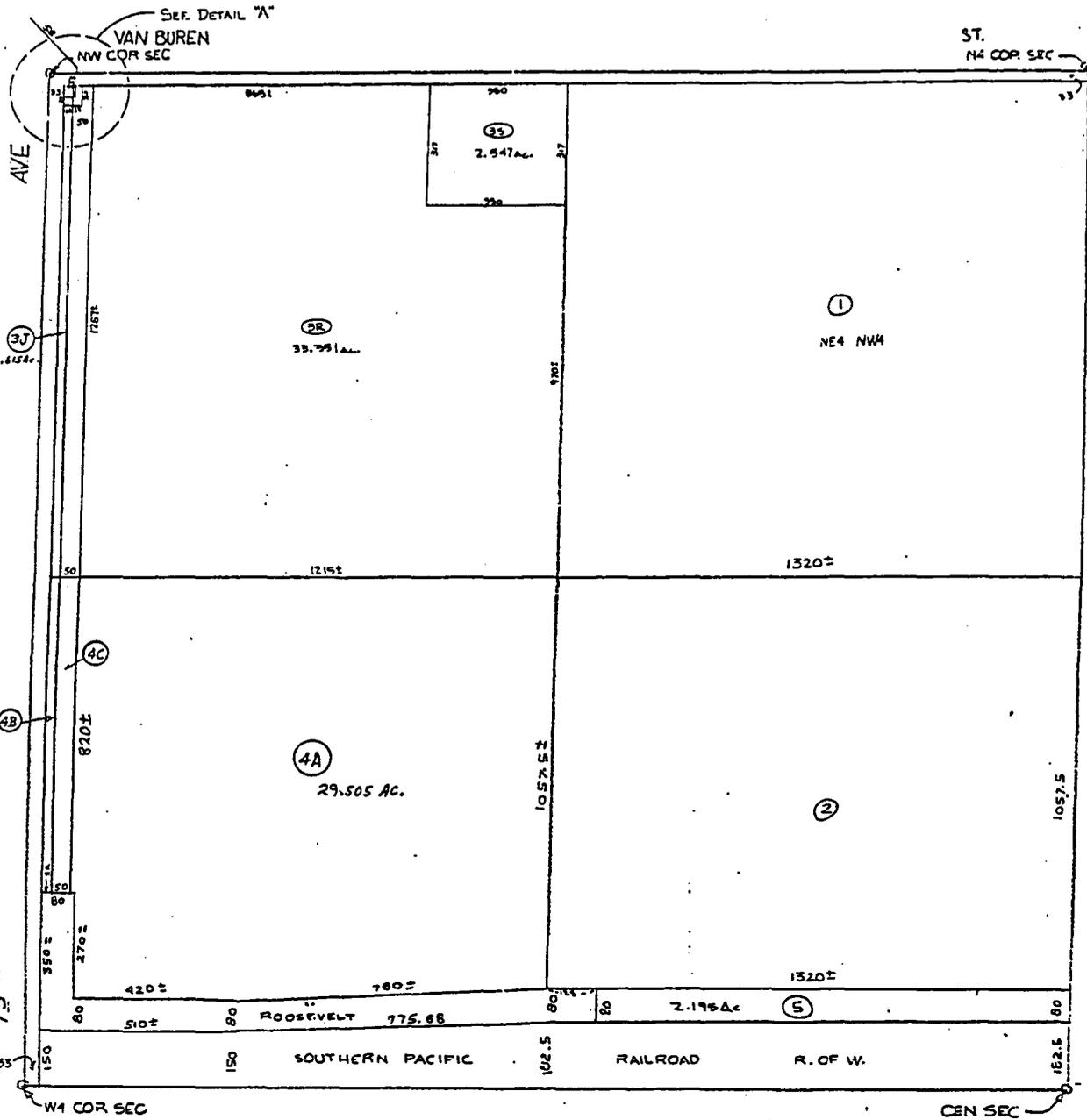


CRM 1-3



NW 1/4 SEC 13. T1N R1E

BOOK 184  
MAP 10



ASSESSORS OFFICE

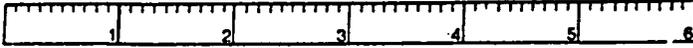
TRACT	ACRES	ASSESSOR	DATE
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3	2.40		
4	2.40		
5	2.40		
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8	2.40		
9	2.40		
10	2.40		
11	2.40		
12	2.40		
13	2.40		
14	2.40		
15	2.40		
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40	2.40		

SCALE 1"=200'

(C2M V-3)



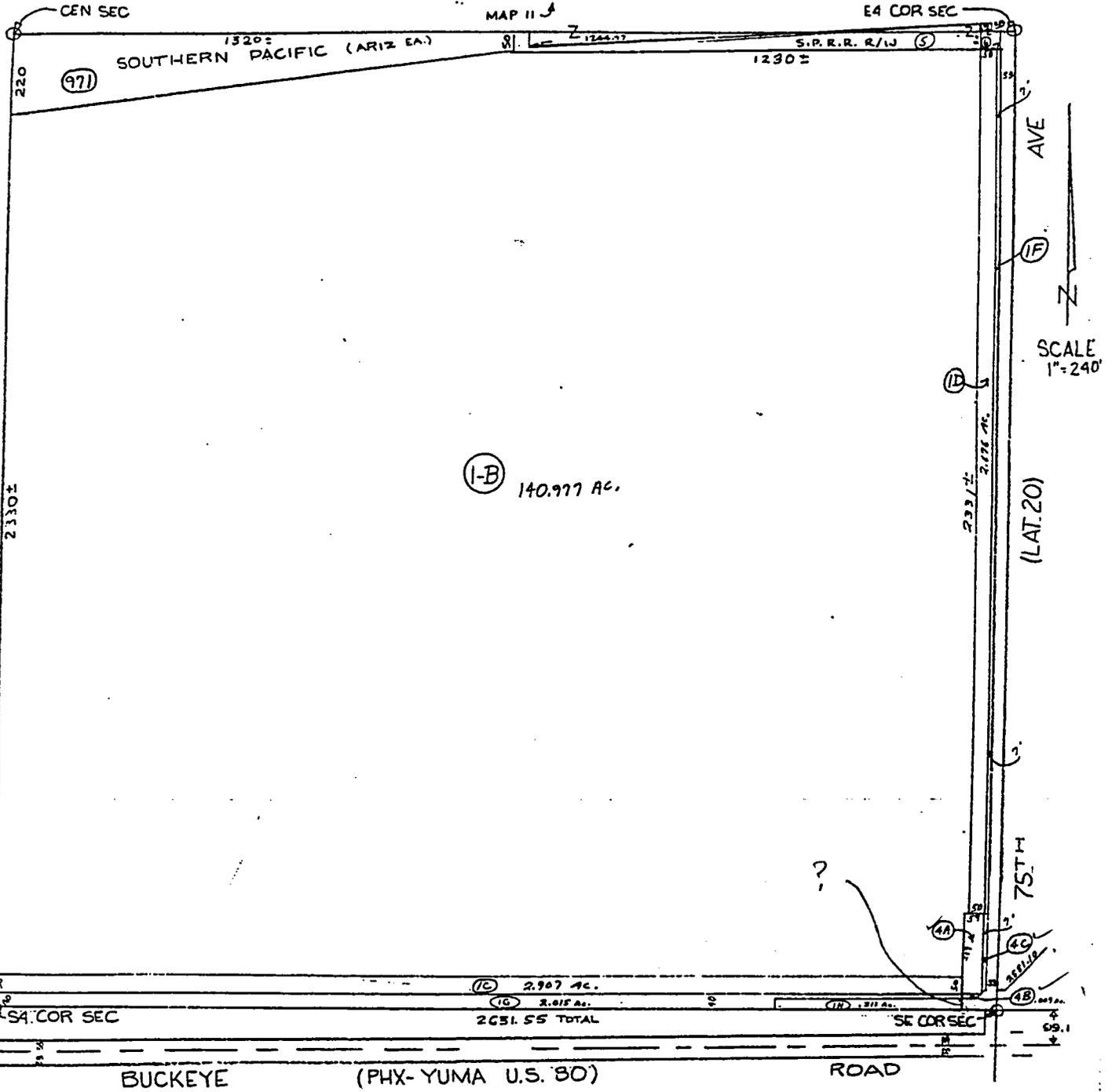
0-345-7334



SCALE IS 1/10 OF AN INCH

SE 1/4 SEC II TIN RIE

BOOK 104  
MAP 14





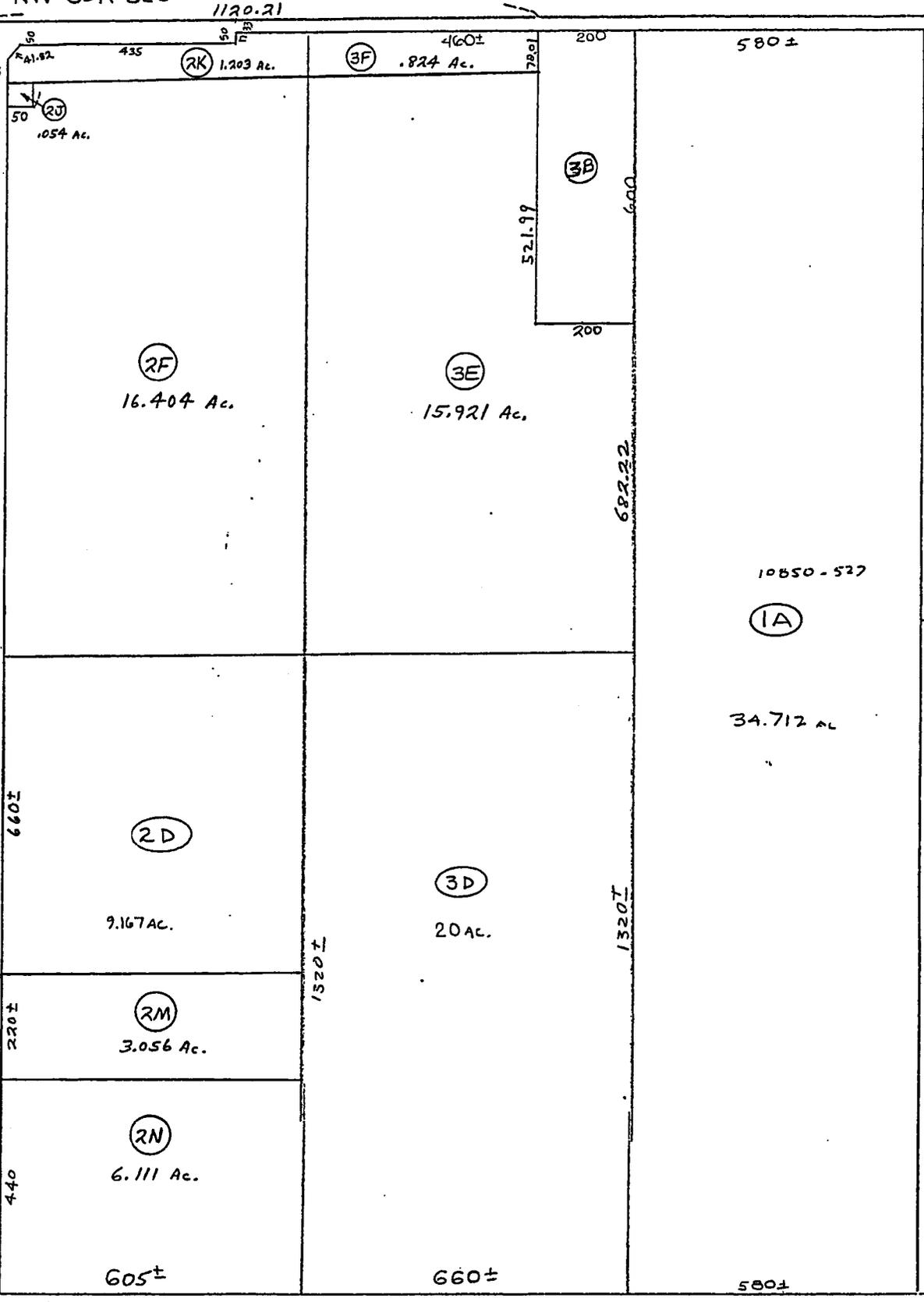
NW 1/4 SEC 13 TIN RIE

BUCKEYE  
NW COR SEC

PHX-YUMA U.S. 80

AVE

(LAT 20)



CITY/ASSASSIONS OFFICE

E II' = 340'

REUSE:

TRACT	ACRES	RECORD	DATE
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F 11673-245	2082	2012	
B 080-61587	2070	2012	
D 13982-186	2072	2012	
E 13982-186	2072	2012	
J 16049-1294	2072	2012	
G 16049-1294	2072	2012	
3F 16049-1294	2072	2012	
L 85-298528	2072	2012	
N 84-554947	2072	2012	
S 88-296545	2072	2012	





**Stantec**

---

## **Appendix E: Traffic Analysis**

---

# TRAFFIC ANALYSIS FOR 75TH AVENUE MC 85 (BUCKEYE ROAD) TO VAN BUREN STREET MARICOPA COUNTY, ARIZONA

## INTERSECTION AND ROADWAY IMPROVEMENT STUDY



**Bolduc,  
Smiley &  
Associates, Inc.**

TRANSPORTATION ENGINEERING CONSULTANTS

5080 North 40th Street - Suite 250  
Phoenix, Arizona 85018 (602) 952-1577

SEPTEMBER 6, 2001

**TRAFFIC ANALYSIS**

**FOR**

**75<sup>th</sup> AVENUE IMPROVEMENTS  
FROM  
MC 85 (BUCKEYE ROAD) TO VAN BUREN STREET**

**MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION**

**BY:**

**Bolduc, Smiley & Associates, Inc.  
5080 North 40<sup>th</sup> Street, Suite 250  
Phoenix, Arizona 85018**

**September 6, 2001**

**TRAFFIC ANALYSIS  
FOR  
75<sup>th</sup> AVENUE IMPROVEMENTS  
FROM MC 85 (BUCKEYE ROAD) TO VAN BUREN STREET**



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**TRAFFIC ANALYSIS  
FOR  
75<sup>th</sup> AVENUE IMPROVEMENTS  
FROM MC 85 (BUCKEYE ROAD) TO VAN BUREN STREET**

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**TRAFFIC ANALYSIS  
FOR  
75<sup>th</sup> AVENUE IMPROVEMENTS  
FROM MC 85 (BUCKEYE ROAD) TO VAN BUREN STREET**

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**TRAFFIC ANALYSIS  
FOR  
75<sup>th</sup> AVENUE IMPROVEMENTS  
FROM MC 85 (BUCKEYE ROAD) TO VAN BUREN STREET**

**LIST OF EXHIBITS  
(Continued)**

<b>EXHIBIT NUMBER</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
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## **1. INTRODUCTION AND SUMMARY**

### **PURPOSE OF REPORT**

The purpose of this analysis was to evaluate the existing and forecast traffic conditions and to recommend design alternatives on 75<sup>th</sup> Avenue from MC 85 (Buckeye Road) to Van Buren Street. The study documents the existing traffic conditions (Year 2001), an interim design year which was noted as 2010, and an ultimate design year, Year 2020.

This traffic study was prepared at the request of Stantec Consulting, Inc. to assist in the development of a Design Concept Report (DCR) for the Maricopa County Department of Transportation (MCDOT). The DCR will document the improvement design alternatives being considered for the section of 75<sup>th</sup> Avenue from MC 85 to Van Buren Street.

### **STUDY OBJECTIVES**

The objective of this study was to investigate the existing and design year traffic operating conditions and to evaluate improvement alternatives. Recommendations are presented. The objective of each alternative is to provide a safe and efficient transportation facility on 75<sup>th</sup> Avenue from MC-85 to Van Buren Street.

The following tasks were performed in this study.

- Collect existing traffic volume information
- Inventory existing roadway features
- Identify programmed developments and improvements
- Analyze vehicular collision records
- Assess existing AM and PM traffic volumes
- Calculate existing level of service
- Project traffic volume growth
- Evaluate design year traffic operation
- Perform intersection capacity analysis for forecasted design year conditions
- Summarize findings and recommend improvement alternatives

The following section provides a summary of the findings and recommendations.

### **EXECUTIVE SUMMARY**

The project is located on 75<sup>th</sup> Avenue between Van Buren Street and MC 85. The existing volume of traffic on 75<sup>th</sup> Avenue is comprised of 19% truck traffic. The existing peak hour volumes have exceeded the desirable level of service for an urban two-lane roadway. The all-way stop-controlled intersection at Van Buren Street is operating at a

poor level of service under existing conditions. The MC 85 intersection is currently functioning at a good level of service as a signalized intersection. The review of historical vehicular collisions for the years of 1998 through 2000 indicated that there were a total of 26 collisions on this one-mile section of 75<sup>th</sup> Avenue and on the approaches to the two major intersections. No roadway geometric deficiencies were identified which may have contributed to the cause of these accidents. Per the MCDOT Roadway Design Manual, the Year 2020 forecasts of future traffic in the project vicinity would classify all three streets (75<sup>th</sup> Avenue, Van Buren and MC 85) as urban principle arterials.

It is anticipated that the Van Buren Street intersection will be improved and signalized by early 2002. A recently completed traffic impact study for the Target Store Distribution Center shows that the improvements that are planned for this intersection will accommodate the site generated traffic generated by the upcoming Target Store Distribution Center and the forecasted traffic that will pass through this intersection. This study recommended that 75<sup>th</sup> Avenue be widened to a five-lane cross section. The study recommends that further study should be conducted to ensure the accuracy of the forecast of future traffic volumes given the significant un-developed land along the 75<sup>th</sup> Avenue corridor.

## **2. GENERAL PROJECT INFORMATION**

### **STUDY LOCATION**

This project is a study of a 1.6-kilometer (one-mile) segment of 75<sup>th</sup> Avenue between Van Buren Street and MC 85 (Buckeye Road) located in central Maricopa County. This section of 75<sup>th</sup> Avenue is currently a two-lane roadway that borders both the City of Phoenix and the City of Tolleson.

The northern project limit, at Van Buren Street, is approximately one kilometer (2/3 mile) south of Interstate 10. Within the project limits, the Union Pacific-Southern Pacific Railroad crosses 75<sup>th</sup> Avenue at the midpoint between Van Buren and MC 85. Approximately 150 meters (492 feet) north of the railroad tracks, the Roosevelt Irrigation District Canal crosses 75<sup>th</sup> Avenue running west/east. Further north of the canal, Madison Street and Washington Street intersect 75<sup>th</sup> Avenue from the west, forming two T-intersections. Exhibit 2-1 illustrates the project corridor described above.

### **EXISTING LAND USE**

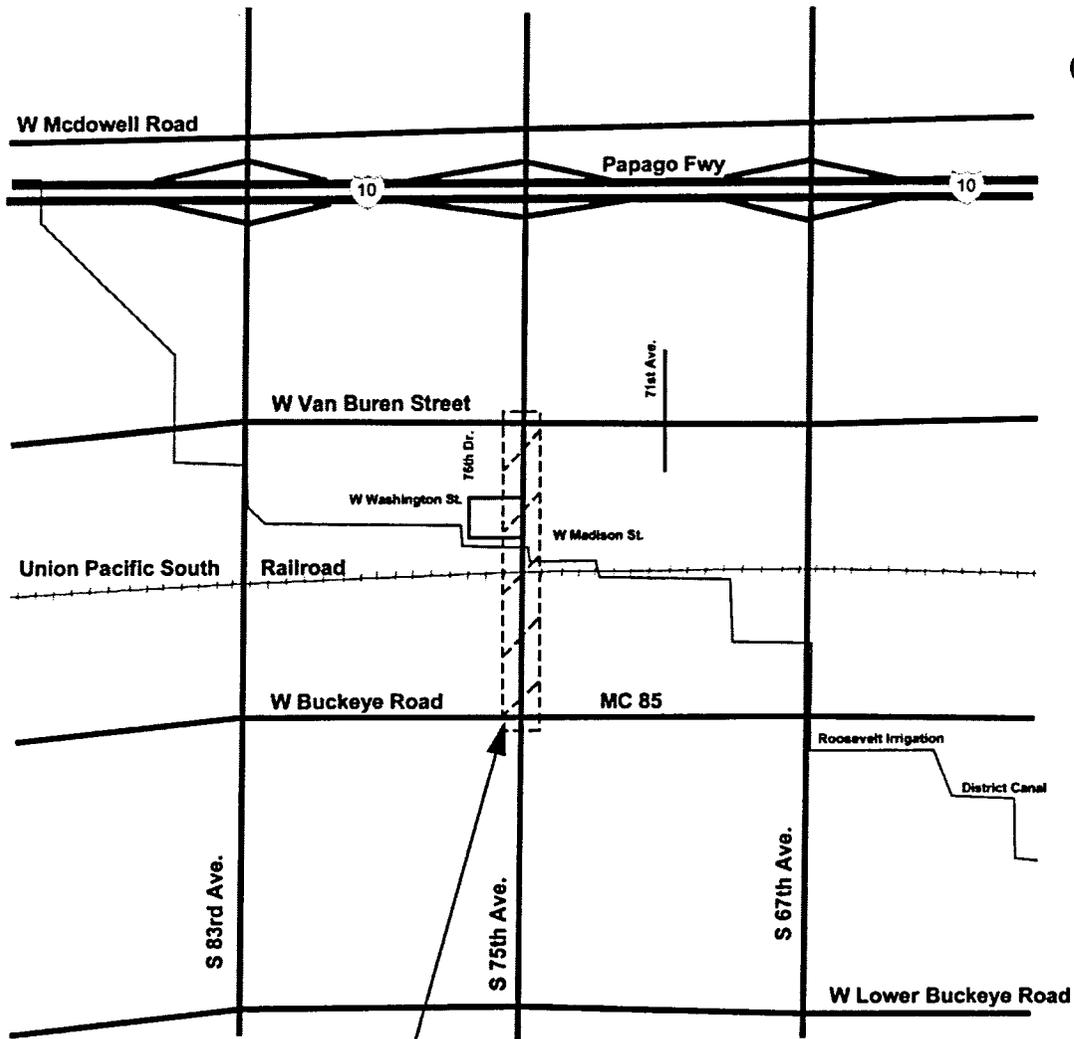
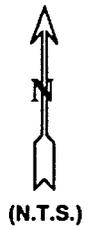
The existing land use adjacent to this section of 75<sup>th</sup> Avenue consists of agriculture and light industrial uses. With increasing commercial developments in the area, the agricultural lands are starting to convert to light industrial properties. The following commercial sites are currently located along 75<sup>th</sup> Avenue.

- Auto Zone Distribution Center
- Southwest Feed and Grain and Pet Food Processing Plants
- Freezer Services Distribution Center

The existing right-of-way (ROW) within the project is the jurisdiction of Maricopa County and will ultimately be annexed by the City of Phoenix. Exhibit 2-2 shows a 16.76 meter (55 feet) half street right-of-way to the east of the existing 75<sup>th</sup> Avenue section line. On Van Buren Street, the City of Phoenix right-of-way line is located 10.06 meters (33 feet) south of the Van Buren centerline. The rights of way shown in Exhibit 2-2 show the 75<sup>th</sup> Avenue and Van Buren Street intersection to be under City of Phoenix jurisdiction, and the 75<sup>th</sup> Avenue and MC 85 intersection to be under Maricopa County (and ultimately City of Phoenix) jurisdiction.

### **PROGRAMMED IMPROVEMENTS**

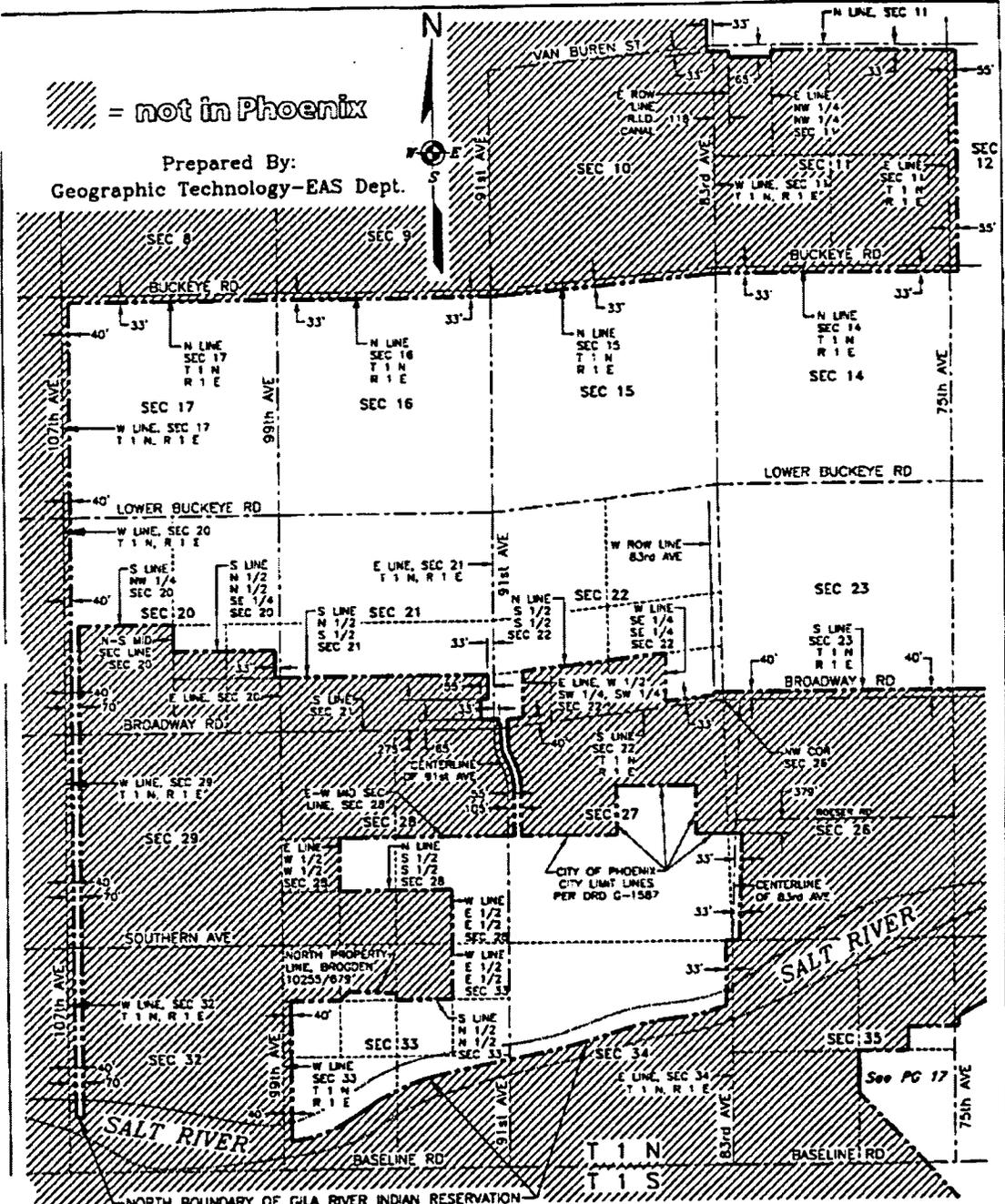
The City of Phoenix has a project programmed that will improve 75<sup>th</sup> Avenue between Van Buren Street and the I-10 freeway. In addition, improvements to the intersection of 75<sup>th</sup> Avenue and Van Buren Street are currently under design. The following schedule is anticipated.



**PROJECT LIMITS**  
**75TH AVENUE**  
**MC 85 TO VAN BUREN STREET**

**Bolduc,  
Smiley &  
Associates, Inc.**

**PROJECT VICINITY MAP**  
**75TH AVENUE, FROM MC 85 TO VAN BUREN STREET**  
**EXHIBIT 2-1**



/// = not in Phoenix

Prepared By:  
Geographic Technology-EAS Dept.

 <b>City of Phoenix</b> City Limits	ORD NO	LAST EFF ANNEX DATE	REV BY	ORD NO	LAST EFF ANNEX DATE	REV BY	PG NO
	G-3532	7-4-92	JWW				19
	G-3918	6-6-96	JWW				

DATA SOURCE: MCDOT ROW SECTION.

**Bolduc,  
Smiley &  
Associates, Inc.**

**PROJECT VICINITY  
RIGHT-OF-WAY MAP**

**EXHIBIT 2-2**

**Projected Construction Schedule  
75<sup>th</sup> Avenue/Van Buren Street Intersection Improvements**

<b>Tasks</b>	<b>Date<sup>1</sup></b>
Project Bid Advertisement	July 2001
Begin Construction	October 2001
End Construction	February 2002

1. Provided by City of Phoenix, March 2001

The intersection improvement project will widen each street to a five-lane cross section, extending 305 meters (1000 feet) in all four directions. The improvement would also install a traffic signal at the intersection replacing the existing all-way stop-controlled condition.

### **ANTICIPATED DEVELOPMENT**

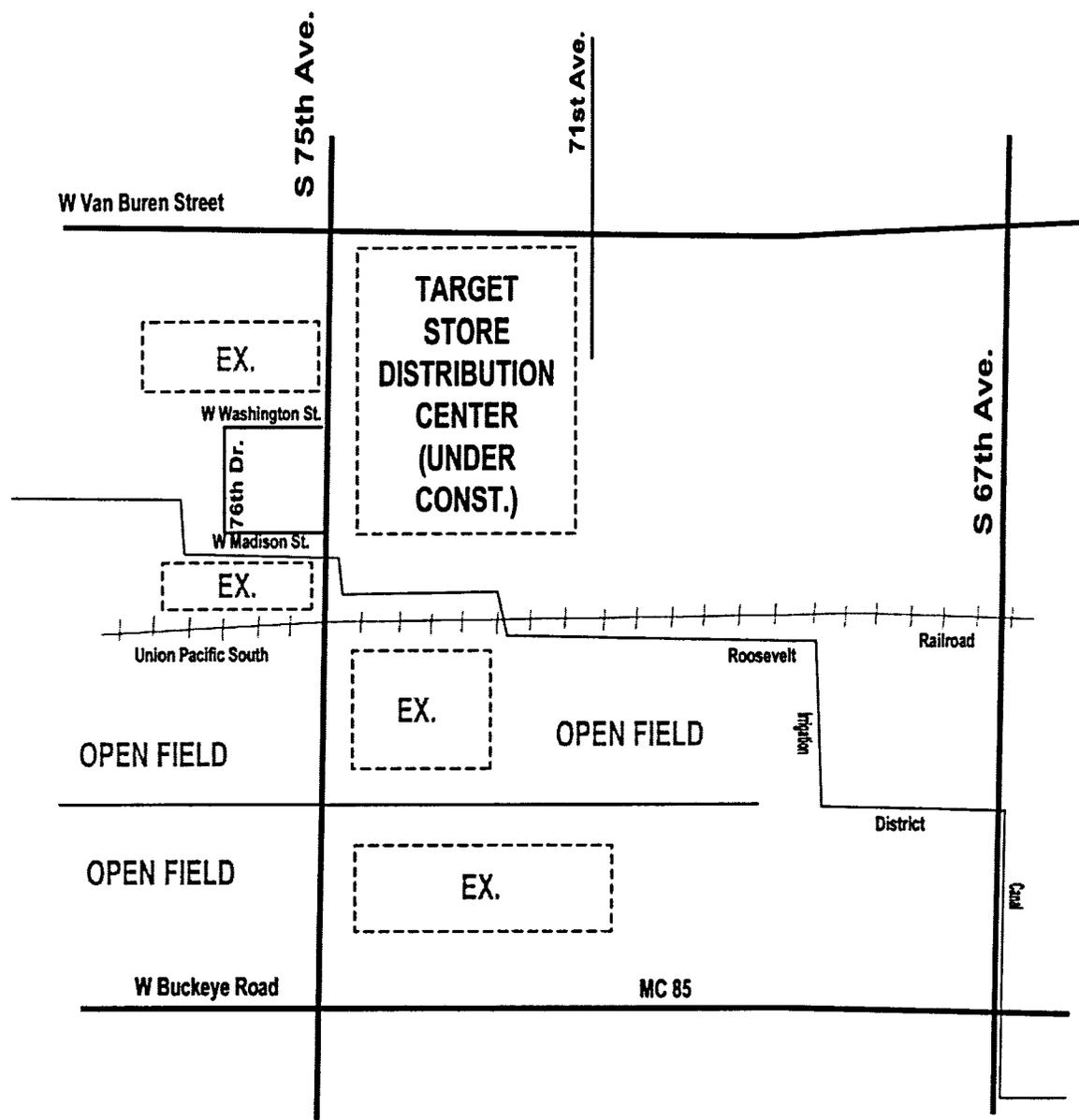
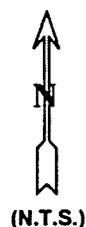
A Target Store warehouse distribution center facility is currently under construction in the southeast quadrant of the 75<sup>th</sup> Avenue and Van Buren Street intersection. A Traffic Impact Study dated October 5, 2000, was obtained, which documents the proposed development. The 0.6 square-kilometer (147 acre) site will accommodate a single 142,473 square-meter (1,533,571 square-foot) warehouse and distribution facility with associated supporting office space. The Target Store warehouse distribution center will employ approximately 850 persons, working over three shifts. The facility is anticipated to be fully functional in the year 2002. The location of the Target Store warehouse distribution center is shown on Exhibit 2-3.

### **USE OF REFERENCES**

The following design guidelines were used to evaluate the existing and future conditions on the section of 75<sup>th</sup> Avenue between Van Buren Street and MC 85.

- Policy on Geometric Design of Highways and Streets, 1994, prepared by the American Association of State Highway and Transportation Officials (AASHTO).
- Highway Capacity Manual (HCM), 2000 edition.
- MCDOT Roadway Design Manual, Adopted November 3, 1993.

Throughout the study, these design guidelines were referenced to evaluate the traffic operating characteristics of the proposed project.



 = COMMERCIAL FACILITIES.

**Bolduc,  
Smiley &  
Associates, Inc.**

**EXISTING AND PROPOSED LAND USE  
75TH AVENUE, FROM MC 85 TO VAN BUREN STREET  
EXHIBIT 2-3**

### **3. EXISTING TRAFFIC CONDITIONS**

#### **PHYSICAL ROADWAY CHARACTERISTICS**

75<sup>th</sup> Avenue is a two-lane roadway and is striped with a double yellow center line. This section of roadway is carrying traffic north and south. A rail crossing located at the middle of the project is perpendicular to 75<sup>th</sup> Avenue. Near the railroad tracks on 75<sup>th</sup> Avenue, railroad crossing pavement markings, signals with gates and warning signs are installed on both north and south approaches. The existing speed limit on 75<sup>th</sup> Avenue is posted at 50 miles per hour (80 kilometer per hour).

Electric power poles with overhead utility lines are located along the east side of 75<sup>th</sup> Avenue between MC 85 and Van Buren Street. On the west side of 75<sup>th</sup> Avenue, an irrigation channel extends the entire length of the project. The Roosevelt Irrigation District Canal runs east-west under 75<sup>th</sup> Avenue approximately 150 meters north of the railroad crossing.

The existing two-lane roadway facility consists of various cross sections within the 1.6-kilometer (1-mile) project length. As identified in the Maricopa County Department of Transportation (MCDOT) Candidate Assessment Report, the typical cross section north of the railroad tracks has a pavement width of 7.9 meters (26 feet). South of the railroad tracks, a cross section of 12.5 meters (41 feet) continues through to the intersection of MC 85. Curb, gutter and sidewalks are installed along the east side of 75<sup>th</sup> Avenue in this segment, except for a length of 150 meters (500 feet) south of the Freezer Service facilities.

The wider roadway south of the railroad tracks provides the width necessary to accommodate northbound right-turn lanes serving the abutting facilities on the east side of 75<sup>th</sup> Avenue. At the MC 85 intersection, left-turn lanes are provided with a shared through and right-turn lane on each approach on 75<sup>th</sup> Avenue. The MC 85 approaches to the intersection consist of an exclusive left-turn lane and two through lanes in each direction. The intersection is currently signalized. In addition, traffic signal poles with street light fixtures are located in all four quadrants of the intersection.

The 75<sup>th</sup> Avenue and Van Buren Street intersection consists of 7.9 meter (26 feet) approach widths on each leg operating with one lane per direction. The standard stop bar and double-yellow pavement marking delineated the four-way stop condition at the intersection. There is no intersection lighting.

#### **VEHICULAR CRASH SUMMARY**

All involved jurisdictions were contacted in an attempt to gather historical accident records. The City of Phoenix was the only agency that has records on this segment of 75<sup>th</sup> Avenue, including the two major intersections within the study limits. The vehicular collisions were categorized into intersection and segment summaries for the calendar years of 1998, 1999 and 2000. The intersection related accidents included

all vehicle crashes which occurred on all approaches within 45.72 meters (150 feet) of the intersection. All other accidents were considered as segment collisions.

The following table summarizes the intersection collisions at 75<sup>th</sup> Avenue and MC 85 which, as previously discussed, is controlled by a traffic signal.

**75<sup>th</sup> Avenue/MC 85 Intersection Collisions**  
**Inquiry Period: 1/1/98 – 12/31/00**

Date	Injury Severity	Type
6/7/00	None	Rear End
10/31/00	None	U-turn

Data source: City of Phoenix Police Department

Two crashes were reported during the three year study period. These crashes included one rear end and one U-turn collision. There were no injuries with these two collisions.

The four-way stopped-controlled intersection at 75<sup>th</sup> Avenue and Van Buren Street has experienced 15 accidents during the study period. The following collisions occurred during the years of 1998 to 2000.

**75<sup>th</sup> Avenue/Van Buren Street Intersection Collisions**  
**Inquiry Period: 1/1/98 – 12/31/00**

Date	Injury Severity	Type
2/24/98	None	Angle
4/27/98	None	Rear End
5/18/98	None	Single Vehicle
6/26/98	None	Single Vehicle
8/17/98	Minor	Rear End
10/5/98	Serious	Single Vehicle
12/24/98	None	Rear End
7/20/99	None	Rear End
8/30/99	Serious	Rear End
10/18/99	None	Angle
2/8/00	Minor	Sideswipe
4/18/00	None	Sideswipe
4/22/00	Minor	Angle
7/10/00	Minor	Angle
10/25/00	Minor	Angle

Data source: City of Phoenix Police Department

These fifteen crashes included five angle, three single vehicle, two sideswipe, and five rear end types of collision. The crashes resulted in two serious injuries and five minor injuries.

A segment collision summary for the section of 75<sup>th</sup> Avenue between Van Buren Street and MC 85 was provided by the City of Phoenix. The segment collisions included the accidents which occurred on 75<sup>th</sup> Avenue more than 45.72 meters (150 feet) from the two major intersections. These collisions are tabulated below.

**75<sup>th</sup> Avenue, MC 85 to Van Buren Street, Segment Collisions  
Inquiry Period: 1/1/98 – 12/31/00**

Date	Injury Severity	Type
1/17/98	None	Rear End
2/4/98	Minor	Rear End
2/18/98	Minor	Rear End
4/8/98	Minor	Rear End
2/13/99	None	Sideswipe
5/24/99	Minor	Rear End
6/13/99	None	Sideswipe
1/24/00	Minor	Rear End
4/24/00	None	Rear End

Data source: City of Phoenix Police Department

There were nine reported segment collisions. The majority of the collisions were rear end type with two sideswipe crashes. These nine crashes resulted in five minor injuries.

A collision diagram is shown on Exhibit 3-1. This exhibit graphically summarizes the collisions which occurred within the project limits for the years 1998 through 2000. The reported collisions included a total of twenty-six vehicular crashes and were comprised of thirteen rear end, five angle, four sideswipe, three single vehicle and one U-turn type of collision.

**HISTORICAL TRAFFIC VOLUMES**

The historical traffic volumes on 75<sup>th</sup> Avenue, north of the MC 85, were provided to the study team by MCDOT, Traffic Engineering. Three years of historical average daily traffic volumes (ADT) were analyzed. This data included the years 1996, 1999 and 2000. The following table lists these ADT's. The Year 2000 data also shows the percent heavy vehicles that were observed.

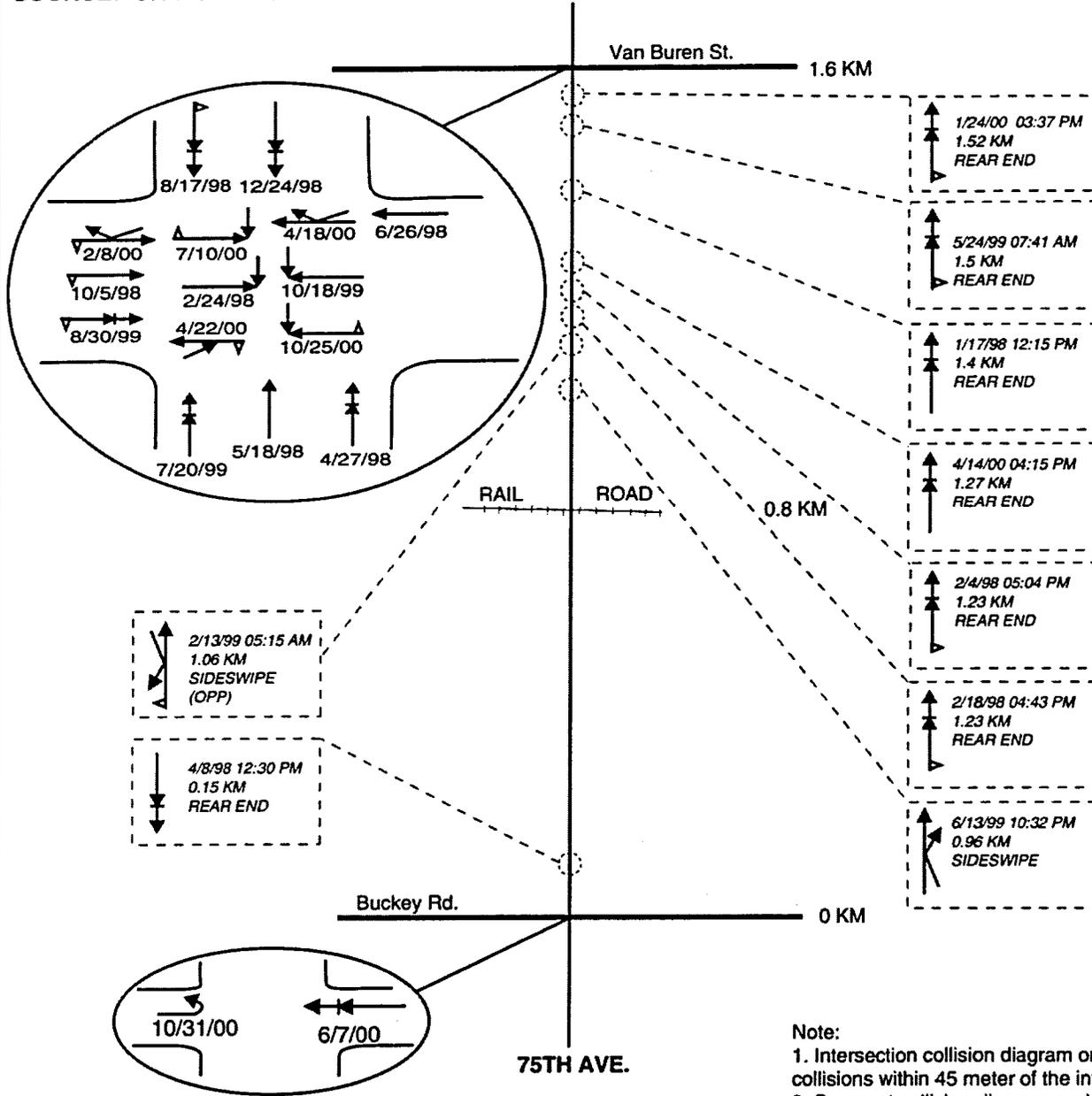
**Historical ADT<sup>1</sup>**

Year	ADT	Heavy Vehicles
1996	8733	-
1999	9782	-
2000	8752	24%

1. Data provided by MCDOT.

Due to the limited amount of historical data available, the information does not provide a reasonable statistical indication of past traffic growth trends.

SOURCE: CITY OF PHOENIX - SAFETY DEPT.



Note:

1. Intersection collision diagram only includes collisions within 45 meter of the intersections.
2. Segment collision diagram excludes the intersection collisions.

TOTALS	SYMBOLS	TYPE OF COLLISION	
REAR END = 13		MOVING VEHICLE	REAR END
U-TURN = 1		INJURY CRASH	U-TURN
SIDESWIPE = 4		SEGMENT CRASH	SIDESWIPE(SAME)
ANGLE = 5		CRASH LOCATION	SIDESWIPE(OPP)
SINGLE VEHICLE = 3		ANGLE CRASH	SINGLE VEHICLE
<b>TOTAL ACCIDENTS = 26</b>			

**Bolduc,  
Smiley &  
Associates, Inc.**

**COLLISION DIAGRAM  
75TH AVE. FROM MC 85 TO VAN BUREN ST.  
1/1/98 THROUGH 12/31/00**

**EXHIBIT 3-1**

#### 4. ANALYSIS OF EXISTING TRAFFIC VOLUMES

##### EXISTING TRAFFIC CHARACTERISTICS

To develop a picture of current traffic conditions, traffic volume data were collected on Tuesday, March 13, 2001. The traffic volume counts included directional twenty-four hour volume and vehicular classification counts on all approaches to the two major intersections of MC 85 and Van Buren Street. Vehicle turning movement counts which also included pedestrian activity were also gathered at these two intersections. The turning movement volumes were performed during the morning and afternoon traffic peak periods of 6:00 to 9:00 AM and 3:00 to 6:00 PM, respectively.

The following table shows the 24-hour traffic volumes on 75<sup>th</sup> Avenue at the intersections of MC 85 and Van Buren Street. These traffic volumes are in vehicles per day.

**24-hour Traffic Volumes on 75<sup>th</sup> Avenue**

On 75 <sup>th</sup> Avenue	24-hour Traffic Volumes	Average ADT
South of Van Buren Street	9,932	9,527
North of MC 85	9,121	

\* Data collected on Tuesday, 3/13/2001.

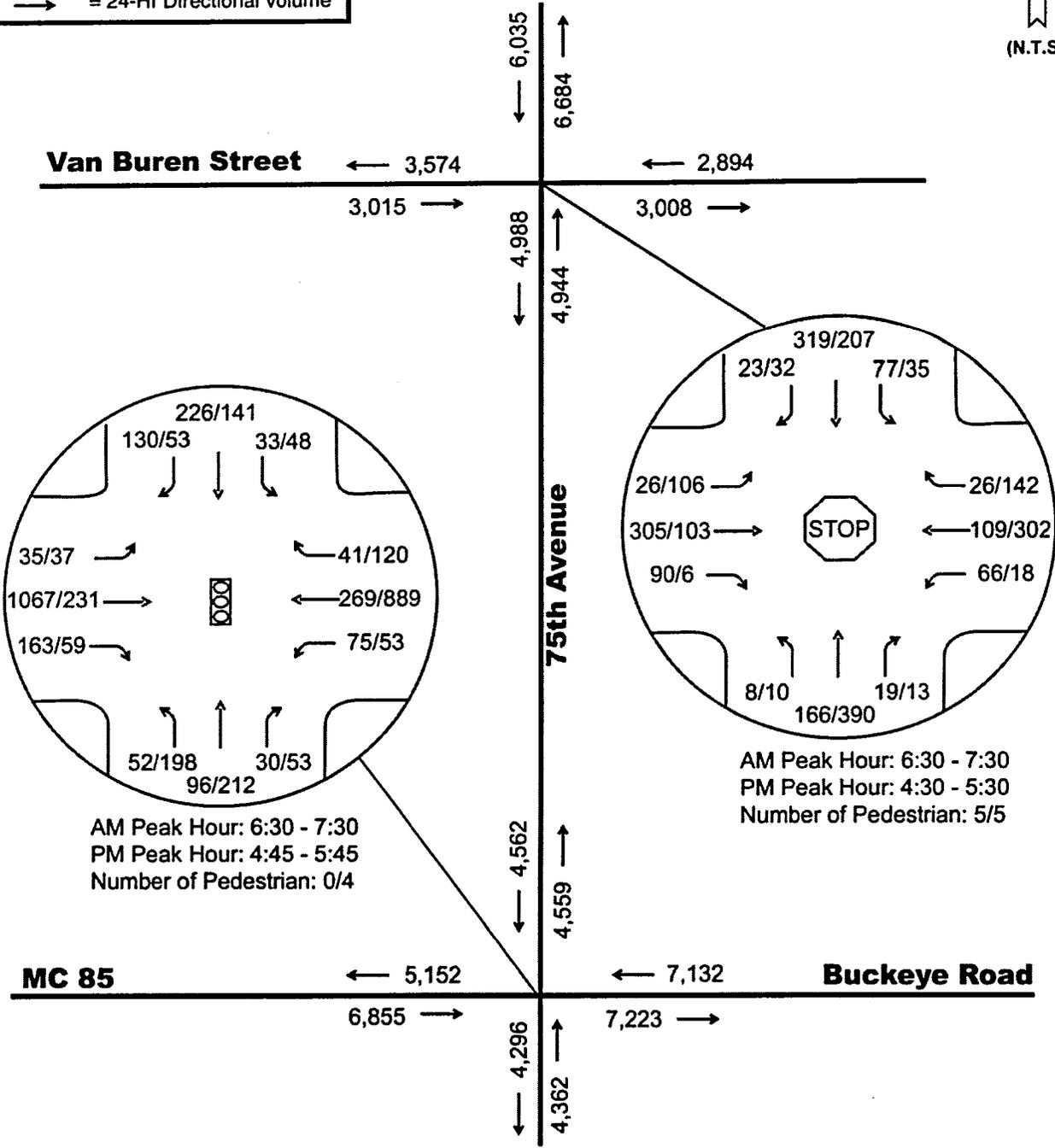
The 24-hour traffic volumes on 75<sup>th</sup> Avenue were collected at the south and north limits of the project. On 75<sup>th</sup> Avenue north of MC 85, the traffic data indicated a total of 9,121 vehicles per day, with 9,932 vehicles per day south of Van Buren Street. An average of these two volumes results in an ADT of 9,527 vehicles.

The directional 24-hour volumes on all approaches to the MC 85 and Van Buren Street intersections are shown on Exhibit 4-1. The morning and afternoon peak hour turning movement counts are also shown. The AM peak hour at both intersections occurred between 6:30 to 7:30 AM. The PM peak hour occurred from 4:45 to 5:45 PM at the MC 85 intersection, and from 4:30 to 5:30 PM at the Van Buren Street intersection.

Exhibit 4-2 shows the 24-hour entering volumes for the two major intersections. In general, the MC 85 intersection carries a higher traffic volume than the Van Buren Street intersection. The exhibit shows that there is a specific morning peak period for both intersections. The Van Buren Street intersection has a relatively low, poorly defined, afternoon peak period, whereas the MC 85 intersection has a well-defined PM peak period. At the MC 85 intersection, the highest hour of traffic occurs during the PM hours.

To characterize the traffic volumes on 75<sup>th</sup> Avenue, the 24-hour directional and bi-directional traffic volumes are plotted on Exhibit 4-3. The traffic volumes shown are averages of the data collected north of MC 85 and south Van Buren Street on 75<sup>th</sup> Avenue.

LEGEND	
xx/xx	= AM/PM Peak Hourly Volume (vph)
→	= 24-Hr Directional Volume

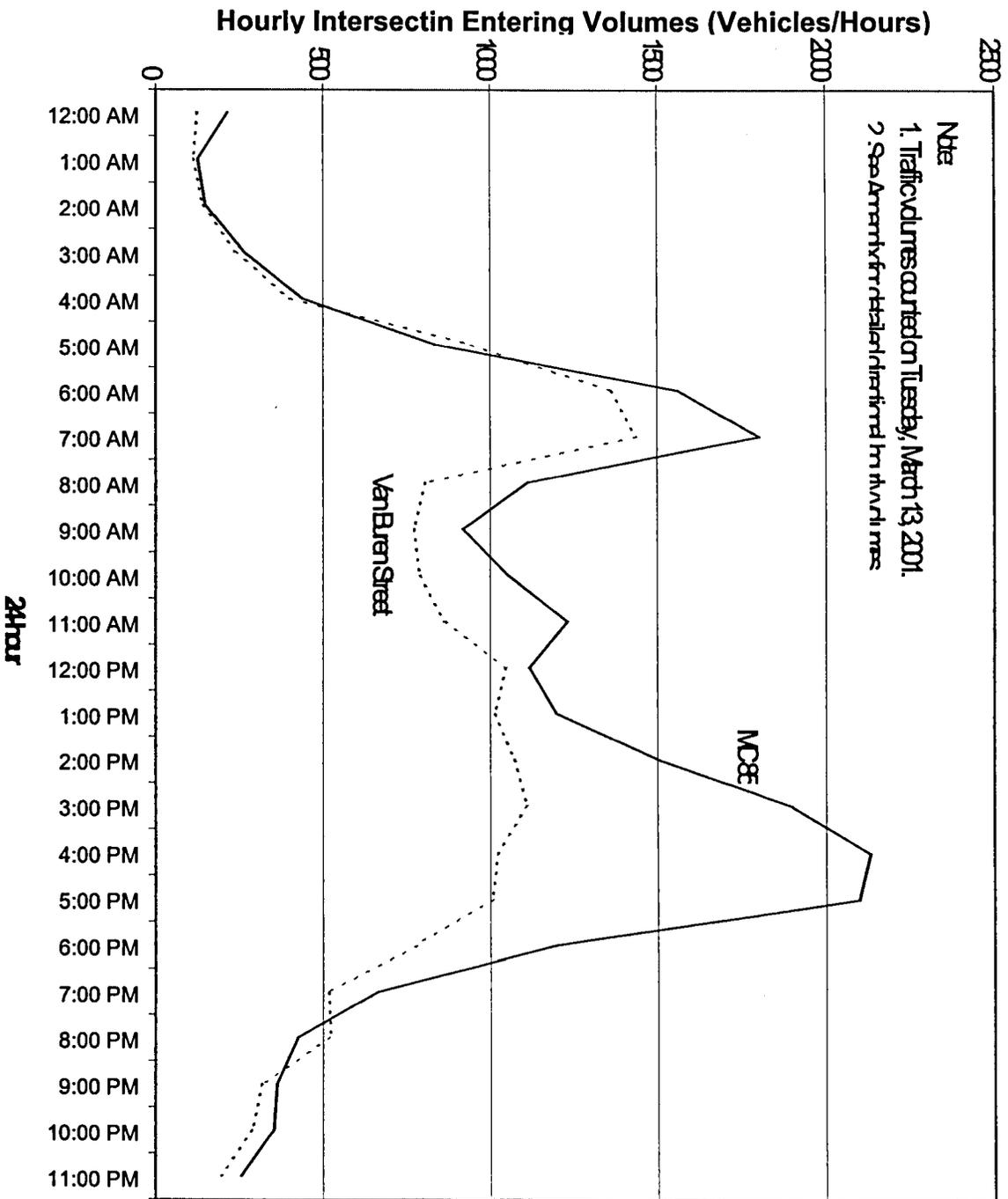


- Notes:
1. Traffic volumes were counted on Tuesday, March 13, 2001.
  2. All volumes are unadjusted.

**Bolduc,  
Smiley &  
Associates, Inc.**

**EXISTING TRAFFIC VOLUMES  
75TH AVENUE, FROM MC 85 TO VAN BUREN STREET  
EXHIBIT 4-1**

## 24hour Intersection Entering Volumes 75th Avenue at Van Buren Street and at MC85 (Budeye Road)

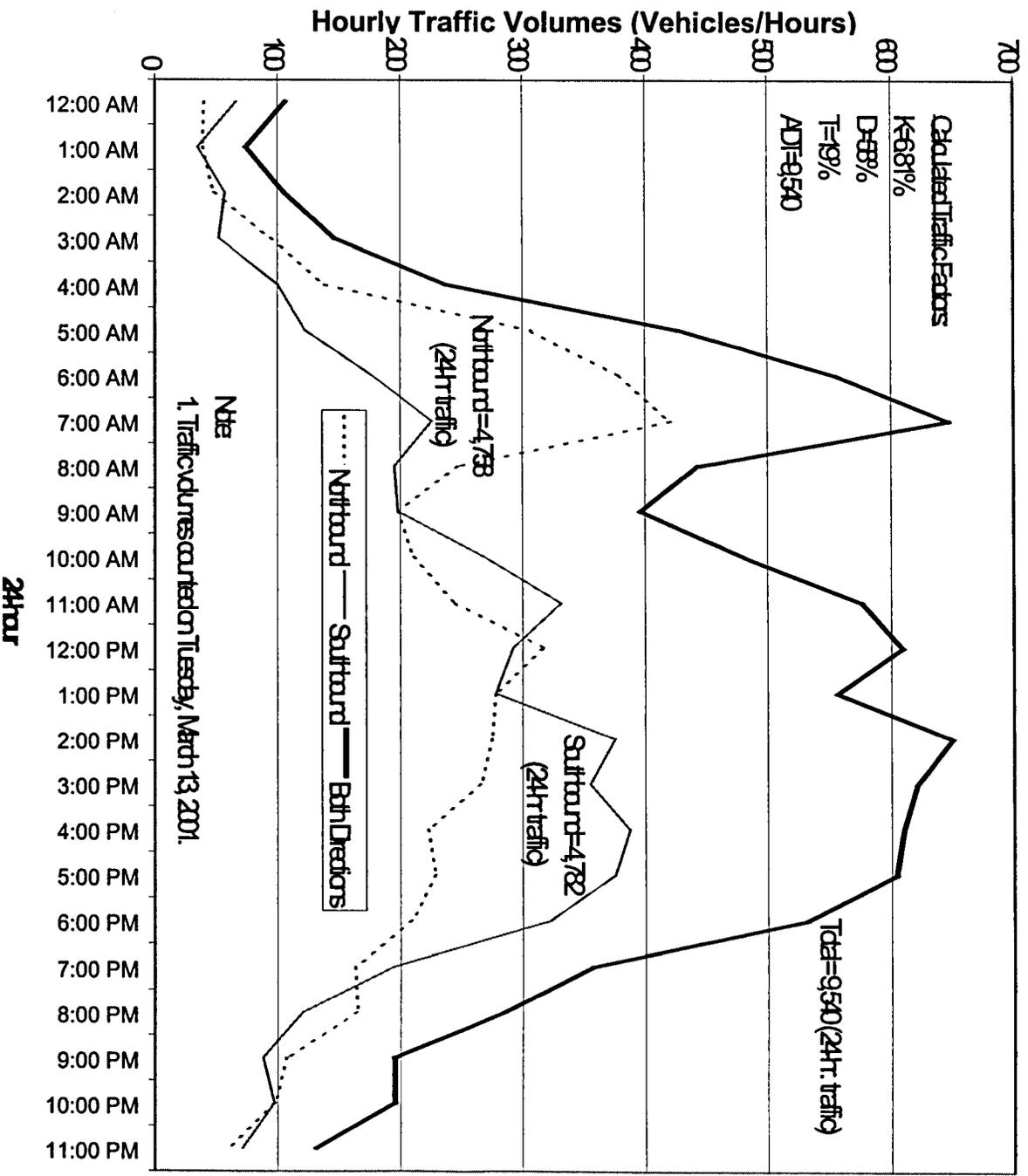


**Rolduc,  
 & Miley &  
 Associates, Inc.**

**24hour Intersection Entering Volumes  
 75th Avenue at Van Buren Street  
 and at MC85 (Budeye Road)**

**Exhibit 42**

## 24-hour Traffic Volumes on 73rd Avenue Northbound and Southbound



**Bolder,  
 Brimley &  
 Associates, Inc.**

**24-hour Traffic Volumes  
 on 73rd Avenue Northbound and Southbound**

**Exhibit 43**

The daily traffic on 75<sup>th</sup> Avenue has an even split on each direction, with 4,758 vehicles per day northbound and 4,782 vehicles per day southbound. The combination of two-direction traffic shows the AM peak hour traffic followed by off-peak volumes throughout the day then increasing to the PM peak period.

### VEHICLE CLASSIFICATIONS

The averages of the vehicle classification counts on 75<sup>th</sup> Avenue, north MC 85 and South Van Buren Street, is summarized into the thirteen Federal Highway Administration (FHWA) vehicle classification categories.

**Vehicle Classification Types**

Vehicle Types	Percent, %
Bikes & Motorcycles	0.3
Cars & Trailers	59.7
Single Truck – 2 axles single tire	21.8
Buses	0.2
Single Truck – 2 axles dual tire	2.3
Single Truck – 3 axles	1.9
Single Truck – 4 axles	0.1
Semi-truck – 4 axles	2.9
Trucks and trailers – 5 axles	8.7
Trucks and trailers – 6 axles	0.2
Multi-sections trucks – 5 axles	1.6
Multi-sections trucks – 6 axles	0.2
Multi-section trucks – 7 axles	0.1
<b>Total</b>	<b>100</b>

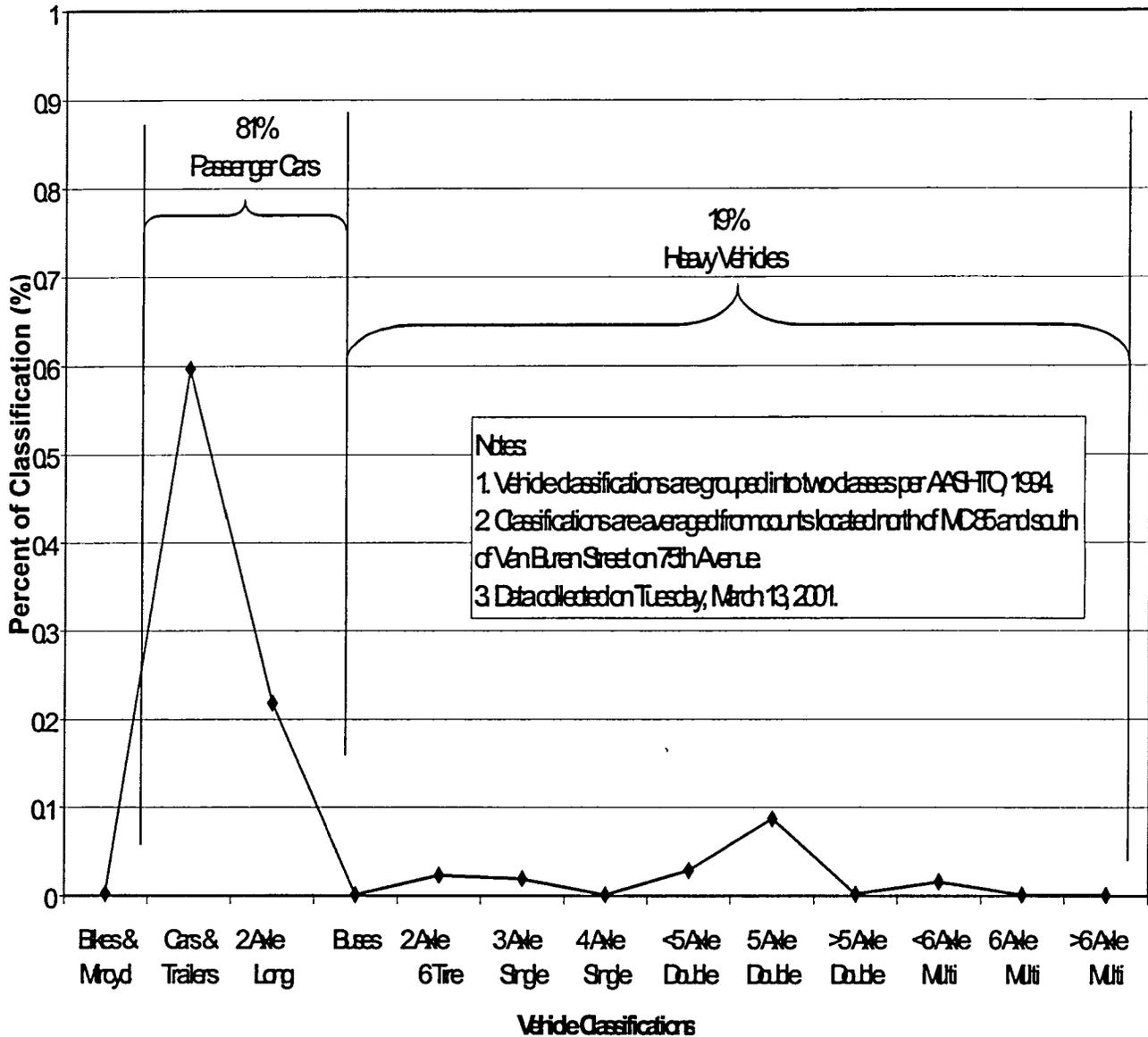
Typically, for traffic operational analysis, the various types of vehicles are grouped into two classes -- passenger cars and trucks. Based on the AASHTO design classification, the passenger car group includes all cars and light delivery trucks. The general group of trucks includes all buses, single-unit trucks, and truck combinations except the light delivery trucks. The following table presents the percentages of passenger cars and truck traffic combined into these two classes.

**Passenger Car and Truck Traffic Percentage**

Passenger Cars	81%
Trucks	19%

The combined vehicle composition included 19% trucks and 81% passenger vehicles. Exhibit 4-4 showed the percent distribution of the classification counts on 75<sup>th</sup> Avenue between MC 85 and Van Buren Street. The detailed classification counts can be found in the Appendix.

### Vehicle Classifications on 75th Avenue, From MC85 to Van Buren Street



**Bolduc,  
Smiley &  
Associates, Inc.**

**Vehicle Classifications  
on 75th Avenue, From MC85 to Van Buren Street**

**Exhibit 44**

## SUMMARY OF EXISTING TRAFFIC

Based on the traffic volumes collected on Tuesday, March 13, 2001, the existing traffic can be characterized as follows. In addition, the relationships recommended in the MCDOT Roadway Design Manual are shown for comparison purposes.

**Traffic Characteristics on 75<sup>th</sup> Avenue**

Traffic Parameters	Actual Field Data <sup>1</sup>	MCDOT Criteria <sup>2</sup>
ADT (vehicles per day)	9,540	7,000
Max. Peak Hr. Traffic (veh/hr/ln)	375	420
K-factor	6.81%	10%
D-factor	58%	60%
T-factor	19%	Varies

1. Data collected on Tuesday, March 13, 2001.

2. Table 2.1 for urban two-lane major collector, maximum volumes to maintain Level of Service "C".  
MCDOT Roadway Design Manual, 1993.

The MCDOT Roadway Design Manual indicates that the maximum ADT on a major urban collector should be 7,000 vehicles per day to maintain a level of service "C" or better operation. The existing ADT exceeds this threshold by 36%. Further examination of the maximum peak hourly traffic indicates a lower K-factor, and a similar D-factor. Overall, the roadway traffic characteristics revealed an urbanization of 75<sup>th</sup> Avenue with many high hours of traffic volume throughout the day. This results in a lower K-factor when factored from the daily traffic.

It is also important to note that the overall performance of the existing two-lane roadway on 75<sup>th</sup> Avenue is impacted by the operation of the existing intersections at MC 85 and at Van Buren Street. The detailed analysis of the existing intersection operations will be discussed in the following chapters of the study.

## 5. EXISTING INTERSECTION LEVEL OF SERVICE

### EXISTING INTERSECTION OPERATIONS

The operation of the existing intersections at MC 85 and at Van Buren Street on 75<sup>th</sup> Avenue were evaluated using the criteria and methodology presented in the Highway Capacity Manual (HCM) 2000. The procedures and level of service criteria were utilized to investigate the operations of the existing intersections.

#### Van Buren Street – Unsignalized Intersection

Part B of Chapter 17 of the HCM 2000 publication presents the procedures for analyzing an all-way stop-controlled (AWSC) intersection, such as Van Buren Street and 75<sup>th</sup> Avenue. The procedure calculates the intersection capacity and estimates the control delay for each approach based on vehicles arriving and departing the intersection. The described methodology analyzes each intersection approach independently as a measure of the conflicts between the opposing movements.

Control delay is used to define the level of service at an AWSC intersection. The LOS thresholds for control delay for AWSC intersections differ from those for signalized intersections. These different LOS threshold values reflect different driver expectations due to the distinctly different types of transportation facilities. As a result, a higher level of control delay is acceptable at a signalized intersection for the same LOS. The following table shows the LOS criteria for AWSC intersections.

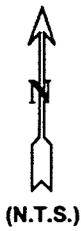
**Level of Service Criteria For AWSC Intersections<sup>1</sup>**

Level of Service	Control Delay (sec/veh)
A	0-10
B	> 10-15
C	> 15-25
D	> 25-35
E	> 35-50
F	> 50

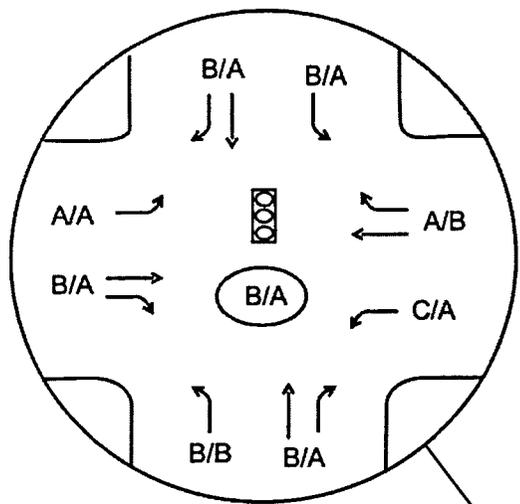
1. Exhibit 17-22, HCM 2000

Based on the AWSC analysis procedure in HCM 2000, the corresponding module in the Highway Capacity Software (HCS) was used to evaluate the operational performance at the Van Buren Street and 75<sup>th</sup> Avenue intersection during the AM and PM peak hours. The existing intersection geometric configuration and traffic volumes characteristics were entered to the HCS worksheet to determine the level of service for the current intersection. Exhibit 5-1 summarizes the level of service results from the HCS analyses. These analyses show that the unsignalized intersection at Van Buren Street is currently operating at a level of service "D" during the AM peak hour and a level of service "F" during the PM peak hour.

LEGEND	
XX/XX	= AM/PM Peak Movement Level of Service
(X/X)	= AM/PM Intersection Level of Service

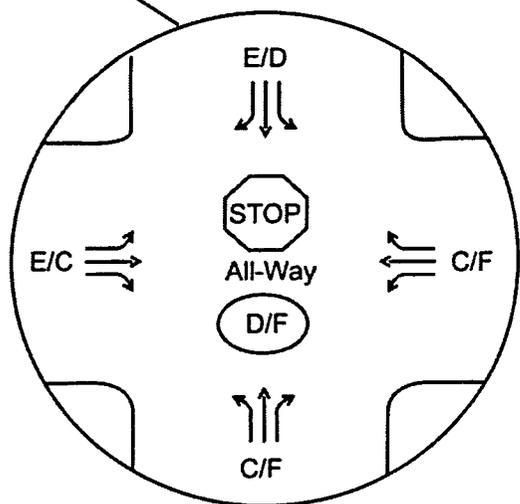


**Van Buren Street**



AM Peak Hour: 6:30 - 7:30  
PM Peak Hour: 4:45 - 5:45

**75th Avenue**



AM Peak Hour: 6:30 - 7:30  
PM Peak Hour: 4:30 - 5:30

**MC 85**

**Buckeye Road**

Notes:

1. Capacity analysis utilized HCS 2000 with existing traffic volumes and geometrics.



**LEVEL OF SERVICE**  
**EXISTING INTERSECTION CONDITIONS**  
**75TH AVENUE AT MC 85 AND AT VAN BUREN STREET**  
**EXHIBIT 5-1**

In general, the operation of the existing intersection is experiencing a high degree of delay on all approaches, especially in the southbound and eastbound directions during the AM peak hour, and in the northbound and westbound directions in the PM peak hour. The detailed analysis results are included in the worksheets in the Appendix.

MC 85 – Signalized Intersection

For the evaluation of a signalized intersection, methodology from Chapter 16 of the HCM 2000 was used. The Synchro 5.0 computer program, a signal optimization program, was used to assess the existing MC 85 intersection level of service. The following table shows the level of service criteria and average control delay at signalized intersections.

**Level of Service Criteria For Signalized Intersections<sup>1</sup>**

Level of Service	Control Delay (sec/veh)
A	0-10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

1. Exhibit 16-2, HCM 2000

With existing intersection conditions, the capacities for each traffic movement were estimated using the HCS signal module. The overall intersection levels of service during the AM and PM peak hours are “B” and “A”, respectively. The individual movements at the intersection all operate at level of service “C” or better. The level of service results are shown on Exhibit 5-1 for the MC 85 and 75<sup>th</sup> Avenue intersection. See the Appendix for the detailed capacity analysis worksheets.

**EXISTING SEGMENT PERFORMANCE**

Based on existing roadway geometry, the MCDOT Roadway Design Manual categorizes this section of 75<sup>th</sup> Avenue as a major urban collector street. As described in HCM 2000, the level of service criteria along an urban street is based on the average through-vehicle travel speed and the amount of control delay incurred at the upstream and downstream intersections. The roadway geometry and the traffic volumes directly affect the travel speed. As roadway geometry becomes more restricted and traffic volumes increase, travel speed decreases, and this results in a lower level of service for the roadway.

In an urban street network, levels of service for individual segments of the roadway are governed by the performance of the intersections and accesses along the subject street. For planning purposes, the MCDOT Roadway Design Manual indicates that a two-lane urban major collector should have a maximum daily volume of 7,000 vehicles to operate at a level of service “C”. As discussed in the previous chapter, the existing ADT of 9,540 vehicles per day exceeds the desirable level of service for a two-lane major urban collector street.

## 6. DESIGN YEAR TRAFFIC VOLUMES

### DESIGN YEAR DAILY TRAFFIC AND GROWTH

The design year was determined to be Year 2020 for this design concept report. To gain an understanding of the future traffic volumes and growth in the project vicinity, Bolduc, Smiley & Associates, Inc. requested forecasts of traffic volumes for the years 2010 and 2020 from the MCDOT Planning Group.

The forecast traffic volumes that were provided include the Years 2010 and Year 2020 ADT's for each approach at both the MC 85 and Van Buren Street intersections on 75<sup>th</sup> Avenue. The following table summarizes the existing and forecast traffic volumes at the Van Buren Street intersection in years 2010 and 2020.

**75<sup>th</sup> Avenue and Van Buren Street Intersection  
Existing and Forecast Traffic Volumes<sup>3</sup>**

Segment	Existing ADT <sup>1</sup>	Year 2010 ADT <sup>2</sup>	Year 2020 ADT <sup>2</sup>
North	12,719	13,400	21,900
South	9,932	12,900	21,600
East	5,902	8,800	23,000
West	6,589	9,000	25,300

1. Existing ADT were counted on Tuesday, March 12,2001.
2. Forecasted ADT were provided by MCDOT Planning Group.
3. Two-way traffic, vehicles per day.

The forecast traffic volumes indicated a slow rate of growth between now and Year 2010, especially on the north and south legs. For the period between Year 2010 and Year 2020, the intersection would experience a higher rate of growth on all approaches.

The comparisons of the existing and forecast traffic volumes for the 75<sup>th</sup> Avenue and MC 85 intersection are presented in the following table.

**75<sup>th</sup> Avenue and MC 85 Intersection  
Existing and Forecast Traffic Volumes<sup>3</sup>**

Segment	Existing ADT <sup>1</sup>	Year 2010 ADT <sup>2</sup>	Year 2020 ADT <sup>2</sup>
North	9,121	11,300	20,000
South	8,658	12,200	22,600
East	14,355	19,800	28,600
West	13,710	21,700	28,900

1. Existing ADT were counted on Tuesday, March 12,2001.
2. Forecasted ADT were provided by MCDOT Planning Group.
3. Two-way traffic, vehicles per day.

Between now and Year 2010, the forecast traffic volumes showed a relatively low rate of growth on the north and south legs, and a moderate rate of growth on the east

and west legs. Between Year 2010 and Year 2020, the intersection would experience a higher rate of growth.

In an attempt to understand the traffic impacts of the Target Store warehouse distribution center, Bolduc, Smiley and Associates, Inc. obtained a copy of the traffic impact study for this proposed development. This report identifies the potential trips that will be generated from the facility. The traffic impact study, which was done by Kittelson & Associates, Inc., shows that a total of 1,510 passenger car trips and 540 truck trips will be generated by the site during a typical weekday. Because the project is situated in an undeveloped area of the County, this study assumes that the Maricopa Association of Governments (MAG) and MCDOT forecasts of future traffic volumes have included the traffic from developments like this Target store warehouse. Therefore, it was assumed that the trips that will be generated by the Target Store distribution center have already been included as part of the forecast traffic volumes provided by the MCDOT Planning Group.

Combined with the existing traffic volumes, an exponential best-fit of the three data points in years 2001, 2010 and 2020 were analyzed for each roadway segment. An annual growth rate for each roadway segment was statistically calculated from the best-fit curve. The results of the estimated annual growth rates are presented in the following table.

**Calculated Traffic Volume Growth Rates  
75<sup>th</sup> Avenue, From Van Buren Street to MC**

<b>Segment</b>	<b>Van Buren Street</b>	<b>MC 85</b>
North	2.9%	4.2%
South	4.1%	5.1%
East	7.2%	3.6%
West	7.1%	3.9%
Intersection Average	5.3%	4.2%

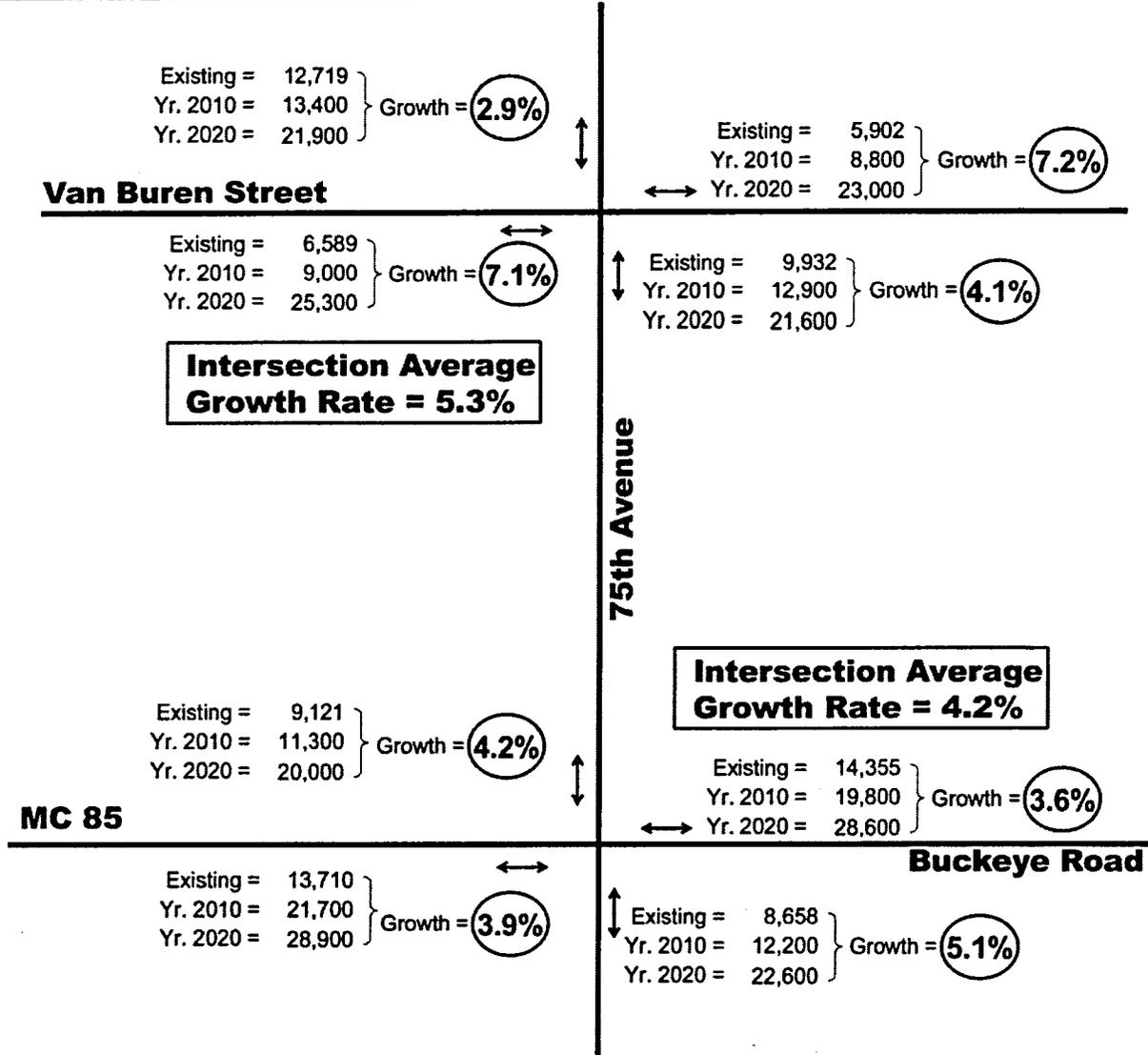
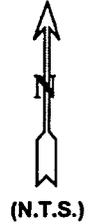
The calculated growth rates range from 2.9% to 7.2% compounded annually. Due to the different roadway classifications of Van Buren Street and MC 85, the growth rates for the two intersections were separated to develop individual intersection growth rates. As a result, the Van Buren Street and 75<sup>th</sup> Avenue intersection is forecast to experience a 5.3% per year increase in traffic volumes, while the MC 85 intersection will experience a 4.2% annual increase.

Exhibit 6-1 summarizes the traffic volumes and the calculated annual growth rates that have been discussed above for the two major intersections.

**LEGEND**

- xxx = Existing Counted ADT
- xxx = Year 2010 Forecasted ADT
- xxx = Year 2020 Forecasted ADT
- (x%)** = Calculated Annual Compounded Growth Rate

**Calculated Growth Rate  
Based on the existing and forecast  
traffic volumes**



**Notes:**

1. Existing ADT's are 24-hour traffic volume counts collected on Tuesday, March 13, 2001.
2. Design years 2010 and 2020 traffic volume forecasts were provided by MCDOT Planning Group.
3. Compounded growth rates are based on an exponential best-fit of the three data points in years 2001, 2010 and 2020 on each roadway segment.

**Bolduc,  
Smiley &  
Associates, Inc.**

**AVERAGE ANNUAL TRAFFIC GROWTH  
EXISTING AND MODEL FORECAST ADT'S  
75TH AVENUE, FROM MC 85 TO VAN BUREN STREET  
EXHIBIT 6-1**

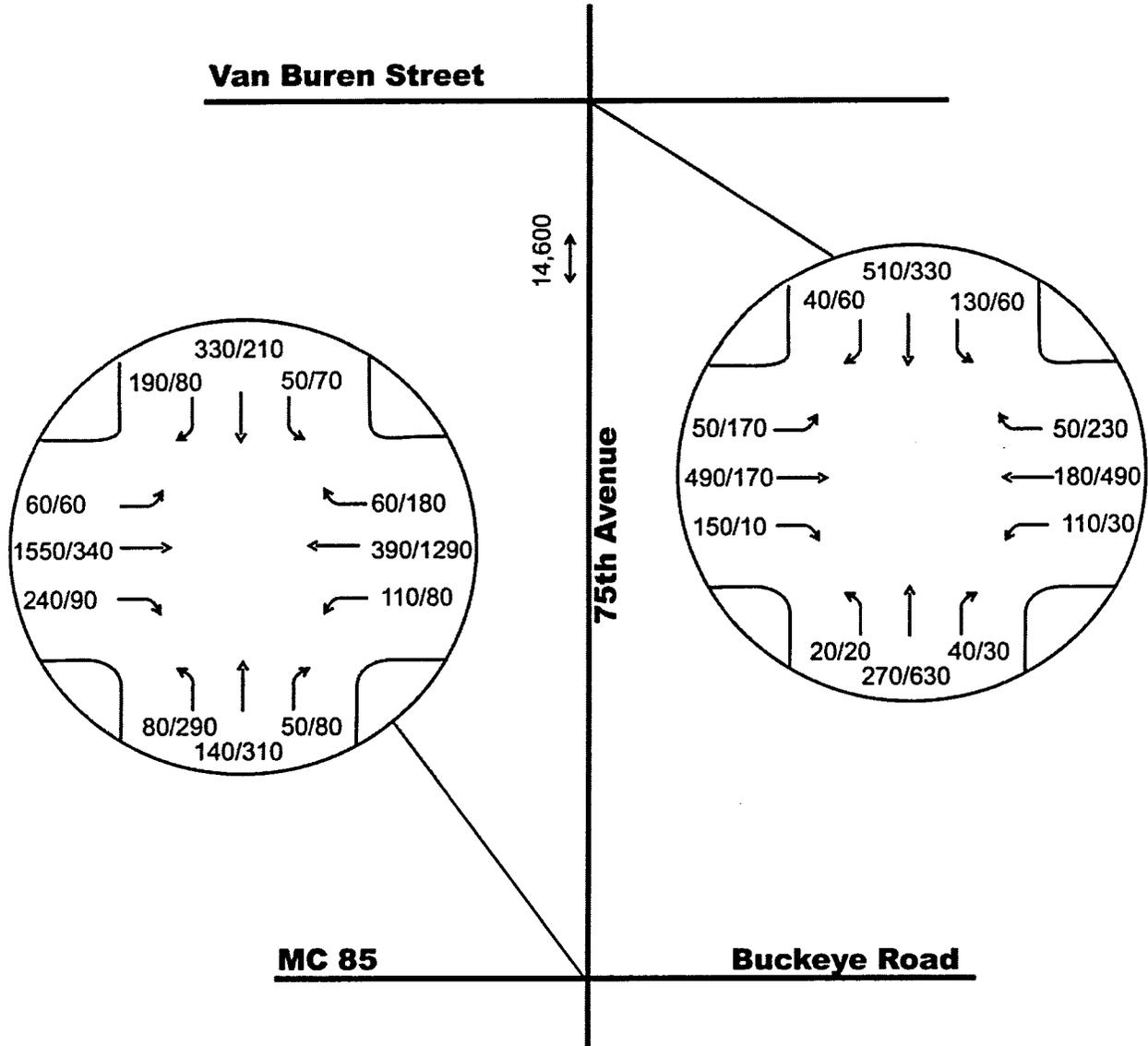
## DESIGN YEAR INTERSECTION TURNING MOVEMENTS

The following assumptions were made to estimate the intersection turning movement volumes for Year 2010 and Year 2020.

- The existing intersection turning movement percentages will remain the same in future design years.
- Traffic volumes for each movement on each approach will increase at a constant rate at each intersection with compounded annual growth.
- All legs of the Van Buren Street intersection will experience the same annual growth rate of 5.3%.
- All legs of the MC 85 intersection will experience the same annual growth rate of 4.2%.

For both intersections on 75<sup>th</sup> Avenue, the forecast intersection AM and PM peak hourly turning movements are presented on Exhibit 6-2 for year 2010 and on Exhibit 6-3 for year 2020.

LEGEND	
xx/xx	= 2010 AM/PM Peak Hourly Volume (vph)
↔	= Two-way ADT



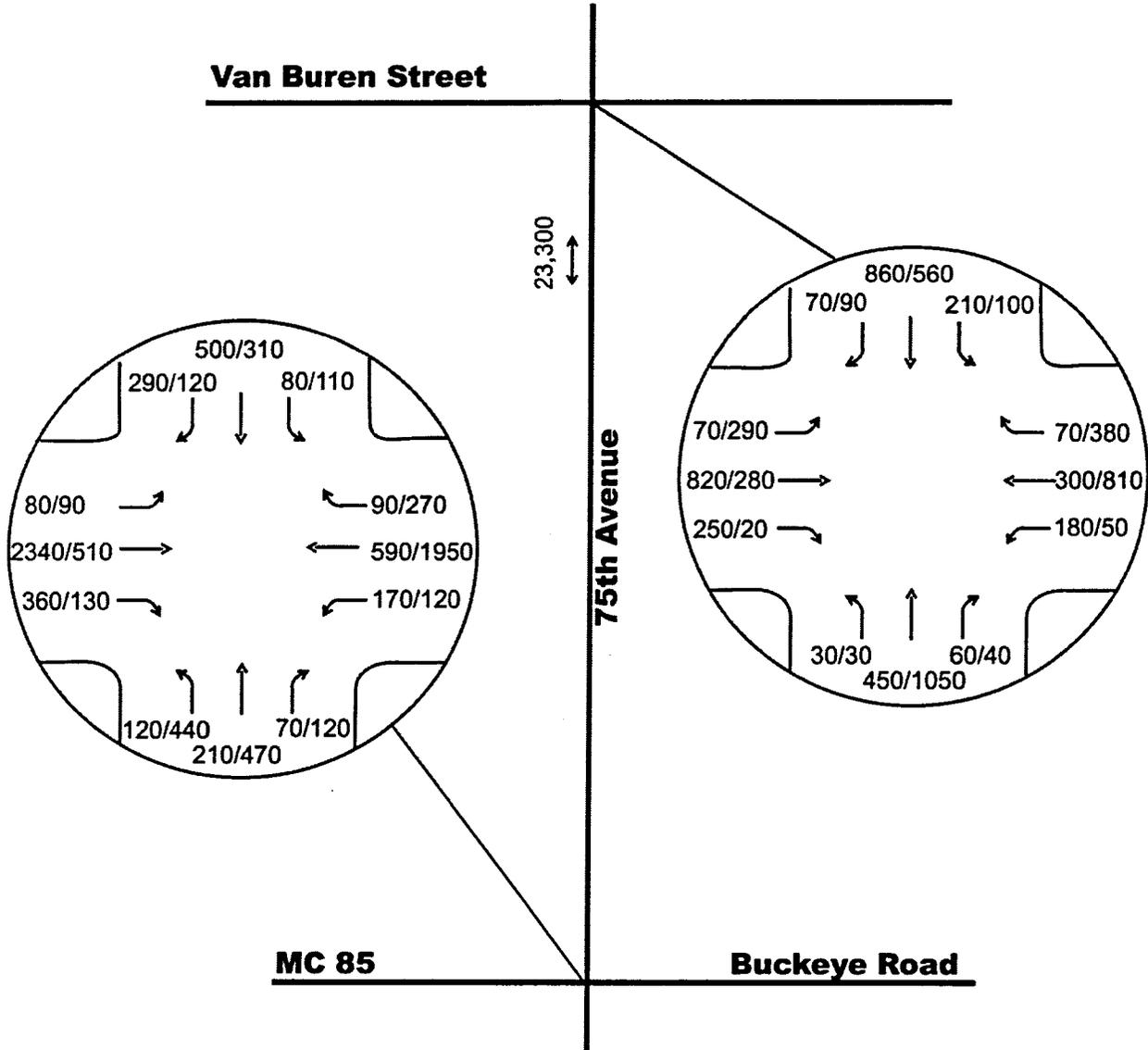
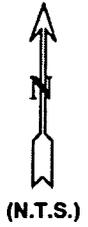
**Notes:**

- Forecasted volumes based on the existing vehicle turning movement percentage and a growth rate of 4.2% at the MC 85 and 5.3 at the Van Buren Street.



**DESIGN YEAR 2010  
INTERSECTION TURNING MOVEMENTS  
75TH AVENUE, FROM MC 85 TO VAN BUREN STREET  
EXHIBIT 6-2**

LEGEND	
xx/xx	= 2020 AM/PM Peak Hourly Volume (vph)
↔	= Two-way ADT



**Notes:**

1. Forecasted volumes based on the existing vehicle turning movement percentage and a growth rate of 4.2% at the MC 85 and 5.3 at the Van Buren Street.

**Bolduc,  
Smiley &  
Associates, Inc.**

**DESIGN YEAR 2020  
INTERSECTION TURNING MOVEMENTS  
75TH AVENUE, FROM MC 85 TO VAN BUREN STREET  
EXHIBIT 6-3**

## 7. CAPACITY ANALYSIS OF DESIGN ALTERNATIVES

### GENERAL

As previously discussed, the capacity on 75<sup>th</sup> Avenue will be primarily controlled by the operations of the major intersections within the project. The following discussion will focus on analyzing the design year characteristics at these two major intersections.

The latest version of Synchro 5.0, a capacity analysis program, was used to examine the intersection delay and level of service characteristics. Synchro 5 implements the new methods of the 2000 Highway Capacity Manual. To provide consistent comparisons of the various design alternatives, the following capacity parameters were assumed in the all of the intersection analysis.

#### Signalized Intersection Operational Characteristics

• Saturation flow rate = 1900 veh/hr/lane
• Percent of truck (T) = 19%
• Total lost time = 4 seconds
• Allow right-turn-on-red
• Allow protective+permissive phase for single left-turn lane
• Yellow + All Red = 4 + 2 seconds = 6 seconds
• Optimize cycle length from 60 to 180 seconds
• Length of vehicles including space between is 7.6 meters (25 feet)

For additional input criteria, see individual analysis results which are presented in the Appendix.

The following table lists the level of service criteria based on the average control delay at signalized intersections.

#### Level of Service Criteria For Signalized Intersections<sup>1</sup>

Level of Service	Control Delay (sec/veh)
A	0-10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

1. Exhibit 16-2, HCM 2000

The following sections will discuss the analysis results and investigate the individual intersection performance by comparing control delay, level of service and 95% queue length.

## VAN BUREN STREET INTERSECTION

### Geometry

The analyzed alternative for the Van Buren Street intersection was based on the improvements that the City of Phoenix is currently designing. Construction completion is anticipated in early 2002. As shown on Exhibit 7-1, the proposed intersection improvements consist of a five-lane cross section with 305 meters (1000 feet) of roadway widening and taper on all legs of the intersection. Each leg will include two departure lanes, one exclusive left-turn lane, two through lanes with the outer lane functioning as a shared through and right-turn lane. The intersection will be signalized and striped with pedestrian crosswalks on all four directions.

### Delay and Level of Service

It is anticipated that the proposed improvements at the Van Buren Street intersection would operate at a higher level of service when compared to existing conditions. With the improvements completed in early 2002, and with the opening of the Target Store warehouse distribution center, the Traffic Impact Study predicts that 250 trips will be added to the adjacent street system during the PM peak hour. A portion of the 250 trips would use the Van Buren Street intersection.

Utilizing the traffic turning movement forecasts for Year 2010, capacity analysis shows that this intersection will operate at level of service "B" with an average delay of 18.4 seconds per vehicle during the AM peak hour of traffic. During the PM peak hour, the intersection delay would increase slightly to an average of 21.7 seconds per vehicle and the intersection will operate at level of service "C".

In design year 2020, as the traffic volumes continue to increase at a compounded annual growth of 5.3% at the Van Buren Street intersection, the average control delay will increase significantly to 45.8 seconds per vehicle with a level of service "D" operation during the AM peak hour. The PM peak hour traffic will experience delay of 65.6 seconds per vehicle, which results in a level of service "E" operation. The delay and level of service statistics are tabulated on Exhibit 7-1.

A review of the Year 2010 and Year 2020 traffic volume forecasts shows that a large volume of traffic will make the westbound to northbound right turn maneuver during the PM peak hour. Also, a large volume of traffic will make the eastbound to southbound right turn maneuver during the AM peak hour. To determine the impact of providing right turn only lanes on both Van Buren Street approaches, additional capacity analyses were performed with these right turn lanes added. The results of this additional analysis are shown in Exhibit 7-2.

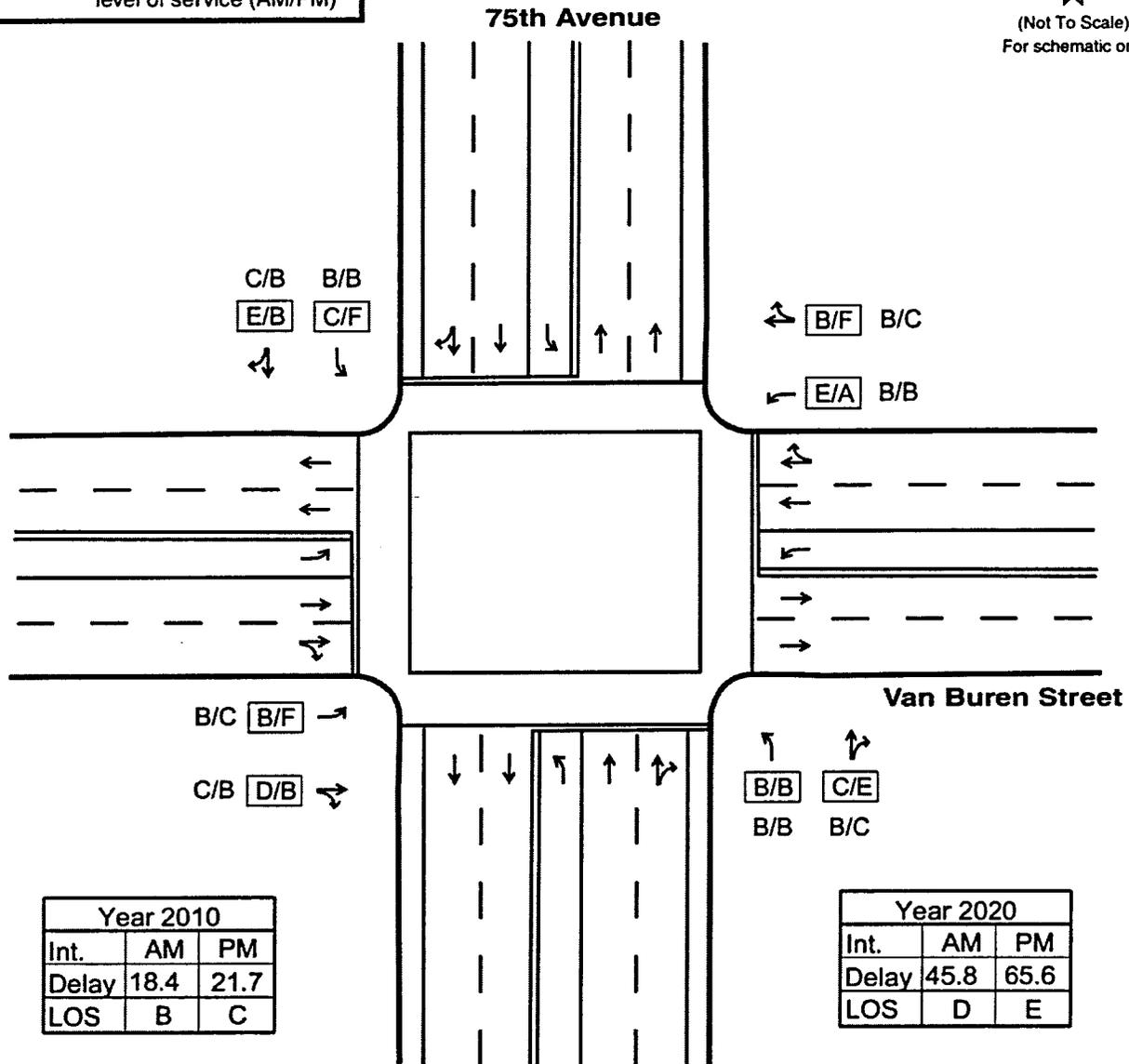
The addition of exclusive right turn only lanes on both Van Buren Street approaches to the 75<sup>th</sup> Avenue intersection results in level of service "B" operation in Year 2010 during both the AM and PM peak hours.

**LEGEND**

xx/xx = Year 2010 movement level of service (AM/PM)  
 [x/x] = Year 2020 movement level of service (AM/PM)



(Not To Scale)  
For schematic only



Geometric Characteristics:

- Five-lane cross section on 75th Ave. and on Van Buren Street at the intersection.
- All approaches have two lanes and single left-turn lane.
- Possible bike lane on 75th Ave. approaches.

**Bolduc,  
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**75TH AVENUE AND VAN BUREN STREET  
PROPOSED IMPROVEMENT WITH 5-LANE  
CROSS SECTION AT ALL SEGMENTS**

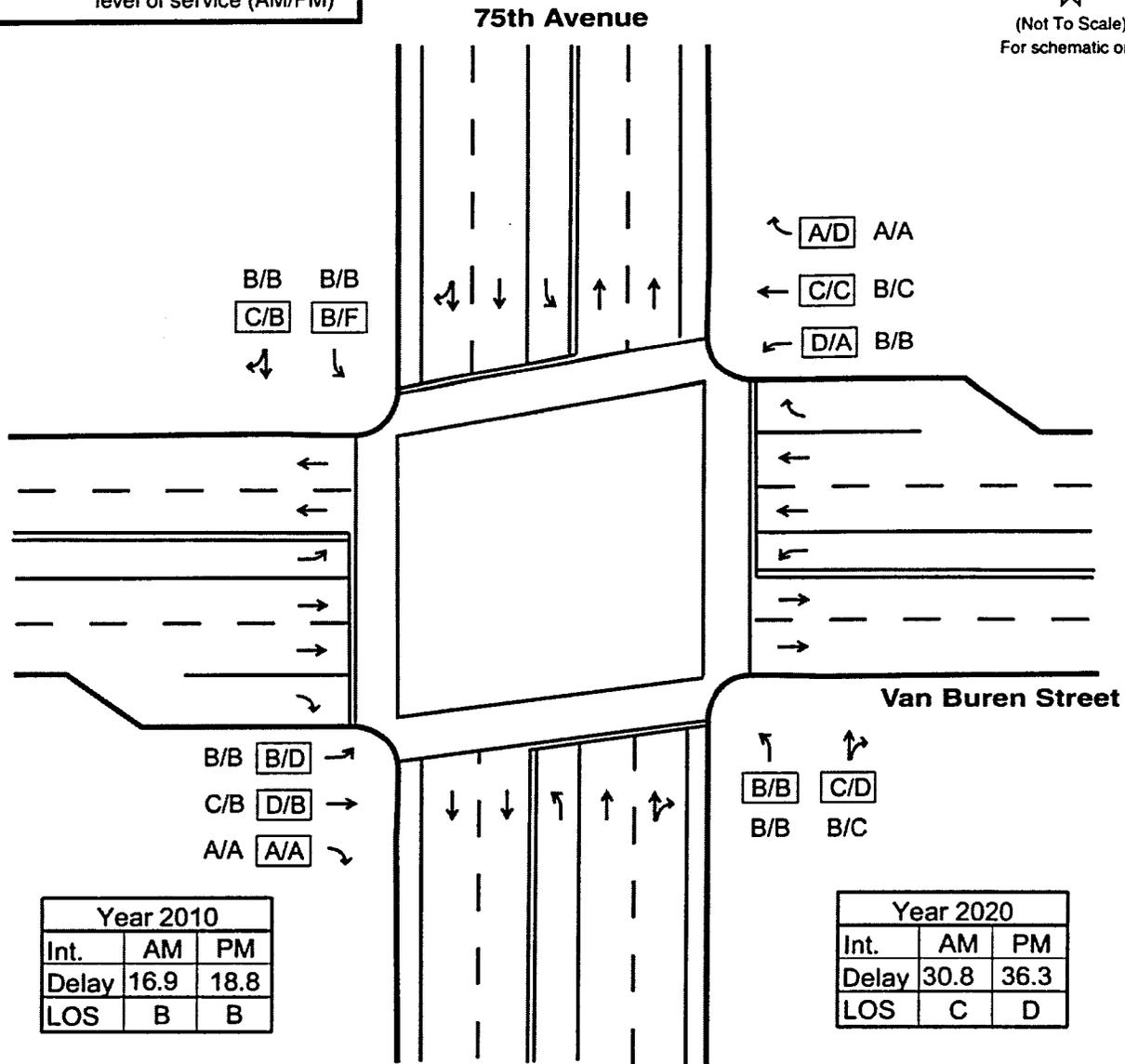
**EXHIBIT 7-1**

**LEGEND**

xx/xx = Year 2010 movement level of service (AM/PM)  
 [x/x] = Year 2020 movement level of service (AM/PM)



(Not To Scale)  
For schematic only



Year 2010		
Int.	AM	PM
Delay	16.9	18.8
LOS	B	B

Year 2020		
Int.	AM	PM
Delay	30.8	36.3
LOS	C	D

**Geometric Characteristics:**

- Five-lane cross section on 75th Ave. and on Van Buren Street at the intersection.
- 75th Avenue approaches have two lanes and single left-turn lane.
- Van Buren Street approaches have two lanes, an exclusive right-turn lane and single left-turn lane.
- Possible bike lane on 75th Ave. approaches.

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**75TH AVENUE AND VAN BUREN STREET  
PROPOSED IMPROVEMENT WITH 5-LANE  
AND RIGHT-TURN LANES ON VAN BUREN STREET  
EXHIBIT 7-2**

In Year 2020, the intersection will operate at level of service "C" in the AM peak hour with 30.8 seconds per vehicle of delay, and level of service "D" operation during the PM peak hour with an average vehicle delay value of 36.3 seconds.

This additional analysis indicates that right turn only lanes should ultimately be provided on both Van Buren Street approaches, and that these right turn lanes will be warranted during the period between Year 2010 and Year 2020.

Queue Lengths

Based on the capacity analysis results for year 2010 and 2020, the following table summarized the queue lengths that will be required for the different turn lanes at this intersection during AM and PM peak hours.

**75<sup>th</sup> Avenue and Van Buren Street Intersection  
95% Queue Length (per Lane) Estimates**

Movements		Year 2010		Year 2020	
		AM	PM	AM	PM
EB	Lt	30'	>116'	48'	>451'
	Th+Rt	>197'	52'	>522'	116'
WB	Lt	56'	21'	>215'	43'
	Th+Rt	56'	>223'	117'	>786'
NB	Lt	15'	15'	30'	37'
	Th+Rt	75'	>189'	213'	>725'
SB	Lt	63'	33'	>163'	>159'
	Th+Rt	143'	94'	>475'	314'

1. > indicates queue length may be longer.
2. For detailed analysis results, see Appendix.
3. Multiply 0.3048 for meter.

Left Turn Lane Storage

For a signalized intersection, the MCDOT Roadway Design Manual, Chapter 6, requires the left turn lane storage length to be calculated based on the following formula.

$$Min.LeftTurnStorageLength = 2 \times \left[ PeakHourlyVolume \div \frac{3600seconds}{CycleLength} \right]$$

Based on the optimized cycle lengths under the design year 2020 AM and PM peak hour conditions, the minimum left turn storage lengths for all directions were calculated as follows.

**75<sup>th</sup> Avenue and Van Buren Street Intersection  
Minimum Left Turn Storage Length in Year 2020<sup>1</sup>**

<b>Movement</b>	<b>Calculated Length<sup>2</sup></b>
EB Left-turn	168 m (550')
WB Left-turn	76 m (250')
NB Left-turn	30 m (100')
SB Left-turn	91 m (300')

1. All storage lengths are based on one lane.
2. Cycle Lengths of 130 seconds for PM and 100 seconds for AM peak hours.
3. Assumed average vehicle length = 7.6 m (25').

The left-turn peak hourly traffic volumes were based on the higher rate of the AM and PM periods with respect to its optimized cycle length. Refer to Appendix for individual input parameters.

**MC 85 INTERSECTION**

Alternative #1 – No-Build

As shown on Exhibit 7-3, the existing MC 85 intersection consists of a two-lane cross section on 75<sup>th</sup> Avenue with exclusive left-turn lanes. On MC 85, a five-lane cross section provides two through lanes in each direction with exclusive left-turn lanes.

Under the no-build alternative, the existing intersection geometric configuration would be maintained in design years 2010 and 2020. This scenario was analyzed with the Year 2010 and 2020 forecast turning movement volumes at the intersection. The overall intersection control delay and level of service are summarized as follows and is also shown on Exhibit 7-3.

**75<sup>th</sup> Avenue and MC 85 Intersection  
Delay and Level of Service – Alt. #1: No Build**

<b>Intersection</b>	<b>Year 2010</b>		<b>Year 2020</b>	
	<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>
Average Delay (sec/veh)	103.5	58.3	209.6	173.9
Level of Service	F	E	F	F

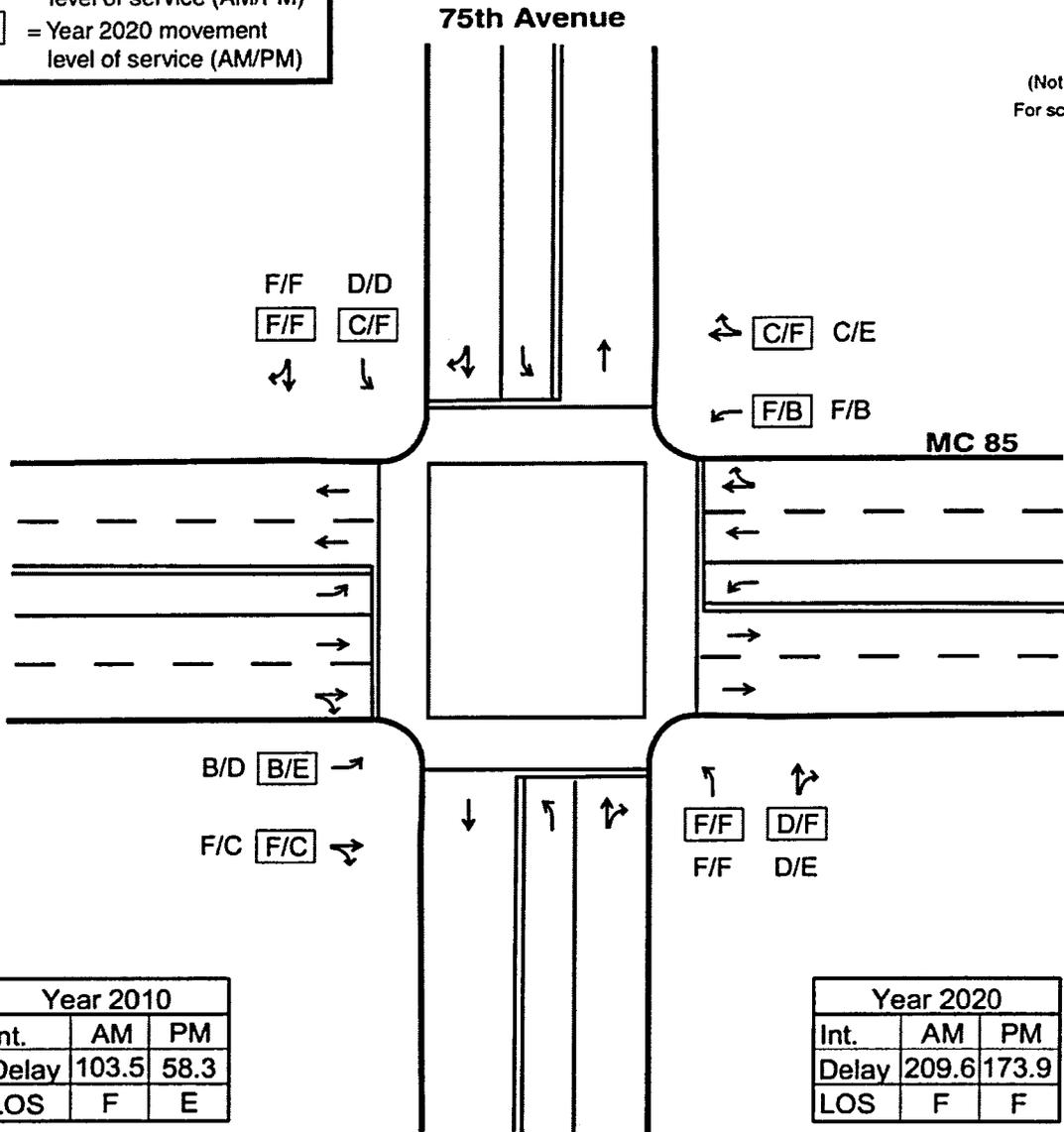
Refer to Appendix for additional intersection analysis results.

With the no-build alternative in design year 2010, the intersection would function at level of service "F" during the AM peak hour and "E" during the PM peak hour. In design year 2020, the overall intersection delay would increase significantly and the intersection would operate at level of service "F" during both of the AM and PM peak hours.

LEGEND	
xx/xx	= Year 2010 movement level of service (AM/PM)
<span style="border: 1px solid black; padding: 2px;">x/x</span>	= Year 2020 movement level of service (AM/PM)



(Not To Scale)  
For schematic only



Year 2010		
Int.	AM	PM
Delay	103.5	58.3
LOS	F	E

Year 2020		
Int.	AM	PM
Delay	209.6	173.9
LOS	F	F

Geometric Characteristics:

- Two-lane cross section on 75th Ave. with single left-turn lane at intersection.
- Five-lane cross section on MC 85 with two lane per direction and single left-turn lane.

**Bolduc,  
Smiley &  
Associates, Inc.**

**75TH AVENUE AND MC 85  
EXISTING LANE GEOMETRY  
ALT #1 - NO-BUILD**

**EXHIBIT 7-3**

Several alternative intersection geometric configurations were tested for both the Year 2010 and Year 2020 traffic projections to determine which alternative would provide an acceptable level of service in the design year. Each of the alternatives is described below. The resultant total intersection delay and level of service for each of the alternatives is shown in the table following all of the alternative descriptions.

#### Alternative #2 – 75<sup>th</sup> Avenue Widening and No-Build on MC 85

Alternative #2 consists of a five-lane cross section on 75<sup>th</sup> Avenue with two lanes in each direction and exclusive left turn lanes. The existing roadway geometric configurations on MC 85 are assumed to remain in place. Refer to Exhibit 7-4 for a schematic of the intersection lane configuration. Utilizing this alternative, capacity analysis shows level of service "D" operation for the overall intersection in Year 2010 during both the AM and PM peak hours. The intersection delay would deteriorate to a level of service "F" with Year 2020 conditions.

#### Alternative #2b – 75<sup>th</sup> Avenue Widening and Right Turn Lanes on all Approaches

Alternative #2b consists of a five lane cross section on 75<sup>th</sup> Avenue as described in Alternative #2, the existing five lane section on MC 85 and separate right turn lanes added on all four approaches. The capacity analyses for the Year 2010 traffic volumes show an intersection level of service D during the AM peak hour and level of service C during the afternoon peak hour. The intersection level of service drops to F during both peak periods in the Year 2020.

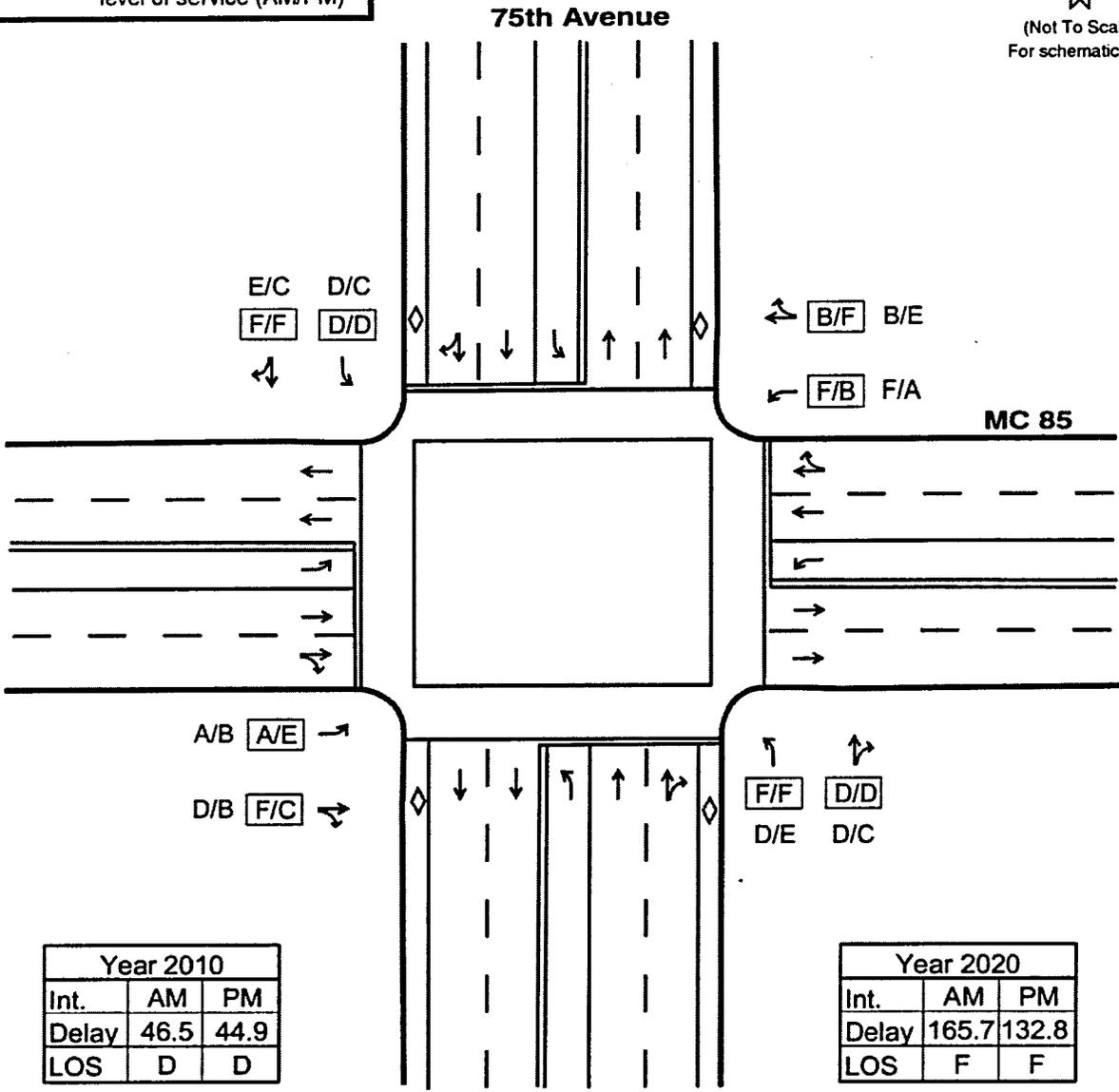
#### Alternative #2c - 75<sup>th</sup> Avenue Widening, MC 85 Widening and Right Turn Lanes Northbound and Southbound

On March 27, 1991, the Maricopa Association of Governments (MAG) Regional Council adopted the Roads of Regional Significance (RRS) concept, including the location, network and design standards for RRS designated roadways. MC 85 between SR 85 in Buckeye and I-17 in Phoenix is included in this network. This includes the 75<sup>th</sup> Avenue intersection. As an RRS facility, MC 85 will have an ultimate cross section that will provide three through traffic lanes in each direction. Alternative #2c was developed to test the impacts of a 6-lane RRS type roadway for MC 85.

LEGEND	
xx/xx	= Year 2010 movement level of service (AM/PM)
<span style="border: 1px solid black; padding: 2px;">x/x</span>	= Year 2020 movement level of service (AM/PM)



(Not To Scale)  
For schematic only



Year 2010		
Int.	AM	PM
Delay	46.5	44.9
LOS	D	D

Year 2020		
Int.	AM	PM
Delay	165.7	132.8
LOS	F	F

**Geometric Characteristics:**

- Five-lane cross section on 75th Ave. with two lane per direction and single left-turn lane.
- Added bike lane on 75th Ave. approaches.
- No changes on MC 85 geometrics.



**75TH AVENUE AND MC 85 INTERSECTION  
IMPROVEMENT ALT. #2 WITH 5-LANE  
CROSS SECTION ON 75TH AVENUE**

**EXHIBIT 7-4**

In addition to the seven lane section described above for MC 85 (six through lanes and one left turn lane) Alternative #2c analyzes a five lane cross section on 75<sup>th</sup> Avenue as described in Alternative #2, with separate right turn lanes for northbound to eastbound and southbound to westbound traffic. The capacity analyses for the Year 2010 traffic volumes show an intersection level of service C during both peak hours. In the Year 2020, the intersection level of service deteriorates to E during both peak periods.

Alternative #2d - 75<sup>th</sup> Avenue Widening, MC 85 Widening and Right Turn Lanes on all Approaches

Alternative #2d consists of a five lane cross section on 75<sup>th</sup> Avenue as described in Alternative #2, a seven lane cross section on MC 85 as described in Alternative #2c and separate right turn lanes on all four approaches. The capacity analyses for the Year 2010 traffic volumes show an intersection level of service C during the AM peak hour and level of service B during the afternoon peak hour. In the Year 2020, the intersection operates at level of service D during both peak periods.

Alternative #2e - 75<sup>th</sup> Avenue Widening, MC 85 Widening, Right Turn Lanes on all Approaches and Dual Left Turn Lanes on MC 85

Alternative #2e consists of a five lane cross section on 75<sup>th</sup> Avenue as described in Alternative #2, a seven lane cross section on MC 85 as described in Alternative #2d, right turn lanes on all four approaches and dual left turn lanes on MC 85. The capacity analyses for the Year 2010 traffic volumes show an intersection level of service C during both peak hours. In the Year 2020, the intersection level of service is C during the AM peak hour and D during the afternoon peak hour.

Alternative #3 - 75<sup>th</sup> Avenue Widening, MC 85 Widening, Right Turn Lanes on all Approaches and Dual Left Turn Lanes on All Approaches

Alternative #3 consists of a five lane cross section on 75<sup>th</sup> Avenue as described in Alternative #2, a seven lane cross section on MC 85 as described in Alternative #2d, right turn lanes on all four approaches and dual left turn lanes on both MC 85 and 75<sup>th</sup> Avenue. The capacity analyses for the Year 2010 traffic volumes show an intersection level of service C during both peak hours. In the Year 2020, the intersection operates at level of service D during both the AM peak hour and PM peak hours.

Exhibit 7-5 shows the intersection configuration for Alternative Number 3 along with the level of service and delay for each lane group as well as the total intersection. The following table shows the level of service and total intersection delay for each of the alternative improvements in Year 2010 and Year 2020. The capacity analysis calculations are included in the appendix for all of the alternatives discussed above.

**75<sup>th</sup> Avenue and MC 85 Intersection  
Delay (seconds) and Level of Service**

Alternative	Year 2010		Year 2020	
	AM Peak	PM Peak	AM Peak	PM Peak
2	46.5	44.9	165.7	132.8
	D	D	F	F
2B	43.9	30.2	103.6	90.9
	D	C	F	F
2C	33.6	25.0	64.7	56.3
	C	C	E	E
2D	23.6	19.6	35.7	48.1
	C	B	D	D
2E	24.8	20.6	37.1	50.4
	C	C	C	D
3	25.5	26.5	38.7	43.4
	C	C	D	D

**LEGEND**

xx/xx = Year 2010 movement level of service (AM/PM)

x/x = Year 2020 movement level of service (AM/PM)

**75th Avenue**

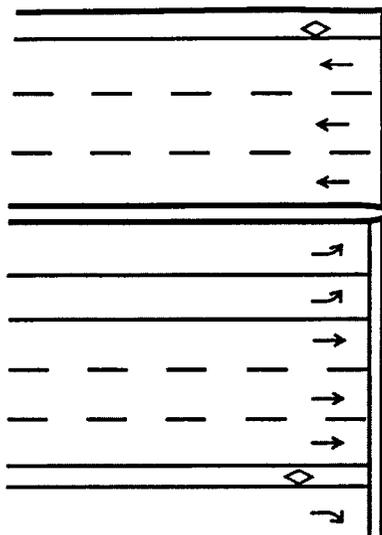


(Not To Scale)  
For schematic only

A/A    C/C    C/C  
A/B   E/D   D/D  
 ↓       ↓       ↓

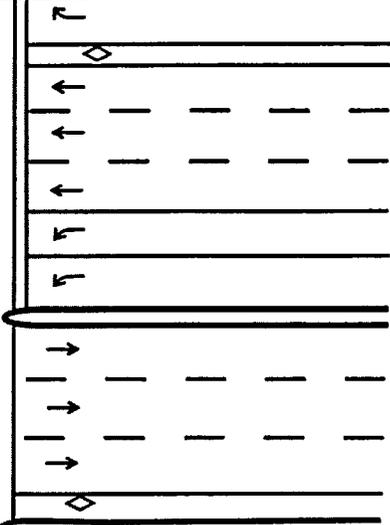
↖ A/A A/A  
 ← B/E B/C  
 ↙ F/D C/C

**MC 85**



Year 2010		
Int.	AM	PM
Delay	25.5	26.5
LOS	C	C

Year 2020		
Int.	AM	PM
Delay	38.7	43.4
LOS	D	D



C/C D/D →  
 C/B D/B →  
 A/A A/A →

↖ E/F C/D    ↖ D/C C/C    ↖ A/A A/A

**Geometric Characteristics:**

- Five-lane cross section on 75th Ave. with two through lanes per direction and double left-turn lanes.
- Flared left-turn and right-turn pockets on all approaches.
- Right-turn and bike lanes on all approaches.
- Raised median on all approaches.



**75TH AVENUE AND MC 85 INTERSECTION  
 IMPROVEMENT ALT. #3 WITH DOUBLE  
 LEFT-TURN LANES ON 75TH AVENUE  
 EXHIBIT 7-5**

Based on the optimized cycle lengths under the design year 2020 AM and PM peak hour conditions, the minimum left turn storage lengths for all directions were calculated as follows.

**75<sup>th</sup> Avenue and MC 85 Intersection  
Minimum Left Turn Storage Length in Year 2020<sup>1</sup>**

<b>Movement</b>	<b>Calculated Length<sup>2</sup></b>
EB Left-turn	46 m (150')
WB Left-turn	91 m (300')
NB Left-turn	198 m (650')
SB Left-turn	61 m (200')

1. All storage lengths are based on one lane.
2. Cycle Lengths of 100 seconds for PM and 110 seconds for AM peak hours.
3. Assumed average vehicle length = 7.6 m (25').

The calculated left-turn storage lengths are based on the higher peak hour turning movement at the intersection with its respective cycle length.

## 75<sup>TH</sup> AVENUE

### No-Build

With the no-build scenario, 75<sup>th</sup> Avenue between Van Buren and MC 85 would retain the existing two-lane condition. The existing two-lane street is an undivided roadway with two lanes, one for use by traffic in each direction. Passing a slower requires use of the opposing lane as sight distance and gaps in the opposing traffic stream permit. Within the study limits, passing is prohibited in both direction of traffic. Therefore, as volume increases, long platoons form behind slow moving vehicles. This results in higher delay.

Based on Table 2.1, from the MCDOT Roadway Design Manual, the ADT for a two-lane roadway should be under 7,000 vehicles per day, with a maximum of 420 vehicles per hour per lane during peak hours, to provide an acceptable level of service "C" operation. This threshold is already being exceeded with existing traffic conditions.

With an average of 4.8% annual compounded growth in the next nineteen years, the traffic on 75<sup>th</sup> Avenue traffic will experience low operating speeds, higher delays, and higher volume. In addition, the minor streets and driveways accessing 75<sup>th</sup> Avenue will suffer significant delays resulting from unavailable gaps in 75<sup>th</sup> Avenue traffic.

Based on HCM 2000, the level of service for an urban street is influenced by the number of traffic signals per mile, intersection control delay, inappropriate signal timing, poor progression, and increasing traffic flow. These features can degrade the level of service substantially. Chapter 10 of the HCM 2000 establishes an approximation method that is highly dependent on the assumed conditions listed in Exhibit 10-7 of HCM 2000. Utilizing this procedure, 75<sup>th</sup> Avenue can be categorized as a Class III intermediate roadway under existing conditions and will change to a Class IV urban roadway by design year 2020. The following table provides a comparison of the service volumes and level of service on 75<sup>th</sup> Avenue under various conditions.

**75<sup>th</sup> Avenue Peak Hour Traffic and Level of Service  
With Two-Lane Street**

On 75 <sup>th</sup> Avenue	Existing	Year 2010	Year 2020
ADT (K = 8%, D=60%, T=19%)	9,540	14,600	23,300
Peak Hour Volumes (veh/hr) <sup>1</sup>	505	770	1,230
Level of Service	D	D	F

1. Percent of truck factor ( $f_{tr}$ ) was calculated to account for the high truck traffic in the vicinity.

2. See Chapter 10 of HCM 2000 for the detailed discussion of methodology.

It is important to reiterate that the above table is provided for planning purposes only. With device-controlled intersections located at each end of this section of 75<sup>th</sup>

Avenue, the operating level of service will be governed by the performance of these intersections.

Three-Lane Cross Section

A three-lane cross section provides one through lane in each direction and a continuous two-way left lane on 75<sup>th</sup> Avenue. The operational characteristics of a three-lane road are similar to the operational characteristics of a two-lane road, except that left-turning vehicles would be able to clear the main stream of through traffic. The ultimate capacity of 75<sup>th</sup> Avenue as a 3-lane roadway would be similar to that of a 2-lane facility, level of service "D" operation in Year 2010 and level of service "F" operation in Year 2020.

Five-Lane Cross Section

A five-lane cross section on 75<sup>th</sup> Avenue between the major intersections would provide two through lanes in each direction, and a continuous two-way left-turn center lane. As suggested in Table 2.1 of MCDOT Roadway Design Manual, the five-lane cross section roadway is categorized as an urban minor arterial which should operate at a desired level of service "C". The minor arterial would have a maximum ADT of 22,000 vehicles per day, with 530 vehicles per hour per lane during the peak hour of traffic.

Using the methodology presented under the no-build alternative, the level of service for five-lane cross section can be approximated as follows.

**75<sup>th</sup> Avenue Peak Hour Traffic and Level of Service  
With Five-Lane Cross Section**

On 75 <sup>th</sup> Avenue	Existing	Year 2010	Year 2020
ADT (K = 8%, D=60%, T=19%)	9,540	14,600	23,300
Peak Hour Volumes (veh/hr) <sup>1</sup>	505	770	1,230
Level of Service	C or better	C or better	D

1. Percent of truck factor ( $f_{TV}$ ) was calculated to account for the high truck traffic in the vicinity.  
2. See Chapter 10 of HCM 2000 for the detailed discussion of methodology.

With a five-lane cross section on 75<sup>th</sup> Avenue, the roadway will operate at level of service "C" or better with existing traffic characteristics. 75<sup>th</sup> Avenue between Van Buren and MC 85 will operate at level of service "C" or better with Year 2010 traffic volumes. As volume increases to 23,300 vehicles per day in Year 2020, the recommended level of service "C" threshold will be exceeded and this section of roadway will operate at level of service "D".

## 8. CONCLUSION

### SUMMARY OF FINDINGS

This traffic study has analyzed existing and future traffic conditions on 75<sup>th</sup> Avenue from MC 85 (Buckeye Road) to Van Buren Street. This section of street is under the jurisdiction of MCDOT. 75<sup>th</sup> Avenue is currently a two-lane roadway situated in an area with light industrial and agriculture land uses. The MCDOT Roadway Design Manual classifies this section of 75<sup>th</sup> Avenue as a major urban collector street.

Vehicular collision records were collected and reviewed to determine if accident concentrations exist or if the roadway is contributing to accident causation. This analysis included accidents which occurred in the areas up to 46 m (150 feet) upstream and down stream of the two major intersections. This accident analysis shows that the project area had a total of 26 crashes in the past three years. There were 13 rear end, one U-turn, 4 sideswipe, 5 angle, and 3 single vehicle collisions. No roadway geometric deficiencies were identified which show that the roadway contributed to these collisions.

Existing traffic volumes were collected in March 2001. The traffic counts included 24-hour directional counts on all approaches to the intersections of MC 85 and Van Buren Street. Morning and afternoon peak hour turning movement data was collected at these two intersections. The existing traffic characteristics on 75<sup>th</sup> Avenue can be summarized as follows.

**Existing Traffic Characteristics on 75<sup>th</sup> Avenue**

Traffic Parameters	Actual Field Data <sup>1</sup>
ADT (vehicles per day)	9,540
Peak Hour Traffic (vehicles per hour)	375
K-factor	6.81%
D-factor	58%
T-factor	19%

1. Data collected on Tuesday, March 13, 2001.

Utilizing HCM 2000, the existing intersections were evaluated. The all-way stop controlled intersection at Van Buren Street is currently functioning at level of service "D" in the morning peak hour and "F" during the afternoon peak hour. The analysis of the signalized intersection at MC 85 shows that this intersection is operating at levels of service "B" and "A" during the AM and PM peak hours, respectively.

For urban street level of service, the HCM 2000 indicates that segment performance is controlled by the operation of adjacent intersections. To estimate a level of service on 75<sup>th</sup> Avenue, planning criteria from MCDOT and HCM 2000 were utilized. The existing level of service on 75<sup>th</sup> Avenue was approximated to be "D", which is lower than the desired level of service that is identified in the MCDOT Roadway Design Manual.

The design year 2020 forecast traffic volumes at the two major intersections were provided by the MCDOT Planning Group. Based on the existing and future ADT's, traffic growth rates were calculated for traffic volumes on each approach to the major intersections. A summary of the volumes and growth rates are tabulated below.

**Forecast Traffic Volumes and Growth Rates  
75<sup>th</sup> Avenue, Van Buren to MC 85**

Segment	Van Buren Street		MC 85	
	2020 ADT <sup>1</sup>	Growth <sup>2</sup>	2020 ADT <sup>1</sup>	Growth <sup>2</sup>
North	21,900	2.9%	20,000	4.2%
South	21,600	4.1%	22,600	5.1%
East	23,000	7.2%	28,600	3.6%
West	25,300	7.1%	28,900	3.9%
Int. Average	-	5.3%	-	4.2%

1. Provided by MCDOT Planning Group, March 2001.

2. Calculated from existing, 2010 and 2020 ADT's.

The average annual growth rate for 75<sup>th</sup> Avenue between the two intersections was calculated to be 4.8 %.

A new Target Store Distribution Center will be in operation in the near future. The traffic impact study for this proposed development shows that at build-out the site will be generating 1,510 vehicles per day, with 250 vehicles per hour during its peak hour. It is assumed that this traffic has already been included in the forecast of design year traffic volumes.

With the forecast of future traffic volumes for Year 2020, various design alternatives were evaluated for the two major intersections and for 75<sup>th</sup> Avenue. This analysis showed that 75<sup>th</sup> Avenue should be improved to a five-lane cross section in order to meet the desirable level of service under current and future traffic conditions.

At the Van Buren Street intersection, a City of Phoenix intersection improvement project is anticipated that will complete this intersection and provide traffic signals by early 2002. The intersection will be signalized with a five-lane cross section in each direction. Based on the forecast traffic volumes, the intersection level of service is presented as follows.

**75<sup>th</sup> Avenue and Van Buren Street  
Intersection Delay and Level of Service**

Design Year		Delay (sec/veh) <sup>1</sup>	Level of Service
2010	AM	18.4	B
	PM	21.7	C
2020	AM	45.8	D
	PM	65.6	E

1. Intersection control delay as defined in HCM 2000.

It can be seen that these City of Phoenix improvements will ensure that this intersection will operate at a level of service "C" or better to approximately Year 2010. After 2010, it is likely that additional improvements such as exclusive right turn only lanes may be necessary.

Several design alternatives were evaluated for the MC 85 intersection, including a no-build alternative, two alternatives with only 75<sup>th</sup> Avenue widened, and four alternatives with a fully-improved intersection with MC 85 functioning as a Road of Regional Significance. Each configuration was analyzed with the forecast of Year 2010 and 2020 traffic volumes. The 75<sup>th</sup> Avenue widening options consisted of upgrading 75<sup>th</sup> Avenue to a five-lane cross section on both the north and south legs, with the MC 85 legs remaining in their existing configurations. The MC 85 widening options consisted of widening 75<sup>th</sup> Avenue to a five-lane cross section and widening MC 85 to a seven-lane cross section with various turn lane options.

The following table summarizes the delays and levels of service for each of the design alternatives at the MC 85 intersection.

**75<sup>th</sup> Avenue and MC 85 Intersection  
Delay (seconds) and Level of Service**

Alternative	Year 2010		Year 2020	
	AM Peak	PM Peak	AM Peak	PM Peak
1	103.5	58.3	209.6	173.9
	F	E	F	F
2	46.5	44.9	165.7	132.8
	D	D	F	F
2B	43.9	30.2	103.6	90.9
	D	C	F	F
2C	33.6	25.0	64.7	56.3
	C	C	E	E
2D	23.6	19.6	35.7	48.1
	C	B	D	D
2E	24.8	20.6	37.1	50.4
	C	C	C	D
3	25.5	26.5	38.7	43.4
	C	C	D	D

Alternative #1 – No Build

Alternative #2 – 75<sup>th</sup> Avenue Widening and No-Build on MC 85

Alternative #2b – 75<sup>th</sup> Avenue Widening and Right Turn Lanes on all Approaches

Alternative #2c - 75<sup>th</sup> Avenue Widening, MC 85 Widening and Right Turn Lanes Northbound and Southbound

Alternative #2d - 75<sup>th</sup> Avenue Widening, MC 85 Widening and Right Turn Lanes on all Approaches

Alternative #2e - 75<sup>th</sup> Avenue Widening, MC 85 Widening, Right Turn Lanes on all Approaches and Dual Left Turn Lanes on MC 85

Alternative #3 - 75<sup>th</sup> Avenue Widening, MC 85 Widening, Right Turn Lanes on all Approaches and Dual Left Turn Lanes on All Approaches

The results of the capacity analyses calculations show that the intersection of 75<sup>th</sup> Avenue and MC 85 will not operate at an acceptable level of service in the Year 2020 without widening 75<sup>th</sup> Avenue to a five-lane section flaring at the intersection to include separate right turn lanes on both approaches. MC 85 needs to be widened to a seven-lane facility flaring to include separate right turn lanes at the intersection.

## **RECOMMENDATIONS**

Based on the analyses and findings documented in this report, the following recommendations are made for the improvement of 75<sup>th</sup> Avenue from Van Buren Street to MC 85 (Buckeye Road).

### **75<sup>th</sup> Avenue**

The existing and forecast traffic volumes strongly indicate that 75<sup>th</sup> Avenue should be widened to a five-lane cross section.

The forecast of Year 2020 traffic volumes indicates that 75<sup>th</sup> Avenue ultimately be classified as a principle arterial per the MCDOT Roadway Design Manual.

### **Van Buren Street Intersection**

With the anticipated City of Phoenix improvements, the intersection will be widened and signalized in early 2002. With this change in intersection control, the existing vehicle turning movement patterns may be impacted. Additional data and operational analysis should be conducted when traffic patterns have stabilized.

### **MC 85 Intersection**

MC 85 has been adopted by the MAG Regional Council as a Road of Regional Significance and therefore will have an ultimate cross section that will provide three through lanes in each direction. The capacity analysis performed for the MC 85 and 75<sup>th</sup> Avenue intersection supports the need for a seven lane cross section on MC 85 in the Design Year 2020. In order for the intersection to operate at an acceptable level of service in Year 2020, there should be two through lanes in both directions on 75<sup>th</sup> Avenue and three through lanes in each direction on MC 85. All four approaches should flare at the intersection to accommodate right turn lanes.

The land area surrounding the MC 85 and 75<sup>th</sup> Avenue intersection has not yet fully developed. Once this area has built-out, the percentage of total traffic making left turns at the intersection may change from the existing percentage. Therefore, Bolduc, Smiley & Associates recommends the intersection be designed to provide only the widening of the north leg of the intersection to a five-lane cross section. MCDOT should continue to study and program the widening of MC 85 to a Road of Regional Significance cross section. The widening of the south leg of the intersection can be improved in conjunction with the future MC 85 project or as a future "stand alone" project.

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**APPENDIX A**

**EXISTING 24-HOUR COUNTS  
EXISTING TURNING MOVEMENT COUNTS**

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue @  
 Van Buren Street  
 County, State: Phoenix, Arizona  
 Date Counted: Tuesday, March 13, 2001

**TURNING MOVEMENT COUNTS**

Begin Time Period	75th Avenue										Van Buren Street										Total
	From North					From South					From East					From West					
	Left	Thru	Right	Peds	Sum	Left	Thru	Right	Peds	Sum	Left	Thru	Right	Peds	Sum	Left	Thru	Right	Peds	Sum	
6:00 AM	14	72	14	0	100	1	44	3	0	48	2	18	7	0	27	4	28	4	0	36	211
6:15 AM	32	86	9	0	127	2	41	2	0	45	11	18	6	0	35	3	68	1	0	72	279
6:30 AM	25	85	7	0	117	0	44	2	0	46	9	30	6	0	45	8	97	11	1	117	325
6:45 AM	19	77	5	1	102	3	34	7	0	44	15	30	6	0	51	11	66	25	1	103	300
7:00 AM	17	79	8	0	104	1	37	4	1	43	19	30	7	1	57	2	72	29	0	103	307
7:15 AM	16	78	3	0	97	4	51	6	0	61	23	19	7	0	49	5	70	25	0	100	307
7:30 AM	33	68	10	0	111	3	58	9	1	71	10	14	8	0	32	8	79	15	1	103	317
7:45 AM	19	77	2	0	98	1	53	9	0	63	8	29	2	0	39	6	70	16	0	92	292
8:00 AM	32	70	9	0	111	0	39	3	0	42	5	24	8	0	37	9	36	1	0	46	236
8:15 AM	4	50	5	1	60	2	46	4	0	52	1	15	10	0	26	4	26	4	0	34	172
8:30 AM	5	48	7	0	60	0	36	0	0	36	6	9	7	0	22	11	22	2	0	35	153
8:45 AM	8	60	6	0	74	1	47	2	0	50	5	20	5	0	30	10	15	1	1	27	181
<b>Total</b>	<b>224</b>	<b>850</b>	<b>85</b>	<b>2</b>	<b>1161</b>	<b>18</b>	<b>530</b>	<b>51</b>	<b>2</b>	<b>601</b>	<b>114</b>	<b>256</b>	<b>79</b>	<b>1</b>	<b>450</b>	<b>81</b>	<b>649</b>	<b>134</b>	<b>4</b>	<b>868</b>	<b>3080</b>
<b>AM</b>	<b>77</b>	<b>319</b>	<b>23</b>	<b>1</b>	<b>420</b>	<b>8</b>	<b>166</b>	<b>19</b>	<b>1</b>	<b>194</b>	<b>66</b>	<b>109</b>	<b>26</b>	<b>1</b>	<b>202</b>	<b>26</b>	<b>305</b>	<b>90</b>	<b>2</b>	<b>423</b>	<b>1239</b>
<b>Peak Hour</b>	<b>6:30 AM to 7:30 AM</b>																				

3:00 PM	11	47	16	0	74	4	75	3	0	82	2	43	19	2	66	16	24	3	0	43	265
3:15 PM	12	66	16	0	94	1	76	2	0	79	4	50	31	0	85	25	25	0	0	50	308
3:30 PM	15	48	14	0	77	6	83	4	0	93	4	49	29	0	82	47	31	3	0	81	333
3:45 PM	13	60	16	0	89	5	89	6	0	100	7	58	37	4	106	17	26	2	0	45	340
4:00 PM	14	48	12	0	74	1	101	1	0	103	1	65	40	0	106	30	35	3	0	68	351
4:15 PM	11	52	15	0	78	2	97	4	1	104	3	58	39	2	102	24	29	2	0	55	339
4:30 PM	11	41	6	1	59	5	103	1	0	109	7	70	33	1	111	22	25	2	0	49	328
4:45 PM	7	57	7	0	71	2	82	2	0	86	2	74	40	2	118	30	32	2	0	64	339
5:00 PM	7	49	11	0	67	1	97	6	0	104	5	71	31	0	107	37	24	1	0	62	340
5:15 PM	10	60	8	0	78	2	108	4	0	114	4	87	38	1	130	17	22	1	0	40	362
5:30 PM	8	45	3	0	56	3	88	2	0	93	4	69	51	0	124	17	30	1	0	48	321
5:45 PM	10	40	4	0	54	1	86	3	0	90	8	77	44	0	129	8	16	1	0	25	298
<b>Total</b>	<b>35</b>	<b>613</b>	<b>128</b>	<b>1</b>	<b>871</b>	<b>33</b>	<b>1085</b>	<b>38</b>	<b>1</b>	<b>1157</b>	<b>51</b>	<b>771</b>	<b>432</b>	<b>12</b>	<b>1266</b>	<b>290</b>	<b>319</b>	<b>21</b>	<b>0</b>	<b>630</b>	<b>3924</b>
<b>PM</b>	<b>35</b>	<b>207</b>	<b>32</b>	<b>1</b>	<b>275</b>	<b>10</b>	<b>390</b>	<b>13</b>	<b>0</b>	<b>413</b>	<b>18</b>	<b>302</b>	<b>142</b>	<b>4</b>	<b>466</b>	<b>106</b>	<b>103</b>	<b>6</b>	<b>0</b>	<b>215</b>	<b>1369</b>
<b>Peak Hour</b>	<b>4:30 PM to 5:30 PM</b>																				

**Bolduc,**  
 Smiley &  
 Associates, Inc.

75TH AVENUE @ VAN BUREN STREET  
 TURNING MOVEMENT COUNTS  
 MARCH 13, 2001

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue @  
 Buckeye Road  
 County, State: Phoenix, Arizona  
 Date Counted: Tuesday, March 13, 2001

**TURNING MOVEMENT COUNTS**

Begin Time Period	75th Avenue										Buckeye Road										Total
	From North					From South					From East					From West					
	Left	Thru	Right	Peds	Sum	Left	Thru	Right	Peds	Sum	Left	Thru	Right	Peds	Sum	Left	Thru	Right	Peds	Sum	
6:00 AM	22	47	15	1	85	14	24	5	0	43	18	41	10	0	69	10	136	36	1	183	380
6:15 AM	28	52	11	0	91	3	27	9	0	39	13	40	6	0	59	7	206	25	0	238	427
6:30 AM	28	62	8	0	98	13	26	12	0	51	17	67	8	0	92	6	274	44	0	324	565
6:45 AM	32	68	9	0	109	13	19	6	0	38	29	70	10	0	109	15	283	40	0	338	594
7:00 AM	34	53	10	0	97	13	25	7	0	45	18	68	10	0	96	4	243	47	0	294	532
7:15 AM	36	43	6	0	85	13	26	5	0	44	11	64	13	0	88	10	267	32	0	309	526
7:30 AM	43	40	12	0	95	15	27	9	0	51	17	58	16	0	91	12	279	22	0	313	550
7:45 AM	42	37	9	0	88	16	28	6	0	50	23	52	11	0	86	11	284	34	0	329	553
8:00 AM	36	41	7	2	86	11	33	4	0	48	13	50	13	0	76	4	134	40	0	178	388
8:15 AM	9	34	6	1	50	16	26	6	0	48	8	34	10	0	52	4	90	16	0	110	260
8:30 AM	14	30	4	0	48	13	22	11	0	46	12	50	14	0	76	15	81	13	0	109	279
8:45 AM	19	37	6	0	62	14	29	8	0	51	13	41	11	2	67	8	93	13	0	114	294
<b>Total</b>	<b>343</b>	<b>544</b>	<b>103</b>	<b>4</b>	<b>994</b>	<b>154</b>	<b>312</b>	<b>88</b>	<b>0</b>	<b>554</b>	<b>192</b>	<b>635</b>	<b>132</b>	<b>2</b>	<b>961</b>	<b>106</b>	<b>2370</b>	<b>362</b>	<b>1</b>	<b>2839</b>	<b>5348</b>
<b>AM</b>	<b>130</b>	<b>226</b>	<b>33</b>	<b>0</b>	<b>389</b>	<b>52</b>	<b>96</b>	<b>30</b>	<b>0</b>	<b>178</b>	<b>75</b>	<b>269</b>	<b>41</b>	<b>0</b>	<b>385</b>	<b>35</b>	<b>1067</b>	<b>163</b>	<b>0</b>	<b>1265</b>	<b>2217</b>
<b>Peak Hour</b>	<b>6:30 AM to 7:30 AM</b>																				

3:00 PM	13	41	12	0	66	28	48	14	0	90	8	93	16	0	117	13	96	4	0	113	386
3:15 PM	15	36	17	0	68	29	38	10	0	77	8	110	16	0	134	19	102	13	0	134	413
3:30 PM	16	22	6	0	44	38	67	32	0	137	10	144	23	0	177	19	100	16	1	136	494
3:45 PM	10	40	21	0	71	49	53	17	0	119	14	181	18	0	213	8	89	13	0	110	513
4:00 PM	10	29	12	0	51	44	46	15	0	105	15	157	24	0	196	16	64	18	0	98	450
4:15 PM	19	39	8	0	66	58	65	17	0	140	10	213	26	0	249	7	70	7	0	84	539
4:30 PM	10	29	12	0	51	48	39	19	0	106	6	213	27	0	246	10	68	9	0	87	490
4:45 PM	11	40	11	1	63	46	50	10	0	106	19	211	26	0	256	8	62	24	0	94	519
5:00 PM	16	31	11	0	58	66	65	23	0	154	14	208	31	0	253	8	65	6	0	79	544
5:15 PM	15	43	9	0	67	41	53	13	0	107	11	228	33	1	273	14	62	16	0	92	539
5:30 PM	11	27	17	2	57	45	44	7	0	96	9	242	30	0	281	7	42	13	0	62	496
5:45 PM	11	25	19	0	55	28	45	8	0	81	13	186	21	0	220	5	54	11	0	70	426
<b>Total</b>	<b>157</b>	<b>402</b>	<b>155</b>	<b>3</b>	<b>717</b>	<b>520</b>	<b>613</b>	<b>185</b>	<b>0</b>	<b>1318</b>	<b>137</b>	<b>2186</b>	<b>291</b>	<b>1</b>	<b>2615</b>	<b>134</b>	<b>874</b>	<b>150</b>	<b>1</b>	<b>1159</b>	<b>5809</b>
<b>PM</b>	<b>53</b>	<b>141</b>	<b>48</b>	<b>3</b>	<b>245</b>	<b>198</b>	<b>212</b>	<b>53</b>	<b>0</b>	<b>463</b>	<b>53</b>	<b>889</b>	<b>120</b>	<b>1</b>	<b>1063</b>	<b>37</b>	<b>231</b>	<b>59</b>	<b>0</b>	<b>327</b>	<b>2098</b>
<b>Peak Hour</b>	<b>4:45 PM to 5:45 PM</b>																				

**Bolduc,  
Smiley &  
Associates, Inc.**

**75TH AVENUE @ BUCKEYE ROAD  
 TURNING MOVEMENT COUNTS  
 MARCH 13, 2001**

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue  
 north of Van Buren  
 Date Counted: Tuesday, March 13, 2001

## NUMBER OF VEHICLES BY CLASSIFICATION

75th Avenue, north of Van Buren (Southbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	1	19	10	0	0	2	0	1	7	0	0	10	0	50
1:00 AM	2	21	8	0	0	0	0	3	8	4	0	10	0	56
2:00 AM	4	38	9	0	1	0	3	0	1	1	1	8	0	66
3:00 AM	2	70	23	0	0	1	0	1	5	1	0	7	0	110
4:00 AM	7	94	50	0	1	0	0	2	5	0	2	15	2	178
5:00 AM	2	222	136	1	6	1	1	1	13	1	2	8	2	396
6:00 AM	33	268	77	0	9	4	18	4	24	2	2	5	2	448
7:00 AM	24	234	104	0	11	7	4	1	30	2	2	3	1	423
8:00 AM	5	140	83	1	15	1	0	10	37	0	3	1	1	297
9:00 AM	0	125	101	0	10	13	0	8	31	0	0	2	0	290
10:00 AM	1	133	92	0	5	2	0	5	38	0	0	0	0	276
11:00 AM	1	168	102	0	10	7	0	7	30	0	1	0	1	327
12:00 PM	0	219	137	0	8	9	0	7	28	0	2	0	0	410
1:00 PM	1	209	121	0	11	10	0	9	28	0	0	0	0	389
2:00 PM	1	200	127	1	8	6	0	10	31	1	0	1	0	386
3:00 PM	1	192	107	0	17	8	0	12	22	0	0	0	0	359
4:00 PM	1	153	86	0	11	4	0	9	24	0	0	0	0	288
5:00 PM	1	154	87	1	12	2	0	5	17	0	1	0	0	280
6:00 PM	1	160	67	0	3	3	0	3	21	0	0	0	0	258
7:00 PM	0	114	56	0	1	5	0	1	25	0	2	1	0	205
8:00 PM	0	150	43	0	3	7	0	1	23	0	1	0	0	228
9:00 PM	0	75	33	0	1	3	0	0	14	0	0	0	0	126
10:00 PM	0	62	32	1	2	2	0	1	17	0	0	0	0	117
11:00 PM	0	42	12	0	1	0	0	1	15	0	1	0	0	72
<b>TOTAL</b>	<b>88</b>	<b>3262</b>	<b>1703</b>	<b>5</b>	<b>146</b>	<b>97</b>	<b>26</b>	<b>102</b>	<b>494</b>	<b>12</b>	<b>20</b>	<b>71</b>	<b>9</b>	<b>6035</b>
<b>Percent by Class</b>	1.5%	54.1%	28.2%	0.1%	2.4%	1.6%	0.4%	1.7%	8.2%	0.2%	0.3%	1.2%	0.1%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON 75th AVENUE  
 NORTH OF VAN BUREN (SOUTHBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.

Location: 75th Avenue

Data Input: M. Tatsch

north of Van Buren

Checked By: L. Li

Date Counted: Tuesday, March 13, 2001

Project #: 2000C69

### NUMBER OF VEHICLES BY CLASSIFICATION

75th Avenue, north of Van Buren (Northbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	0	45	15	0	0	3	0	1	1	2	1	5	0	73
1:00 AM	0	16	8	0	0	0	0	1	5	2	0	2	0	34
2:00 AM	0	42	6	0	0	1	1	1	2	1	1	6	1	62
3:00 AM	0	31	9	0	0	2	0	3	5	0	0	6	0	56
4:00 AM	1	60	13	0	0	1	0	3	9	1	0	7	0	95
5:00 AM	3	83	27	0	2	1	1	7	8	1	0	6	1	140
6:00 AM	6	125	49	0	3	3	3	5	19	3	0	5	2	223
7:00 AM	1	162	56	0	10	2	0	8	21	1	3	3	0	267
8:00 AM	0	117	70	0	11	2	0	14	30	1	0	0	0	245
9:00 AM	0	122	64	0	4	5	2	8	34	1	1	0	0	241
10:00 AM	0	218	84	0	7	15	1	10	54	0	1	0	0	390
11:00 AM	0	288	114	0	12	10	2	5	35	0	1	0	0	467
12:00 PM	0	264	93	0	13	8	0	3	24	1	0	2	0	408
1:00 PM	0	239	91	0	5	8	0	7	23	0	2	0	0	375
2:00 PM	1	348	119	0	5	14	1	5	39	0	1	0	2	535
3:00 PM	0	399	140	1	5	10	3	4	28	0	0	0	0	590
4:00 PM	1	465	169	0	9	6	0	7	20	0	1	1	0	679
5:00 PM	0	487	131	0	3	2	0	2	17	0	1	0	0	643
6:00 PM	0	308	96	0	5	9	0	1	22	0	0	0	0	441
7:00 PM	0	179	38	0	2	5	0	0	20	0	1	0	1	246
8:00 PM	0	81	24	0	2	4	0	4	20	0	2	0	0	137
9:00 PM	0	72	24	0	4	3	0	1	13	0	2	1	0	120
10:00 PM	0	76	13	0	1	0	0	4	17	0	9	1	0	121
11:00 PM	0	65	15	0	2	0	0	1	7	0	6	0	0	96
<b>TOTAL</b>	<b>13</b>	<b>4292</b>	<b>1468</b>	<b>1</b>	<b>105</b>	<b>114</b>	<b>14</b>	<b>105</b>	<b>473</b>	<b>14</b>	<b>33</b>	<b>45</b>	<b>7</b>	<b>6684</b>
Percent by Class	0.1%	64.2%	21.9%	0.0%	1.5%	1.7%	0.2%	1.5%	7.0%	0.2%	0.4%	0.6%	0.1%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON 75th AVENUE  
NORTH OF VAN BUREN (NORTHBOUND)  
DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue  
 south of Van Buren  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

75th Avenue, south of Van Buren (Northbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	0	14	7	1	2	1	0	2	13	0	1	0	0	41
1:00 AM	0	17	3	0	0	1	0	1	18	0	0	0	0	40
2:00 AM	1	33	6	0	0	1	0	1	10	0	1	0	0	53
3:00 AM	0	70	16	0	2	0	0	0	10	0	0	0	0	98
4:00 AM	0	89	30	0	0	1	0	3	13	0	3	0	0	139
5:00 AM	0	235	51	0	3	2	0	2	18	0	4	0	0	315
6:00 AM	0	252	104	0	6	3	0	2	26	0	7	0	0	400
7:00 AM	0	296	106	0	9	9	0	12	27	0	4	0	0	463
8:00 AM	0	133	59	0	10	7	0	9	33	0	3	1	0	255
9:00 AM	0	102	59	0	14	9	0	2	32	0	0	2	0	220
10:00 AM	0	104	53	0	7	4	0	6	36	0	0	0	0	210
11:00 AM	0	144	59	0	8	3	0	4	33	0	1	0	0	252
12:00 PM	0	191	77	0	6	8	0	5	35	0	1	0	0	323
1:00 PM	1	172	72	0	3	6	0	10	28	0	0	0	1	293
2:00 PM	0	164	72	0	2	4	0	12	28	1	0	0	0	283
3:00 PM	0	163	61	0	7	6	0	9	20	0	0	0	0	266
4:00 PM	0	141	42	0	1	6	0	8	26	0	0	0	0	224
5:00 PM	0	147	46	0	8	1	0	7	18	0	1	0	0	228
6:00 PM	0	137	45	0	2	2	0	3	22	0	0	0	0	211
7:00 PM	0	97	27	0	3	2	0	6	22	0	2	1	0	160
8:00 PM	0	142	22	0	5	4	0	3	20	0	1	0	0	197
9:00 PM	0	75	20	0	1	2	0	0	12	0	0	0	0	110
10:00 PM	0	62	16	0	3	2	0	0	17	0	0	0	0	100
11:00 PM	0	37	6	0	0	1	0	1	17	0	1	0	0	63
<b>TOTAL</b>	<b>2</b>	<b>3017</b>	<b>1059</b>	<b>1</b>	<b>102</b>	<b>85</b>	<b>0</b>	<b>108</b>	<b>534</b>	<b>1</b>	<b>30</b>	<b>4</b>	<b>1</b>	<b>4944</b>
<b>Percent by Class</b>	0.0%	61.0%	21.4%	0.0%	2.1%	1.7%	0.0%	2.2%	10.8%	0.0%	0.6%	0.1%	0.0%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON 75th AVENUE  
 SOUTH OF VAN BUREN (NORTHBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue  
 south of Van Buren  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

75th Avenue, south of Van Buren (Southbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	1	39	16	0	0	3	0	3	2	1	3	0	0	68
1:00 AM	0	16	11	0	0	0	0	4	2	1	2	0	0	36
2:00 AM	0	44	12	0	0	2	0	0	2	1	5	0	1	67
3:00 AM	0	29	8	0	0	3	0	5	4	0	4	0	0	53
4:00 AM	0	61	17	0	2	2	2	8	6	1	3	0	0	102
5:00 AM	0	69	21	0	4	0	2	13	11	2	5	0	1	128
6:00 AM	1	103	38	2	5	1	1	11	14	5	7	0	0	188
7:00 AM	0	163	39	0	4	4	0	7	17	2	10	0	0	246
8:00 AM	0	87	50	0	7	0	2	18	20	1	6	0	0	191
9:00 AM	0	85	58	1	4	7	0	11	34	2	2	1	2	207
10:00 AM	1	141	53	1	10	14	0	7	49	2	1	0	1	280
11:00 AM	0	195	73	0	11	10	0	11	29	0	3	0	0	332
12:00 PM	2	179	70	1	9	9	0	7	22	0	1	2	0	302
1:00 PM	0	176	67	1	5	10	0	7	29	0	3	0	0	298
2:00 PM	9	238	75	1	7	7	3	13	32	1	0	3	1	390
3:00 PM	16	222	72	3	10	4	10	9	20	0	1	7	0	374
4:00 PM	0	286	81	1	6	8	0	6	18	1	1	1	0	409
5:00 PM	0	281	81	0	4	3	0	4	12	0	1	0	1	387
6:00 PM	1	239	76	0	4	9	0	2	17	0	2	0	0	350
7:00 PM	0	131	36	0	4	5	0	4	15	0	3	0	0	198
8:00 PM	1	65	24	0	3	1	0	8	11	0	4	0	1	118
9:00 PM	0	51	16	0	1	2	0	2	12	0	4	1	0	89
10:00 PM	0	58	17	0	1	1	0	1	12	0	13	0	0	103
11:00 PM	1	46	10	0	1	2	0	1	3	1	7	0	0	72
<b>TOTAL</b>	<b>33</b>	<b>3004</b>	<b>1021</b>	<b>11</b>	<b>102</b>	<b>107</b>	<b>20</b>	<b>162</b>	<b>393</b>	<b>21</b>	<b>91</b>	<b>15</b>	<b>8</b>	<b>4988</b>
Percent by Class	0.7%	60.2%	20.5%	0.2%	2.0%	2.1%	0.4%	3.2%	7.9%	0.4%	1.8%	0.3%	0.2%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON 75th AVENUE  
 SOUTH OF VAN BUREN (SOUTHBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.

Location: Van Buren

Data Input: M. Tatsch

east of 75th Avenue

Checked By: L. Li

Date Counted: Tuesday, March 13, 2001

Project #: 2000C69

### NUMBER OF VEHICLES BY CLASSIFICATION

Van Buren, east of 75th Avenue (Westbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	0	12	2	0	0	1	0	0	0	0	0	0	0	15
1:00 AM	0	8	1	0	0	0	0	1	2	0	0	0	0	12
2:00 AM	0	8	1	0	0	1	0	0	0	0	0	0	0	10
3:00 AM	0	15	1	0	1	0	0	0	1	0	0	0	0	18
4:00 AM	0	40	2	0	0	0	0	0	0	0	0	0	0	42
5:00 AM	1	68	27	0	0	4	0	1	0	0	0	0	0	101
6:00 AM	0	87	43	0	0	2	0	3	5	0	0	0	0	140
7:00 AM	1	87	36	0	3	0	0	0	4	0	0	0	1	132
8:00 AM	0	72	26	0	1	3	0	2	4	0	0	0	0	108
9:00 AM	0	80	37	0	3	3	0	3	2	0	0	0	0	128
10:00 AM	0	98	39	0	2	2	0	2	3	0	0	0	0	146
11:00 AM	0	95	36	0	2	2	0	2	3	0	0	0	0	140
12:00 PM	0	104	40	0	4	1	0	3	7	0	0	0	0	159
1:00 PM	1	105	46	0	3	1	0	2	3	0	0	0	0	161
2:00 PM	0	159	52	0	4	0	0	4	2	0	0	0	0	221
3:00 PM	1	208	62	0	7	4	0	6	2	0	0	0	0	290
4:00 PM	1	238	75	0	6	2	0	3	1	0	0	0	0	326
5:00 PM	0	272	64	0	1	1	0	0	4	0	0	0	0	342
6:00 PM	1	159	39	0	1	0	0	0	1	0	0	0	0	201
7:00 PM	0	47	19	0	0	1	0	1	0	0	0	0	0	68
8:00 PM	0	31	3	0	0	0	0	0	4	0	0	0	0	38
9:00 PM	0	29	3	0	0	0	0	0	2	0	0	0	0	34
10:00 PM	0	19	7	0	1	0	0	2	1	0	0	0	0	30
11:00 PM	0	24	8	0	0	0	0	0	0	0	0	0	0	32
<b>TOTAL</b>	<b>6</b>	<b>2065</b>	<b>669</b>	<b>0</b>	<b>39</b>	<b>28</b>	<b>0</b>	<b>35</b>	<b>51</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2894</b>
Percent by Class	0.2%	71.4%	23.1%	0.0%	1.3%	1.0%	0.0%	1.2%	1.8%	0.0%	0.0%	0.0%	0.0%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON VAN BUREN  
EAST OF 75TH AVENUE (WESTBOUND)  
DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: Van Buren  
 east of 75th Avenue  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

Van Buren, east of 75th Avenue (Eastbound)														
Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	0	14	2	0	0	0	0	0	0	1	0	0	0	17
1:00 AM	0	5	1	0	0	0	0	0	0	0	1	0	1	8
2:00 AM	0	5	2	0	0	0	0	0	0	0	0	0	1	8
3:00 AM	0	8	1	0	0	0	0	1	0	0	1	0	0	11
4:00 AM	1	16	5	0	0	0	0	0	0	0	1	0	0	23
5:00 AM	0	75	18	0	1	1	3	0	1	1	1	0	1	102
6:00 AM	110	136	40	4	2	9	15	1	4	5	4	3	18	351
7:00 AM	209	71	9	2	2	3	29	4	5	6	4	17	32	393
8:00 AM	0	89	32	0	5	1	0	1	2	1	0	0	0	131
9:00 AM	0	78	40	0	7	1	0	2	4	0	0	0	0	132
10:00 AM	0	105	53	1	8	4	1	4	1	0	0	0	0	177
11:00 AM	0	114	49	1	5	4	0	1	3	0	0	0	1	178
12:00 PM	0	100	40	2	7	1	0	1	3	1	0	0	0	155
1:00 PM	2	103	37	0	3	2	0	2	1	1	2	0	3	156
2:00 PM	1	139	39	0	6	1	0	4	5	0	0	0	0	195
3:00 PM	0	167	73	0	5	2	0	3	1	0	0	0	0	251
4:00 PM	1	176	60	0	3	4	0	2	4	0	0	1	1	252
5:00 PM	0	132	38	0	1	0	1	2	3	0	0	0	1	178
6:00 PM	0	67	22	1	0	1	0	1	1	0	1	0	1	95
7:00 PM	0	45	13	0	0	0	0	1	1	0	0	0	0	60
8:00 PM	0	39	7	1	0	0	0	0	0	0	0	0	0	47
9:00 PM	0	23	2	0	0	0	0	1	0	2	0	0	2	30
10:00 PM	0	25	4	0	0	0	0	0	1	0	0	0	2	32
11:00 PM	0	21	1	0	0	0	0	0	0	0	1	0	3	26
<b>TOTAL</b>	<b>324</b>	<b>1753</b>	<b>588</b>	<b>12</b>	<b>55</b>	<b>34</b>	<b>49</b>	<b>31</b>	<b>40</b>	<b>18</b>	<b>16</b>	<b>21</b>	<b>67</b>	<b>3008</b>
<b>Percent by Class</b>	10.8%	58.3%	19.5%	0.4%	1.8%	1.1%	1.6%	1.0%	1.3%	0.6%	0.5%	0.7%	2.2%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON VAN BUREN  
 EAST OF 75TH AVENUE (EASTBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: Van Buren  
 west of 75th Avenue  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

#### Van Buren, west of 75th Avenue (Eastbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	0	16	3	0	0	0	0	0	0	0	0	0	0	19
1:00 AM	0	4	2	0	0	0	0	1	0	0	0	0	0	7
2:00 AM	0	10	2	0	0	0	0	0	0	0	0	0	0	12
3:00 AM	0	9	2	0	0	0	0	1	1	0	1	0	0	14
4:00 AM	1	33	5	0	0	0	0	0	2	0	0	0	0	41
5:00 AM	0	90	30	0	3	1	0	1	6	0	0	0	0	131
6:00 AM	0	273	81	0	6	2	0	4	5	0	1	1	0	373
7:00 AM	0	292	94	0	11	1	0	9	12	0	0	0	0	419
8:00 AM	0	99	39	0	3	1	0	3	2	0	0	0	0	147
9:00 AM	0	82	40	0	2	2	0	5	3	0	0	0	0	134
10:00 AM	0	106	40	0	2	5	0	2	2	0	0	0	0	157
11:00 AM	0	96	41	0	1	0	0	3	3	0	0	0	0	144
12:00 PM	0	109	36	0	3	3	0	5	0	0	0	0	0	156
1:00 PM	0	117	35	0	3	4	1	8	3	0	0	0	0	171
2:00 PM	0	127	38	0	6	2	0	6	4	0	0	0	0	183
3:00 PM	0	142	46	0	1	1	0	4	2	0	0	0	0	196
4:00 PM	1	137	40	0	3	0	0	2	2	0	0	0	0	185
5:00 PM	0	115	34	0	2	0	0	3	2	0	0	0	0	156
6:00 PM	0	87	17	0	2	1	0	1	0	0	0	0	0	108
7:00 PM	0	71	12	0	0	0	0	0	1	0	0	0	0	84
8:00 PM	0	50	9	0	0	1	0	0	0	0	0	0	0	60
9:00 PM	0	40	7	0	0	0	0	0	1	0	0	0	0	48
10:00 PM	0	35	7	0	0	0	0	0	0	0	0	0	0	42
11:00 PM	0	25	2	0	0	0	0	0	1	0	0	0	0	28
<b>TOTAL</b>	<b>2</b>	<b>2165</b>	<b>662</b>	<b>0</b>	<b>48</b>	<b>24</b>	<b>1</b>	<b>58</b>	<b>52</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3015</b>

Percent by Class	0.1%	71.8%	22.0%	0.0%	1.6%	0.8%	0.0%	1.9%	1.7%	0.0%	0.1%	0.0%	0.0%	100.0%
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VEHICLE CLASSIFICATION ON VAN BUREN  
 WEST OF 75TH AVENUE (EASTBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: Van Buren  
 west of 75th Avenue  
 Date Counted: Tuesday, March 13, 2001

## NUMBER OF VEHICLES BY CLASSIFICATION

### Van Buren, west of 75th Avenue (Westbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	0	13	2	0	0	0	0	0	0	0	0	0	0	15
1:00 AM	0	7	5	0	0	0	0	0	1	0	0	0	0	13
2:00 AM	0	7	0	0	0	0	0	0	0	0	0	0	0	7
3:00 AM	0	16	6	1	0	0	0	1	0	0	0	0	0	24
4:00 AM	0	37	2	0	0	0	0	2	0	0	0	0	0	41
5:00 AM	0	67	15	0	1	2	0	0	0	0	0	0	0	85
6:00 AM	1	110	45	0	5	2	0	3	9	0	0	0	0	175
7:00 AM	0	130	51	1	2	2	0	5	2	0	0	0	0	193
8:00 AM	0	75	37	1	6	3	0	3	2	0	0	0	0	127
9:00 AM	0	75	32	1	7	1	0	4	2	0	1	0	0	123
10:00 AM	0	109	50	0	2	6	0	2	3	0	0	0	0	172
11:00 AM	1	103	45	0	4	0	0	2	4	0	0	0	0	159
12:00 PM	0	103	41	0	8	1	0	4	6	0	0	0	0	163
1:00 PM	1	115	49	1	6	0	0	6	0	0	0	0	0	178
2:00 PM	0	166	63	0	9	6	0	8	2	0	0	0	1	255
3:00 PM	1	278	71	0	8	4	0	8	0	0	0	0	0	370
4:00 PM	1	326	112	3	9	1	0	5	0	0	0	0	0	457
5:00 PM	0	386	89	1	4	1	1	4	2	0	0	0	0	488
6:00 PM	0	176	57	0	2	3	0	1	1	0	0	0	0	240
7:00 PM	0	74	21	0	1	1	0	1	0	0	0	0	0	98
8:00 PM	1	39	7	0	0	0	0	0	2	0	0	0	0	49
9:00 PM	0	41	12	0	3	0	0	1	0	0	0	0	0	57
10:00 PM	0	31	8	0	0	0	0	0	2	0	0	0	0	41
11:00 PM	0	35	8	0	0	0	0	1	0	0	0	0	0	44
<b>TOTAL</b>	<b>6</b>	<b>2519</b>	<b>828</b>	<b>9</b>	<b>77</b>	<b>33</b>	<b>1</b>	<b>61</b>	<b>38</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>3574</b>
<b>Percent by Class</b>	0.2%	70.5%	23.2%	0.3%	2.2%	0.9%	0.0%	1.7%	1.1%	0.0%	0.0%	0.0%	0.0%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON VAN BUREN  
 WEST OF 75TH AVENUE (WESTBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: Buckeye  
 west of 75th Avenue  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

Buckeye, west of 75th Avenue (Westbound)														
Begin Time Period	F1 Bikes & Mtrcycl	F2 Cars & Trailers	F3 2 Axle Long	F4 Buses	F5 2 Axle 6 Tire	F6 3 Axle Single	F7 4 Axle Single	F8 <5 Axle Double	F9 5 Axle Double	F10 >5 Axle Double	F11 <6 Axle Multi	F12 6 Axle Multi	F13 >6 Axle Multi	TOTAL
12:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
1:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
2:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
3:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
4:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
5:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
6:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
7:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
8:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
9:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	0
10:00 AM	2	123	71	2	8	15	2	7	36	5	5	1	3	280
11:00 AM	0	185	77	1	6	11	0	5	38	3	4	2	12	344
12:00 PM	2	167	62	1	5	16	1	9	26	6	3	0	4	302
1:00 PM	0	189	73	4	7	20	3	9	28	12	5	2	10	362
2:00 PM	2	276	102	1	11	15	2	6	21	5	6	1	13	461
3:00 PM	1	388	149	6	10	16	4	7	17	5	7	0	10	620
4:00 PM	3	575	178	1	5	15	6	12	13	10	8	4	19	849
5:00 PM	3	626	186	1	7	15	14	6	17	2	8	1	22	908
6:00 PM	0	292	97	0	3	10	2	3	10	6	5	3	7	438
7:00 PM	1	107	44	1	1	11	0	1	9	3	1	0	0	179
8:00 PM	1	72	18	0	0	6	1	2	5	1	0	0	1	107
9:00 PM	0	70	12	0	1	3	1	0	3	4	4	1	1	100
10:00 PM	0	78	18	0	2	4	0	1	14	2	8	1	2	130
11:00 PM	0	39	11	0	1	2	1	0	11	2	1	3	1	72
<b>TOTAL</b>	<b>15</b>	<b>3187</b>	<b>1098</b>	<b>18</b>	<b>67</b>	<b>159</b>	<b>37</b>	<b>68</b>	<b>248</b>	<b>66</b>	<b>65</b>	<b>19</b>	<b>105</b>	<b>5152</b>
<b>Percent by Class</b>	0.3%	61.9%	21.3%	0.3%	1.3%	3.1%	0.7%	1.3%	4.8%	1.3%	1.3%	0.4%	2.0%	100.0%

\* = Not counted

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON BUCKEYE  
 WEST OF 75TH AVENUE (WESTBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue  
 north of Buckeye  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

75th Avenue, north of Buckeye (Southbound)														
Begin Time Period	F1 Bikes & Mtrcycl	F2 Cars & Trailers	F3 2 Axle Long	F4 Buses	F5 2 Axle 6 Tire	F6 3 Axle Single	F7 4 Axle Single	F8 <5 Axle Double	F9 5 Axle Double	F10 >5 Axle Double	F11 <6 Axle Multi	F12 6 Axle Multi	F13 >6 Axle Multi	TOTAL
12:00 AM	1	40	14	0	0	3	0	1	3	0	2	0	0	64
1:00 AM	0	18	9	0	0	0	0	1	6	0	0	0	0	34
2:00 AM	0	26	9	0	1	1	0	0	6	0	4	0	0	47
3:00 AM	0	24	8	0	1	0	0	6	10	0	1	0	0	50
4:00 AM	0	62	17	0	2	1	0	8	7	0	1	0	0	98
5:00 AM	0	63	29	0	4	1	0	10	9	0	0	0	0	116
6:00 AM	1	92	33	0	3	4	0	5	26	0	1	0	0	165
7:00 AM	0	112	50	0	5	3	1	8	24	0	3	0	0	206
8:00 AM	0	85	65	0	9	0	0	10	29	0	0	0	0	198
9:00 AM	3	78	52	0	4	8	1	6	28	2	1	1	4	188
10:00 AM	1	128	52	0	15	9	0	14	37	0	1	0	0	257
11:00 AM	0	188	85	0	9	8	1	8	28	0	1	0	1	329
12:00 PM	1	164	70	0	7	12	0	8	16	0	1	2	0	281
1:00 PM	0	142	65	0	6	8	0	10	25	0	2	0	0	258
2:00 PM	0	215	85	0	7	5	0	13	33	0	1	0	0	359
3:00 PM	0	205	80	2	9	3	2	6	27	1	0	0	1	336
4:00 PM	1	256	78	0	4	7	0	2	14	0	1	1	0	364
5:00 PM	0	253	85	0	4	2	0	4	13	0	1	0	0	362
6:00 PM	0	190	75	0	6	4	0	4	15	0	0	0	0	294
7:00 PM	0	119	40	0	3	7	0	5	14	0	1	0	0	189
8:00 PM	0	67	23	0	3	1	0	8	17	0	3	0	0	122
9:00 PM	0	51	18	0	2	0	0	0	12	0	2	1	0	86
10:00 PM	0	48	16	0	0	0	0	3	14	0	9	0	0	90
11:00 PM	0	44	10	1	1	2	0	1	4	0	6	0	0	69
<b>TOTAL</b>	<b>8</b>	<b>2670</b>	<b>1068</b>	<b>3</b>	<b>105</b>	<b>89</b>	<b>5</b>	<b>141</b>	<b>417</b>	<b>3</b>	<b>42</b>	<b>5</b>	<b>6</b>	<b>4562</b>
<b>Percent by Class</b>	0.2%	58.5%	23.4%	0.1%	2.3%	2.0%	0.1%	3.1%	9.1%	0.1%	0.9%	0.1%	0.1%	100.0%

**Bolduc,  
 Smiley &  
 Associates, Inc.**

VEHICLE CLASSIFICATION ON 75th AVENUE  
 NORTH OF BUCKEYE (SOUTHBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue  
 north of Buckeye  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

75th Avenue, north of Buckeye (Northbound)														
Begin Time Period	F1 Bikes & Mtrcycl	F2 Cars & Trailers	F3 2 Axle Long	F4 Buses	F5 2 Axle 6 Tire	F6 3 Axle Single	F7 4 Axle Single	F8 <5 Axle Double	F9 5 Axle Double	F10 >5 Axle Double	F11 <6 Axle Multi	F12 6 Axle Multi	F13 >6 Axle Multi	TOTAL
12:00 AM	0	15	8	0	3	1	0	1	3	2	5	0	0	38
1:00 AM	0	15	3	1	1	1	0	1	5	2	8	0	0	37
2:00 AM	1	22	8	0	1	0	0	1	3	0	7	0	0	43
3:00 AM	0	64	16	0	2	0	0	0	3	0	4	0	0	89
4:00 AM	0	87	35	0	1	0	0	3	1	1	8	0	1	137
5:00 AM	1	214	56	1	3	2	0	5	3	2	11	0	0	298
6:00 AM	0	226	92	1	7	1	1	10	3	2	10	2	0	355
7:00 AM	0	218	97	1	18	2	0	11	7	4	19	0	2	379
8:00 AM	0	118	57	2	15	4	0	9	22	0	13	1	0	241
9:00 AM	1	78	46	0	12	10	0	5	19	0	0	1	3	175
10:00 AM	1	99	50	3	7	5	0	5	34	2	4	1	0	211
11:00 AM	1	133	52	0	10	9	0	6	22	0	4	0	0	237
12:00 PM	0	184	73	0	6	13	0	5	29	0	1	0	0	311
1:00 PM	1	150	63	1	3	6	0	7	28	1	2	0	0	262
2:00 PM	0	147	67	1	3	3	0	18	27	0	1	0	0	267
3:00 PM	2	155	55	0	13	7	0	15	15	0	3	0	0	265
4:00 PM	0	145	36	1	3	6	0	7	22	0	1	0	0	221
5:00 PM	0	144	51	1	7	3	0	7	15	0	2	0	0	230
6:00 PM	0	135	44	1	4	1	0	4	16	0	3	0	1	209
7:00 PM	0	99	31	0	1	4	1	3	13	1	11	1	0	165
8:00 PM	0	87	14	0	5	5	0	2	16	0	3	0	0	132
9:00 PM	0	71	22	0	1	2	0	0	3	0	5	0	0	104
10:00 PM	0	56	21	0	3	2	0	2	7	0	5	0	0	96
11:00 PM	0	34	5	0	0	1	0	8	1	0	8	0	0	57
<b>TOTAL</b>	<b>8</b>	<b>2696</b>	<b>1002</b>	<b>14</b>	<b>129</b>	<b>88</b>	<b>2</b>	<b>135</b>	<b>317</b>	<b>17</b>	<b>138</b>	<b>6</b>	<b>7</b>	<b>4559</b>
<b>Percent by Class</b>	0.2%	59.1%	22.0%	0.3%	2.8%	1.9%	0.0%	3.0%	7.0%	0.4%	3.0%	0.1%	0.2%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON 75th AVENUE  
 NORTH OF BUCKEYE (NORTHBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue  
 south of Buckeye  
 Date Counted: Tuesday, March 13, 2001

## NUMBER OF VEHICLES BY CLASSIFICATION

### 75th Avenue, south of Buckeye (Northbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	1	33	9	0	2	2	0	0	4	2	0	0	0	53
1:00 AM	0	12	2	0	0	0	0	0	8	1	1	1	1	26
2:00 AM	0	10	5	0	0	6	0	1	1	1	0	1	0	25
3:00 AM	0	22	5	0	1	2	2	2	9	3	2	0	0	48
4:00 AM	1	37	14	0	2	2	0	0	1	5	4	1	0	67
5:00 AM	0	70	21	1	4	0	0	0	8	6	2	1	1	114
6:00 AM	1	83	40	1	3	4	2	6	16	2	15	2	2	177
7:00 AM	0	98	32	2	8	4	0	5	16	5	16	1	3	190
8:00 AM	0	88	42	0	8	5	1	10	36	2	7	0	1	200
9:00 AM	0	75	39	0	10	9	0	7	54	2	2	0	1	199
10:00 AM	1	96	44	0	11	25	0	2	39	0	4	1	1	224
11:00 AM	0	143	54	1	5	23	1	6	27	0	4	0	0	264
12:00 PM	0	116	64	0	6	10	0	5	32	0	1	2	0	236
1:00 PM	0	138	44	1	4	15	0	2	39	0	2	0	0	245
2:00 PM	0	175	61	2	8	16	0	5	38	1	2	0	1	309
3:00 PM	1	270	83	1	11	11	2	4	32	0	3	1	0	419
4:00 PM	0	323	94	1	7	14	0	5	18	0	2	1	3	468
5:00 PM	0	292	93	0	5	12	0	2	20	0	1	0	1	426
6:00 PM	0	140	55	1	5	9	0	1	25	0	0	0	0	236
7:00 PM	0	94	26	0	2	7	0	0	14	2	4	0	0	149
8:00 PM	0	57	11	0	1	6	0	0	19	3	5	1	0	103
9:00 PM	0	31	12	0	0	4	0	0	12	4	3	3	1	70
10:00 PM	0	25	11	0	1	0	0	1	8	7	3	0	0	56
11:00 PM	0	34	7	0	0	3	0	1	5	1	4	2	1	58
<b>TOTAL</b>	<b>5</b>	<b>2462</b>	<b>868</b>	<b>11</b>	<b>104</b>	<b>189</b>	<b>8</b>	<b>65</b>	<b>481</b>	<b>47</b>	<b>87</b>	<b>18</b>	<b>17</b>	<b>4362</b>
<b>Percent by Class</b>	0.1%	56.4%	19.9%	0.3%	2.4%	4.3%	0.2%	1.5%	11.0%	1.1%	2.0%	0.4%	0.4%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

**VEHICLE CLASSIFICATION ON 75th AVENUE  
SOUTH OF BUCKEYE (NORTHBOUND)  
DATE COUNTED 3/13/01**

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: 75th Avenue  
 south of Buckeye  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

75th Avenue, south of Buckeye (Southbound)

Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcycl	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	0	15	5	0	4	2	0	3	7	0	0	0	0	36
1:00 AM	0	11	6	0	2	2	0	2	13	1	0	0	0	37
2:00 AM	0	18	4	0	2	3	0	2	9	0	0	0	0	38
3:00 AM	0	30	10	0	3	3	0	1	5	0	0	1	0	53
4:00 AM	0	66	19	0	0	2	0	1	6	0	2	0	0	96
5:00 AM	1	172	54	0	5	6	0	0	18	1	0	0	1	258
6:00 AM	0	283	91	0	9	5	0	2	22	1	2	0	1	416
7:00 AM	0	238	95	0	19	4	0	5	21	0	2	0	0	384
8:00 AM	0	119	59	0	8	12	0	9	34	0	4	0	0	245
9:00 AM	1	79	46	0	12	15	0	8	33	0	1	1	0	196
10:00 AM	0	83	56	0	5	8	0	9	28	0	0	2	0	191
11:00 AM	0	126	41	0	4	7	0	4	36	0	1	1	0	220
12:00 PM	0	159	58	0	6	7	0	7	31	0	2	0	0	270
1:00 PM	1	127	60	0	3	12	0	4	34	1	0	0	0	242
2:00 PM	2	127	61	0	1	11	0	2	33	0	3	0	1	241
3:00 PM	1	135	45	0	6	11	1	9	27	0	0	0	0	235
4:00 PM	1	145	49	0	2	12	0	7	23	0	0	0	0	239
5:00 PM	1	131	41	0	7	8	0	5	28	0	2	0	0	223
6:00 PM	0	109	36	0	5	5	0	1	25	0	0	0	0	181
7:00 PM	0	84	21	0	1	6	0	2	28	0	1	0	0	143
8:00 PM	0	75	21	0	4	8	0	2	16	0	0	0	0	126
9:00 PM	0	57	13	0	1	5	0	1	13	0	0	0	0	90
10:00 PM	0	32	16	0	4	5	0	3	16	0	0	0	0	76
11:00 PM	0	27	6	0	5	1	0	2	19	0	0	0	0	60
<b>TOTAL</b>	<b>8</b>	<b>2448</b>	<b>913</b>	<b>0</b>	<b>118</b>	<b>160</b>	<b>1</b>	<b>91</b>	<b>525</b>	<b>4</b>	<b>20</b>	<b>5</b>	<b>3</b>	<b>4296</b>
Percent by Class	0.2%	57.0%	21.3%	0.0%	2.7%	3.7%	0.0%	2.1%	12.2%	0.1%	0.5%	0.1%	0.1%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON 75th AVENUE  
 SOUTH OF BUCKEYE (SOUTHBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: Buckeye  
 east of 75th Avenue  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

#### Buckeye, east of 75th Avenue (Westbound)

Begin Time Period	F1 Bikes & Mtrcycl	F2 Cars & Trailers	F3 2 Axle Long	F4 Buses	F5 2 Axle 6 Tire	F6 3 Axle Single	F7 4 Axle Single	F8 <5 Axle Double	F9 5 Axle Double	F10 >5 Axle Double	F11 <6 Axle Multi	F12 6 Axle Multi	F13 >6 Axle Multi	TOTAL
12:00 AM	1	45	6	0	1	1	0	0	1	0	0	0	1	56
1:00 AM	1	20	9	0	1	1	1	0	4	0	1	2	3	43
2:00 AM	4	16	3	0	0	2	0	1	5	2	0	0	4	37
3:00 AM	1	66	11	0	1	5	2	0	5	6	0	1	2	100
4:00 AM	2	67	25	0	2	5	2	1	1	3	0	3	4	115
5:00 AM	8	147	28	0	4	1	3	3	6	7	0	5	3	215
6:00 AM	7	183	60	1	6	16	2	2	12	3	0	8	6	306
7:00 AM	1	174	61	0	6	13	0	7	17	12	3	13	13	320
8:00 AM	3	108	75	0	10	10	0	6	17	6	2	10	4	251
9:00 AM	3	115	75	0	8	8	3	9	26	3	2	10	5	267
10:00 AM	4	124	81	0	5	19	1	4	27	3	0	15	3	286
11:00 AM	3	147	89	0	5	19	0	5	39	1	3	6	6	323
12:00 PM	1	158	80	0	2	16	2	7	28	1	0	4	4	303
1:00 PM	2	196	91	1	8	22	1	3	36	3	1	7	6	377
2:00 PM	2	266	98	0	10	21	2	13	30	2	4	4	5	457
3:00 PM	1	418	168	0	9	15	3	15	22	4	5	3	7	670
4:00 PM	3	621	213	0	7	8	8	8	20	4	7	4	15	918
5:00 PM	2	675	244	0	4	20	8	5	10	3	4	9	15	999
6:00 PM	0	316	117	0	2	10	1	2	16	2	1	7	5	479
7:00 PM	0	111	47	0	2	6	0	1	6	2	1	3	2	181
8:00 PM	1	79	17	0	1	4	0	1	3	1	0	3	3	113
9:00 PM	2	84	19	0	2	1	0	0	5	2	1	3	2	121
10:00 PM	1	77	16	0	0	1	0	2	5	3	2	3	3	113
11:00 PM	0	55	12	0	1	2	1	0	3	0	0	4	4	82
<b>TOTAL</b>	<b>53</b>	<b>4268</b>	<b>1645</b>	<b>2</b>	<b>97</b>	<b>226</b>	<b>40</b>	<b>95</b>	<b>344</b>	<b>73</b>	<b>37</b>	<b>127</b>	<b>125</b>	<b>7132</b>
Percent by Class	0.7%	59.8%	23.1%	0.0%	1.4%	3.2%	0.6%	1.3%	4.8%	1.0%	0.5%	1.8%	1.8%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON BUCKEYE  
 EAST OF 75TH AVENUE (WESTBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: Buckeye  
 east of 75th Avenue  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

Buckeye, east of 75th Avenue (Eastbound)														
Begin Time Period	F1 Bikes & Mtrcycl	F2 Cars & Trallers	F3 2 Axle Long	F4 Buses	F5 2 Axle 6 Tire	F6 3 Axle Single	F7 4 Axle Single	F8 <5 Axle Double	F9 5 Axle Double	F10 >5 Axle Double	F11 <6 Axle Multi	F12 6 Axle Multi	F13 >6 Axle Multi	TOTAL
12:00 AM	0	21	3	0	1	1	7	1	2	4	0	0	1	41
1:00 AM	0	13	3	0	0	5	4	0	1	2	0	0	0	28
2:00 AM	0	44	6	0	1	2	0	0	1	1	1	0	3	59
3:00 AM	1	53	10	0	2	1	7	1	9	5	0	0	1	90
4:00 AM	1	136	21	0	0	8	9	0	5	14	0	0	5	199
5:00 AM	2	281	74	0	3	13	5	1	12	17	4	2	9	423
6:00 AM	5	659	173	1	3	36	27	4	27	25	5	2	46	1013
7:00 AM	4	750	148	0	9	36	28	6	37	26	5	7	51	1107
8:00 AM	1	252	73	0	9	23	18	4	19	23	5	0	23	450
9:00 AM	0	134	72	0	5	9	9	6	22	14	2	0	8	281
10:00 AM	1	146	61	2	4	3	10	2	21	28	1	4	16	299
11:00 AM	0	184	64	1	8	7	14	4	12	20	3	3	11	331
12:00 PM	1	147	60	2	2	12	14	4	14	13	3	3	9	284
1:00 PM	0	176	75	1	6	8	16	7	11	20	2	0	17	339
2:00 PM	3	239	83	3	6	12	21	8	22	17	1	1	9	425
3:00 PM	2	279	80	3	6	13	14	2	21	19	2	3	15	459
4:00 PM	1	242	56	1	3	11	10	2	11	11	3	1	6	358
5:00 PM	1	209	38	1	6	11	6	4	5	11	3	0	6	301
6:00 PM	1	167	38	0	0	8	7	1	6	2	1	0	3	234
7:00 PM	0	107	26	1	1	5	3	0	6	2	2	0	0	153
8:00 PM	1	69	17	0	2	1	5	0	4	6	0	0	1	106
9:00 PM	0	59	11	1	1	4	7	1	3	3	0	1	2	93
10:00 PM	0	72	16	0	0	0	4	0	0	5	0	0	4	101
11:00 PM	0	31	4	0	0	1	4	1	5	3	0	0	0	49
<b>TOTAL</b>	<b>25</b>	<b>4470</b>	<b>1212</b>	<b>17</b>	<b>78</b>	<b>230</b>	<b>249</b>	<b>59</b>	<b>276</b>	<b>291</b>	<b>43</b>	<b>27</b>	<b>246</b>	<b>7223</b>
<b>Percent by Class</b>	0.3%	61.9%	16.8%	0.2%	1.1%	3.2%	3.4%	0.8%	3.8%	4.0%	0.6%	0.4%	3.4%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON BUCKEYE  
 EAST OF 75TH AVENUE (EASTBOUND)  
 DATE COUNTED 3/13/01

Counts By: Traffic Research & Analysis, Inc.  
 Data Input: M. Tatsch  
 Checked By: L. Li  
 Project #: 2000C69

Location: Buckeye  
 west of 75th Avenue  
 Date Counted: Tuesday, March 13, 2001

### NUMBER OF VEHICLES BY CLASSIFICATION

Buckeye, west of 75th Avenue (Eastbound)														
Begin Time Period	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	TOTAL
	Bikes & Mtrcyc	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	
12:00 AM	1	27	3	0	0	3	0	1	2	0	2	3	0	42
1:00 AM	1	14	3	0	0	2	0	1	0	0	0	3	0	24
2:00 AM	1	31	5	0	0	0	0	0	1	0	1	2	0	41
3:00 AM	1	39	9	0	1	3	0	2	5	1	1	2	1	65
4:00 AM	2	115	17	0	0	7	1	3	3	2	1	6	0	157
5:00 AM	3	271	67	0	0	9	8	1	13	3	5	6	3	389
6:00 AM	12	609	145	0	1	24	27	2	26	11	2	18	37	914
7:00 AM	13	708	184	2	3	19	23	4	23	25	4	22	53	1083
8:00 AM	8	261	86	0	7	8	7	7	34	8	4	17	18	465
9:00 AM	6	139	51	0	4	7	6	5	26	5	1	10	4	264
10:00 AM	9	138	59	0	5	7	4	5	25	5	4	16	11	288
11:00 AM	3	174	72	0	3	14	5	10	22	1	1	6	4	315
12:00 PM	3	162	61	0	4	16	3	6	22	4	1	14	2	298
1:00 PM	7	179	66	0	3	12	4	9	15	2	5	7	10	319
2:00 PM	3	225	75	0	3	11	4	11	18	5	2	11	10	378
3:00 PM	7	308	81	0	5	8	5	8	15	4	3	21	7	472
4:00 PM	4	263	60	0	6	12	3	3	11	2	3	12	3	382
5:00 PM	3	222	37	0	4	12	3	8	7	4	2	5	5	312
6:00 PM	1	140	30	0	0	9	1	4	3	0	1	3	0	192
7:00 PM	1	103	31	0	1	1	0	0	1	1	1	3	0	143
8:00 PM	2	59	18	0	0	3	0	0	2	0	1	2	0	87
9:00 PM	2	55	12	0	1	6	0	2	1	1	1	4	1	86
10:00 PM	1	66	15	0	0	0	0	0	4	1	2	4	0	93
11:00 PM	3	28	5	0	0	2	0	1	4	1	1	1	0	46
<b>TOTAL</b>	<b>97</b>	<b>4336</b>	<b>1192</b>	<b>2</b>	<b>51</b>	<b>195</b>	<b>104</b>	<b>93</b>	<b>283</b>	<b>86</b>	<b>49</b>	<b>198</b>	<b>169</b>	<b>6855</b>
Percent by Class	1.4%	63.3%	17.4%	0.0%	0.7%	2.8%	1.5%	1.4%	4.1%	1.3%	0.7%	2.9%	2.5%	100.0%

**Bolduc,  
Smiley &  
Associates, Inc.**

VEHICLE CLASSIFICATION ON BUCKEYE  
 WEST OF 75TH AVENUE (EASTBOUND)  
 DATE COUNTED 3/13/01

**APPENDIX B**

**EXISTING CAPACITY ANALYSIS**



Flow Rates:

Total in Lane	421	201	193	419
Left-Turn	26	66	8	77
Right-Turn	90	26	19	23
Prop. Left-Turns	0.1	0.3	0.0	0.2
Prop. Right-Turns	0.2	0.1	0.1	0.1
Prop. Heavy Vehicle	0.2	0.2	0.2	0.2
Geometry Group	1	1	1	1
Adjustments Table 10-40:				
hLT-adj	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7
hadj, computed	0.2	0.3	0.3	0.3

Worksheet 4 - Departure Headway and Service

Time \_\_\_\_\_

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate	421		201		193		419	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.37		0.18		0.17		0.37	
hd, final value	7.08		7.86		7.86		7.19	
x, final value	0.83		0.44		0.42		0.84	
Move-up time, m		2.0		2.0		2.0		2.0
Service Time	5.1		5.9		5.9		5.2	

Worksheet 5 - Capacity and Level of

Service \_\_\_\_\_

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	421		201		193		419	
Service Time	5.1		5.9		5.9		5.2	
Utilization, x	0.83		0.44		0.42		0.84	
Dep. headway, hd	7.08		7.86		7.86		7.19	
Capacity	493		405		404		487	
Delay	40.99		16.97		16.55		43.22	
LOS	E		C		C		E	
Approach:								
Delay		40.99		16.97		16.55		43.22
LOS		E		C		C		E
Intersection Delay	34.01		Intersection LOS		D			



Flow Rates:

Total in Lane	215	462	413	274
Left-Turn	106	18	10	35
Right-Turn	6	142	13	32
Prop. Left-Turns	0.5	0.0	0.0	0.1
Prop. Right-Turns	0.0	0.3	0.0	0.1
Prop. Heavy Vehicle	0.2	0.2	0.2	0.2
Geometry Group	1	1	1	1
Adjustments Table 10-40:				
hLT-adj	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7
hadj, computed	0.4	0.1	0.3	0.3

Worksheet 4 - Departure Headway and Service

Time \_\_\_\_\_

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate	215		462		413		274	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.19		0.41		0.37		0.24	
hd, final value	9.20		7.95		8.24		8.78	
x, final value	0.55		1.02		0.94		0.67	
Move-up time, m		2.0		2.0		2.0		2.0
Service Time	7.2		5.9		6.2		6.8	

Worksheet 5 - Capacity and Level of

Service \_\_\_\_\_

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	215		462		413		274	
Service Time	7.2		5.9		6.2		6.8	
Utilization, x	0.55		1.02		0.94		0.67	
Dep. headway, hd	9.20		7.95		8.24		8.78	
Capacity	375		462		435		398	
Delay	23.26		151.31		89.91		28.93	
LOS	C		F		F		D	
Approach:								
Delay		23.26		151.31		89.91		28.93
LOS		C		F		F		D
Intersection Delay	87.95		Intersection LOS		F			

**APPENDIX C**

**FUTURE CAPACITY ANALYSIS**



Lane Group	EBL	EBI	EBR	WBL	WBI	WBR	NBL	NBI	NBR	SBL	SBI	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.980			0.980			0.964			0.945		
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2973	0	1517	2973	0	1517	1539	0	1517	1509	0
Flt Permitted	0.563			0.144			0.392			0.676		
Satd. Flow (perm)	899	2973	0	230	2973	0	626	1539	0	1079	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			41			30			56	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	35	1067	163	75	269	41	52	96	30	33	226	130
Peak Hour Factor	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. Flow (vph)	35	1067	163	75	269	41	52	96	30	33	226	130
Lane Group Flow (vph)	35	1230	0	75	310	0	52	126	0	33	356	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2		2		6
Permitted Phases	4			8			2			6		
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	33.0	33.0	0.0	33.0	33.0	0.0	22.0	22.0	0.0	22.0	22.0	0.0
Total Split (%)	60%	60%	0%	60%	60%	0%	40%	40%	0%	40%	40%	0%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	29.0	29.0		29.0	29.0		18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.53	0.53		0.53	0.53		0.33	0.33		0.33	0.33	
v/c Ratio	0.07	0.77		0.62	0.20		0.25	0.24		0.09	0.67	
Uniform Delay, d1	6.4	9.9		9.1	5.9		13.6	10.1		12.8	13.2	
Delay	6.7	10.5		26.7	6.0		14.7	11.0		13.3	15.2	
LOS	A	B		C	A		B	B		B	B	
Approach Delay		10.4			10.0			12.1			15.0	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	5	145		15	21		12	0		7	75	
Queue Length 95th (ft)	16	220		#78	38		36	50		23	#157	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%); Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 55

Control Type: Pretimed

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 11.3

Intersection LOS: B

Intersection Capacity Utilization 68.7%

ICU Level of Service B

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak

 ø2	 ø4
 ø6	 ø8



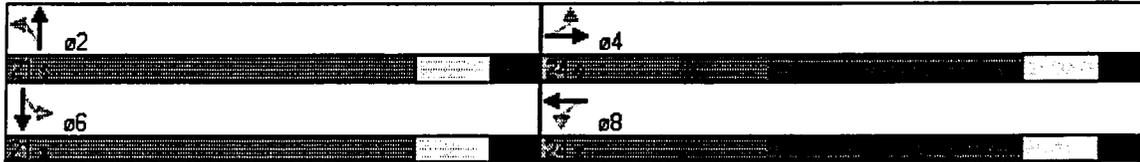
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEL	SBT	SEB
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>		0.969			0.982			0.970			0.959	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2940	0	1517	2979	0	1517	1549	0	1517	1531	0
Fit Permitted	0.200			0.574			0.636			0.567		
Satd. Flow (perm)	319	2940	0	916	2979	0	1015	1549	0	905	1531	0
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		59			42			32			48	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	37	231	59	53	889	120	198	212	53	48	141	53
Peak Hour Factor	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. Flow (vph)	37	231	59	53	889	120	198	212	53	48	141	53
Lane Group Flow (vph)	37	290	0	53	1009	0	198	265	0	48	194	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	24.0	24.0	0.0	24.0	24.0	0.0	21.0	21.0	0.0	21.0	21.0	0.0
Total Split (%)	53%	53%	0%	53%	53%	0%	47%	47%	0%	47%	47%	0%
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)	20.0	20.0		20.0	20.0		17.0	17.0		17.0	17.0	
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.38	0.38		0.38	0.38	
v/c Ratio	0.26	0.22		0.13	0.75		0.52	0.44		0.14	0.32	
Uniform Delay, d1	7.8	6.0		7.4	9.9		10.8	9.0		9.2	7.3	
Delay	9.4	6.2		7.8	10.9		11.8	9.6		9.7	7.9	
LOS	A	A		A	B		B	A		A	A	
Approach Delay		6.6			10.7			10.6			8.2	
Approach LOS		A			B			B			A	
Queue Length 50th (ft)	6	17		7	100		38	37		8	22	
Queue Length 95th (ft)	23	34		23	159		87	80		24	53	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\Li\00c69\00c69EXamMC85.sy6  
 bolducphoe-ix51

Area Type: Other  
Cycle Length: 45  
Actuated Cycle Length: 45  
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
Natural Cycle: 45  
Control Type: Pretimed  
Maximum v/c Ratio: 0.75  
Intersection Signal Delay: 9.8  
Intersection Capacity Utilization 60.0%  
Intersection LOS: A  
ICU Level of Service B

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak



**APPENDIX C**

**FUTURE CAPACITY ANALYSIS**



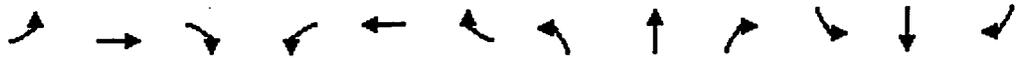
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.965			0.967			0.981			0.989	
Frt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2927	0	1517	2934	0	1517	2976	0	1517	3000	0
Frt Permitted	0.601			0.230			0.311			0.530		
Satd. Flow (perm)	960	2927	0	367	2934	0	497	2976	0	846	3000	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		61			53			25			12	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	50	490	150	110	180	50	20	270	40	130	510	40
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	516	158	116	189	53	21	284	42	137	537	42
Lane Group Flow (vph)	53	674	0	116	242	0	21	326	0	137	579	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	22.0	0.0	10.0	22.0	0.0	10.0	23.0	0.0	10.0	23.0	0.0
Total Split (%)	15%	34%	0%	15%	34%	0%	15%	35%	0%	15%	35%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	24.0	18.0		24.0	18.0		25.0	19.0		25.0	19.0	
Actuated g/C Ratio	0.37	0.28		0.37	0.28		0.38	0.29		0.38	0.29	
v/c Ratio	0.13	0.79		0.48	0.28		0.07	0.37		0.35	0.65	
Uniform Delay, d1	11.0	19.6		11.6	14.2		10.2	16.7		11.1	19.6	
Delay	11.3	22.4		12.1	14.5		10.4	17.0		11.7	20.1	
LOS	B	C		B	B		B	B		B	C	
Approach Delay		21.6			13.7			16.6			18.5	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	12	117		27	29		4	45		31	95	
Queue Length 95th (ft)	30	#197		56	56		15	75		63	143	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
 Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 65  
 Control Type: Pretimed  
 Maximum V/C Ratio: 0.79  
 Intersection Signal Delay: 18.4 Intersection LOS: B  
 Intersection Capacity Utilization 58.6% ICU Level of Service A  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Van Buren Street & 75th Avenue AM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00		0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.991			0.952			0.993			0.977	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3006	0	1517	2888	0	1517	3012	0	1517	2964	0
Flt Permitted	0.222			0.632			0.450			0.230		
Satd. Flow (perm)	354	3006	0	1009	2888	0	718	3012	0	367	2964	0
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		9			118			7			32	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	170	170	10	30	490	230	20	630	30	60	330	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	179	179	11	32	516	242	21	663	32	63	347	63
Lane Group Flow (vph)	179	190	0	32	758	0	21	695	0	63	410	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	22.0	0.0	10.0	22.0	0.0	10.0	23.0	0.0	10.0	23.0	0.0
Total Split (%)	15%	34%	0%	15%	34%	0%	15%	35%	0%	15%	35%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	24.0	18.0		24.0	18.0		25.0	19.0		25.0	19.0	
Actuated g/C Ratio	0.37	0.28		0.37	0.28		0.38	0.29		0.38	0.29	
v/c Ratio	0.75	0.23		0.08	0.86		0.06	0.79		0.26	0.46	
Uniform Delay, d1	12.2	17.2		10.8	18.7		10.2	20.9		10.5	17.2	
Delay	25.5	17.5		11.1	24.1		10.4	23.4		10.8	17.6	
LOS	C	B		B	C		B	C		B	B	
Approach Delay		21.4			23.6			23.0			16.7	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	44	27		7	126		4	122		14	59	
Queue Length 95th (ft)	#116	52		21	#223		15	#189		33	94	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
Cycle Length: 65  
Actuated Cycle Length: 65  
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
Natural Cycle: 65  
Control Type: Pretimed  
Maximum v/c Ratio: 0.86  
Intersection Signal Delay: 21.7 Intersection LOS: C  
Intersection Capacity Utilization 68.1% ICU Level of Service B  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 2: Van Buren Street & 75th Avenue PM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frnt		0.965			0.972			0.982			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2927	0	1517	2949	0	1517	2979	0	1517	3000	0
Flt Permitted	0.511			0.100			0.160			0.234		
Satd. Flow (perm)	816	2927	0	160	2949	0	255	2979	0	374	3000	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46			34			14			9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	70	820	250	180	300	70	30	450	60	210	860	70
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	74	863	263	189	316	74	32	474	63	221	905	74
Lane Group Flow (vph)	74	1126	0	189	390	0	32	537	0	221	979	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	41.0	0.0	13.0	44.0	0.0	10.0	29.0	0.0	17.0	36.0	0.0
Total Split (%)	10%	41%	0%	13%	44%	0%	10%	29%	0%	17%	36%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	43.0	37.0		49.0	40.0		31.0	25.0		42.0	32.0	
Actuated g/C Ratio	0.43	0.37		0.49	0.40		0.31	0.25		0.42	0.32	
v/c Ratio	0.19	1.01		0.94	0.33		0.21	0.71		0.72	1.01	
Uniform Delay, d1	13.4	30.2		20.0	18.7		17.8	33.2		19.7	33.6	
Delay	13.7	54.1		59.7	19.0		18.2	33.7		24.6	59.2	
LOS	B	D		E	B		B	C		C	E	
Approach Delay		51.6			32.3			32.8			52.8	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)	24	~372		77	80		12	154		93	~333	
Queue Length 95th (ft)	48	#522		#215	117		30	213		#163	#475	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\Li\00c69\00c69X5VBYr2020.sy6  
 bolducphoe-ix51

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Pretimed

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 45.8 Intersection LOS: D

Intersection Capacity Utilization 86.8% ICU Level of Service D

Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 1: Van Buren Street & 75th Avenue AM Peak





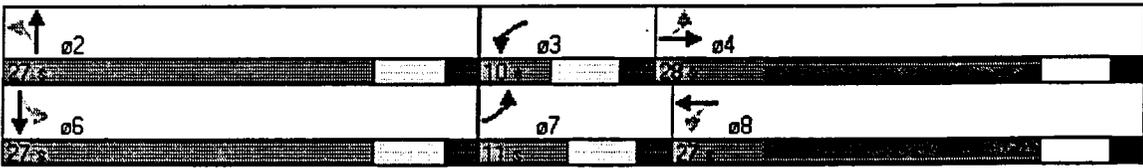
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕	↗	↘	↕	↗	↘	↕	↗	↘	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00		0.95	1.00		0.95	1.00		0.95
Fr <sub>t</sub>		0.990			0.952			0.995			0.979	
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3003	0	1517	2888	0	1517	3018	0	1517	2970	0
Fl <sub>t</sub> Permitted	0.167			0.560			0.281			0.174		
Satd. Flow (perm)	267	3003	0	894	2888	0	449	3018	0	278	2970	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			30			6			31	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	290	280	20	50	810	380	30	1050	40	100	560	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	305	295	21	53	853	400	32	1105	42	105	589	95
Lane Group Flow (vph)	305	316	0	53	1253	0	32	1147	0	105	684	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		22.0	22.0		22.0	22.0	
Total Split (s)	11.0	28.0	0.0	10.0	27.0	0.0	27.0	27.0	0.0	27.0	27.0	0.0
Total Split (%)	17%	43%	0%	15%	42%	0%	42%	42%	0%	42%	42%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Act Effct Green (s)	31.0	24.0		29.0	23.0		23.0	23.0		23.0	23.0	
Actuated g/C Ratio	0.48	0.37		0.45	0.35		0.35	0.35		0.35	0.35	
v/c Ratio	1.16	0.28		0.12	1.20		0.20	1.07		1.07	0.64	
Uniform Delay, d <sub>1</sub>	11.5	13.8		7.8	20.4		14.6	20.9		20.9	16.6	
Delay	96.0	14.0		8.1	102.3		15.8	60.5		110.5	17.1	
LOS	F	B		A	F		B	E		F	B	
Approach Delay		54.3			98.5			59.3			29.5	
Approach LOS		D			F			E			C	
Queue Length 50th (ft)	~104	43		10	~325		9	~254		~47	103	
Queue Length 95th (ft)	#246	71		24	#446		29	#392		#134	152	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\LI\00c69\00c69X5VB\Yr2020.sy6  
 bolducphoe-lx51

Area Type: Other  
 Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 65  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.20  
 Intersection Signal Delay: 65.6 Intersection LOS: E  
 Intersection Capacity Utilization 104.3% ICU Level of Service F  
 Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Van Buren Street & 75th Avenue PM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEL	SBT	SBR
Lane Configurations	↖	↑↑	↗	↖	↑↑	↗	↖	↑↑	↗	↖	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850			0.981			0.989
Frt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	2976	0	1517	3000	0
Frt Permitted	0.633			0.350			0.311			0.530		
Satd. Flow (perm)	1011	3034	1357	559	3034	1357	497	2976	0	846	3000	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			158			53			25			12
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	50	490	150	110	180	50	20	270	40	130	510	40
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	516	158	116	189	53	21	284	42	137	537	42
Lane Group Flow (vph)	53	516	158	116	189	53	21	326	0	137	579	0
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0		10.0	22.0	
Total Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	23.0	0.0	10.0	23.0	0.0
Total Split (%)	15%	34%	34%	15%	34%	34%	15%	35%	0%	15%	35%	0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Act Effct Green (s)	24.0	18.0	18.0	24.0	18.0	18.0	25.0	19.0		25.0	19.0	
Actuated g/C Ratio	0.37	0.28	0.28	0.37	0.28	0.28	0.38	0.29		0.38	0.29	
v/c Ratio	0.13	0.61	0.32	0.39	0.23	0.13	0.07	0.37		0.35	0.65	
Uniform Delay, d1	11.0	20.5	0.0	11.5	18.1	0.0	10.2	16.7		11.1	19.6	
Delay	11.3	20.9	4.0	12.0	18.4	6.1	10.4	17.0		11.7	20.1	
LOS	B	C	A	B	B	A	B	B		B	C	
Approach Delay		16.5			14.5			16.6			18.5	
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	12	93	0	27	30	0	4	45		31	95	
Queue Length 95th (ft)	30	140	38	56	53	22	15	75		63	143	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

**Intersection Summary**

Area Type: Other  
 Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 0 (0%); Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 65  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.65  
 Intersection Signal Delay: 16.9 Intersection LOS: B  
 Intersection Capacity Utilization 53.5% ICU Level of Service A

Splits and Phases: 1: Van Buren Street & 75th Avenue AM Peak





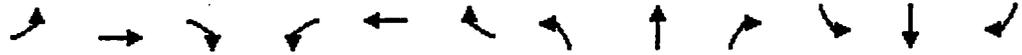
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.993			0.977	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	3012	0	1517	2964	0
Flt Permitted	0.331			0.639			0.443			0.222		
Satd. Flow (perm)	528	3034	1357	1020	3034	1357	707	3012	0	354	2964	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			11			242		7			32	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	170	170	10	30	490	230	20	630	30	60	330	60
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	179	179	11	32	516	242	21	663	32	63	347	63
Lane Group Flow (vph)	179	179	11	32	516	242	21	695	0	63	410	0
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0		10.0	22.0	
Total Split (s)	11.0	23.0	23.0	10.0	22.0	22.0	10.0	22.0	0.0	10.0	22.0	0.0
Total Split (%)	17%	35%	35%	15%	34%	34%	15%	34%	0%	15%	34%	0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Act Effct Green (s)	26.0	19.0	19.0	24.0	18.0	18.0	24.0	18.0		24.0	18.0	
Actuated g/C Ratio	0.40	0.29	0.29	0.37	0.28	0.28	0.37	0.28		0.37	0.28	
v/c Ratio	0.56	0.20	0.03	0.08	0.61	0.44	0.06	0.83		0.26	0.49	
Uniform Delay, d1	11.4	17.3	0.0	10.3	20.5	0.0	10.8	21.8		11.1	18.0	
Delay	12.4	17.5	9.6	10.6	20.9	3.3	11.0	26.3		11.4	18.3	
LOS	B	B	A	B	C	A	B	C		B	B	
Approach Delay		14.8			15.1			25.9			17.4	
Approach LOS		B			B			C			B	
Queue Length 50th (ft)	42	27	0	7	93	0	5	125		14	61	
Queue Length 95th (ft)	81	50	10	20	140	47	16	#210		34	97	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
 Cycle Length: 65  
 Actuated Cycle Length: 65  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 65  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.83  
 Intersection Signal Delay: 18.8 Intersection LOS: B  
 Intersection Capacity Utilization 60.3% ICU Level of Service B  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Van Buren Street & 75th Avenue PM Peak

 ø1	 ø2	 ø3	 ø4
 ø5	 ø6	 ø7	 ø8

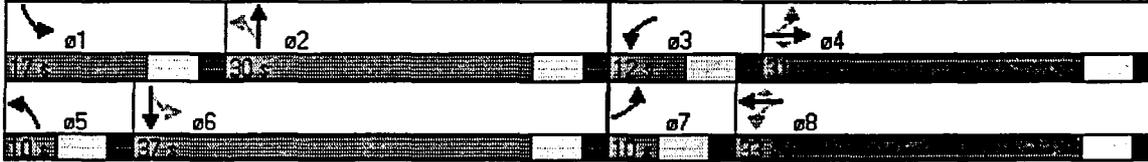


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.982			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	2979	0	1517	3000	0
Flt Permitted	0.556			0.138			0.159			0.272		
Satd. Flow (perm)	888	3034	1357	220	3034	1357	254	2979	0	434	3000	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			183			74		16			11	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	70	820	250	180	300	70	30	450	60	210	860	70
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	74	863	263	189	316	74	32	474	63	221	905	74
Lane Group Flow (vph)	74	863	263	189	316	74	32	537	0	221	979	0
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0		10.0	22.0	
Total Split (s)	10.0	31.0	31.0	12.0	33.0	33.0	10.0	30.0	0.0	17.0	37.0	0.0
Total Split (%)	11%	34%	34%	13%	37%	37%	11%	33%	0%	19%	41%	0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Act Effct Green (s)	33.0	27.0	27.0	37.0	29.0	29.0	32.0	26.0		43.0	33.0	
Actuated g/C Ratio	0.37	0.30	0.30	0.41	0.32	0.32	0.36	0.29		0.48	0.37	
v/c Ratio	0.20	0.95	0.49	0.92	0.32	0.15	0.18	0.62		0.61	0.88	
Uniform Delay, d1	15.4	30.8	7.2	16.6	23.0	0.0	13.3	26.8		14.4	26.4	
Delay	15.8	44.9	8.7	54.4	23.4	5.8	13.6	27.2		14.8	31.3	
LOS	B	D	A	D	C	A	B	C		B	C	
Approach Delay		35.2			31.2			26.4			28.3	
Approach LOS		D			C			C			C	
Queue Length 50th (ft)	24	251	33	68	71	0	9	128		74	267	
Queue Length 95th (ft)	51	#375	104	#193	106	29	25	181		124	#389	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

**Intersection Summary**

Area Type: Other  
Cycle Length: 90  
Actuated Cycle Length: 90  
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
Natural Cycle: 90  
Control Type: Pretimed  
Maximum v/c Ratio: 0.95  
Intersection Signal Delay: 30.8 Intersection LOS: C  
Intersection Capacity Utilization 78.4% ICU Level of Service C  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 1: Van Buren Street & 75th Avenue AM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑	↗	↖	↑↑	↗	↖	↑↑	↗	↖	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850			0.995			0.979
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	3018	0	1517	2970	0
Flt Permitted	0.200			0.572			0.294			0.182		
Satd. Flow (perm)	319	3034	1357	913	3034	1357	469	3018	0	291	2970	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			21			40			7			34
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	290	280	20	50	810	380	30	1050	40	100	560	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	305	295	21	53	853	400	32	1105	42	105	589	95
Lane Group Flow (vph)	305	295	21	53	853	400	32	1147	0	105	684	0
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2				6
Permitted Phases	4		4	8		8	2			6		
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	12.0	24.0	24.0	10.0	22.0	22.0	26.0	26.0	0.0	26.0	26.0	0.0
Total Split (%)	20%	40%	40%	17%	37%	37%	43%	43%	0%	43%	43%	0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Act Effct Green (s)	28.0	20.0	20.0	24.0	18.0	18.0	22.0	22.0		22.0	22.0	
Actuated g/C Ratio	0.47	0.33	0.33	0.40	0.30	0.30	0.37	0.37		0.37	0.37	
v/c Ratio	0.99	0.29	0.05	0.12	0.94	0.92	0.19	1.03		0.98	0.62	
Uniform Delay, d1	10.6	14.8	0.0	8.1	20.4	18.2	12.9	18.8		18.8	14.7	
Delay	52.1	15.0	6.8	8.3	33.3	38.7	14.0	49.4		88.8	15.1	
LOS	D	B	A	A	C	D	B	D		F	B	
Approach Delay		33.0			33.9			48.4			24.9	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)	66	40	0	9	156	125	8	~211		36	90	
Queue Length 95th (ft)	#210	67	12	24	#265	#283	26	#358		#124	136	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
 Cycle Length: 60  
 Actuated Cycle Length: 60  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 60  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.03  
 Intersection Signal Delay: 36.3 Intersection LOS: D  
 Intersection Capacity Utilization 91.5% ICU Level of Service E  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Van Buren Street & 75th Avenue PM Peak

 2 23	 3 10	 4 23
 6 23	 7 12	 8 23

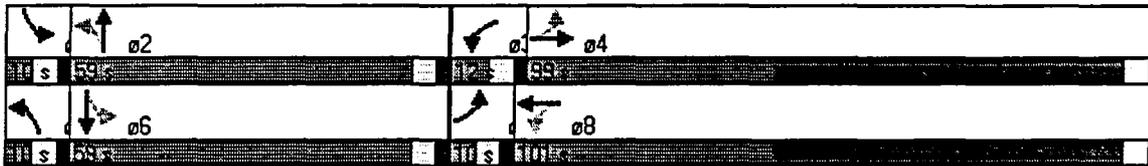


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.980			0.960			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2973	0	1517	2973	0	1517	1533	0	1517	1509	0
Flt Permitted	0.443			0.041			0.073			0.499		
Satd. Flow (perm)	707	2973	0	65	2973	0	117	1533	0	797	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			15			10			17	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	60	1550	240	110	390	60	80	140	50	50	330	190
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Lane Group Flow (vph)	63	1885	0	116	474	0	84	200	0	53	547	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	99.0	0.0	12.0	101.0	0.0	10.0	59.0	0.0	10.0	59.0	0.0
Total Split (%)	6%	55%	0%	7%	56%	0%	6%	33%	0%	6%	33%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	101.0	95.0		104.9	97.0		61.0	55.1		61.0	55.1	
Actuated g/C Ratio	0.56	0.53		0.58	0.54		0.34	0.31		0.34	0.31	
v/c Ratio	0.15	1.20		1.14	0.29		0.98	0.42		0.18	1.16	
Uniform Delay, d1	15.5	42.1		42.9	21.9		41.1	47.1		38.1	60.3	
Delay	15.7	125.3		134.7	22.1		109.2	47.7		38.8	128.4	
LOS	B	F		F	C		F	D		D	F	
Approach Delay		121.7			44.2			65.9			120.5	
Approach LOS		F			D			E			F	
Queue Length 50th (ft)	31	~1412		~115	153		67	176		42	~747	
Queue Length 95th (ft)	55	#926		#263	193		#184	260		78	#994	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
Cycle Length: 180  
Actuated Cycle Length: 180  
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
Natural Cycle: 180  
Control Type: Pretimed  
Maximum v/c Ratio: 1.20  
Intersection Signal Delay: 103.5 Intersection LOS: F  
Intersection Capacity Utilization 108.0% ICU Level of Service F  
~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak





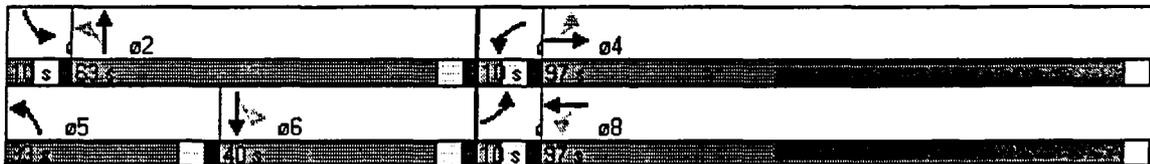
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.969			0.982			0.969			0.959	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2940	0	1517	2979	0	1517	1547	0	1517	1531	0
Flt Permitted	0.045			0.442			0.153			0.396		
Satd. Flow (perm)	72	2940	0	706	2979	0	244	1547	0	632	1531	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			13			8			10	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	60	340	90	80	1290	180	290	310	80	70	210	80
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Lane Group Flow (vph)	63	453	0	84	1547	0	305	410	0	74	305	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	97.0	0.0	10.0	97.0	0.0	33.0	63.0	0.0	10.0	40.0	0.0
Total Split (%)	6%	54%	0%	6%	54%	0%	18%	35%	0%	6%	22%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	99.0	93.1		99.0	93.1		68.9	59.0		41.9	36.0	
Actuated g/C Ratio	0.55	0.52		0.55	0.52		0.38	0.33		0.23	0.20	
v/c Ratio	0.72	0.30		0.20	1.00		1.02	0.80		0.42	0.97	
Uniform Delay, d1	17.5	23.2		17.5	43.1		49.1	53.9		38.2	69.1	
Delay	45.8	23.3		17.9	58.8		89.4	56.3		42.6	97.4	
LOS	D	C		B	E		F	E		D	F	
Approach Delay		26.1			56.7			70.4			86.7	
Approach LOS		C			E			E			F	
Queue Length 50th (ft)	32	148		44	~946		~313	436		57	346	
Queue Length 95th (ft)	#113	188		74	#540		#523	585		98	#562	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\li\00c69\00c69ExMC85Yr2010.sy6  
 bolducphoe-ix51

Area Type: Other  
 Cycle Length: 180  
 Actuated Cycle Length: 180  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 180  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.02  
 Intersection Signal Delay: 58.3 Intersection LOS: E  
 Intersection Capacity Utilization 94.1% ICU Level of Service E  
 Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.980			0.962			0.945	
Frt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2973	0	1517	2973	0	1517	1536	0	1517	1509	0
Frt Permitted	0.299			0.065			0.103			0.365		
Satd. Flow (perm)	477	2973	0	104	2973	0	164	1536	0	583	1509	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18			18			13			23	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	80	2340	360	170	590	90	120	210	70	80	500	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Lane Group Flow (vph)	84	2842	0	179	716	0	126	295	0	84	831	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	65.0	0.0	11.0	66.0	0.0	10.0	43.0	0.0	11.0	44.0	0.0
Total Split (%)	8%	50%	0%	8%	51%	0%	8%	33%	0%	8%	34%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	67.0	61.0		69.0	62.0		45.0	39.0		47.1	40.0	
Actuated g/C Ratio	0.52	0.47		0.53	0.48		0.35	0.30		0.36	0.31	
v/c Ratio	0.29	2.02		1.37	0.50		1.06	0.63		0.32	1.73	
Uniform Delay, d1	13.8	34.1		26.5	22.7		29.3	37.3		26.1	42.8	
Delay	14.1	282.8		169.9	23.0		107.0	38.2		26.7	243.1	
LOS	B	F		F	C		F	D		C	F	
Approach Delay		275.1			52.4			58.8			223.3	
Approach LOS		F			D			E			F	
Queue Length 50th (ft)	32	~1991		~155	207		~72	199		46	~1030	
Queue Length 95th (ft)	59	#2114		#310	264		#205	299		84	#1282	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\Li\00c69\00c69ExMC85Yr2020.sy6  
 bolducphoe-ix51

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 130

Control Type: Pretimed

Maximum v/c Ratio: 2.02

Intersection Signal Delay: 209.6

Intersection LOS: F

Intersection Capacity Utilization 156.7%

ICU Level of Service H

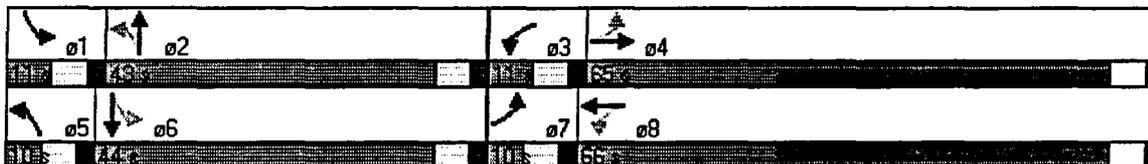
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak



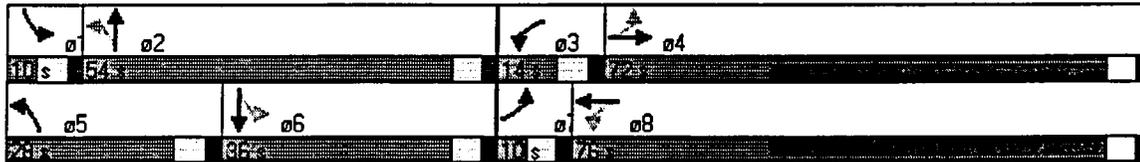


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15	9	15	15	9	15	15	9	15	15	9	15
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.970		0.982		0.970		0.958					
Flt Protected	0.950		0.950		0.950		0.950		0.950			
Satd. Flow (prot)	1517	2943	0	1517	2979	0	1517	1549	0	1517	1530	0
Flt Permitted	0.059		0.285		0.111		0.125					
Satd. Flow (perm)	94	2943	0	455	2979	0	177	1549	0	200	1530	0
Right Turn on Red	Yes		Yes		Yes		Yes					
Satd. Flow (RTOR)	28		14		9		12					
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	50			50			50			50		
Link Distance (ft)	2832			2688			3400			2712		
Travel Time (s)	38.6			36.7			46.4			37.0		
Volume (vph)	90	510	130	120	1950	270	440	470	120	110	310	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Lane Group Flow (vph)	95	674	0	126	2337	0	463	621	0	116	452	0
Turn Type	pm+pt		pm+pt		pm+pt		pm+pt					
Protected Phases	7	4	3	8	5	2	1	6				
Permitted Phases	4		8		2		6					
Minimum Split (s)	10.0	22.0	10.0	22.0	10.0	22.0	10.0	22.0	10.0	22.0	10.0	22.0
Total Split (s)	10.0	72.0	0.0	14.0	76.0	0.0	28.0	54.0	0.0	10.0	36.0	0.0
Total Split (%)	7%	48%	0%	9%	51%	0%	19%	36%	0%	7%	24%	0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Act Effct Green (s)	74.0	68.0	82.1	72.0	60.0	50.0	38.0	32.0				
Actuated g/C Ratio	0.49	0.45	0.55	0.48	0.40	0.33	0.25	0.21				
v/c Ratio	0.92	0.50	0.39	1.63	1.62	1.19	1.13	1.35				
Uniform Delay, d1	24.7	27.6	16.8	38.6	45.1	49.1	34.8	56.9				
Delay	77.3	27.9	17.0	230.1	231.8	129.4	131.1	177.9				
LOS	E	C	B	F	F	F	F	F				
Approach Delay	34.0		219.2		173.1		168.3					
Approach LOS	C		F		F		F					
Queue Length 50th (ft)	50	232	59	~1739	~611	~726	~86	~570				
Queue Length 95th (ft)	#171	291	96	#1865	#821	#971	#220	#794				
Internal Link Dist (ft)	2752		2608		3320		2632					
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

**Intersection Summary**

Area Type: Other  
 Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 150  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.63  
 Intersection Signal Delay: 173.9 Intersection LOS: F  
 Intersection Capacity Utilization 134.9% ICU Level of Service H  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.980			0.980			0.960			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2973	0	1517	2973	0	1517	2912	0	1517	2867	0
Flt Permitted	0.456			0.050			0.182			0.549		
Satd. Flow (perm)	728	2973	0	80	2973	0	291	2912	0	877	2867	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			24			34			76	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	60	1550	240	110	390	60	80	140	50	50	330	190
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Lane Group Flow (vph)	63	1885	0	116	474	0	84	200	0	53	547	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	84.0	0.0	10.0	84.0	0.0	10.0	26.0	0.0	10.0	26.0	0.0
Total Split (%)	8%	65%	0%	8%	65%	0%	8%	20%	0%	8%	20%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	86.1	80.0		86.1	80.0		28.0	22.0		28.0	22.0	
Actuated g/C Ratio	0.66	0.62		0.66	0.62		0.22	0.17		0.22	0.17	
v/c Ratio	0.12	1.03		0.97	0.26		0.71	0.38		0.24	1.00	
Uniform Delay, d1	6.5	24.6		26.7	10.8		39.2	39.5		38.3	46.5	
Delay	6.6	47.1		84.5	10.9		54.8	39.9		39.1	73.8	
LOS	A	D		F	B		D	D		D	E	
Approach Delay		45.8			25.4			44.3			70.8	
Approach LOS		D			C			D			E	
Queue Length 50th (ft)	16	~885		55	85		57	64		35	209	
Queue Length 95th (ft)	31	#422		#182	114		#109	102		71	#341	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 130  
 Control Type: Pretimed  
 Maximum V/c Ratio: 1.03  
 Intersection Signal Delay: 46.5 Intersection LOS: D  
 Intersection Capacity Utilization 93.6% ICU Level of Service E  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak

 ø1	 ø2	 ø3	 ø4
10s	26s	10s	8s
 ø5	 ø6	 ø7	 ø8
10s	26s	10s	8s



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	INBL	NEI	INBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.969			0.982			0.969			0.959	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2940	0	1517	2979	0	1517	2940	0	1517	2909	0
Flt Permitted	0.080			0.452			0.354			0.494		
Satd. Flow (perm)	128	2940	0	722	2979	0	565	2940	0	789	2909	0
Right Turn on Red		Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		46			21			29			47	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	60	340	90	80	1290	180	290	310	80	70	210	80
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Lane Group Flow (vph)	63	453	0	84	1547	0	305	410	0	74	305	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	54.0	0.0	10.0	54.0	0.0	16.0	27.0	0.0	10.0	22.0	0.0
Total Split (%)	10%	53%	0%	10%	53%	0%	16%	26%	0%	10%	22%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	56.0	50.0		56.0	50.0		34.0	24.0		24.0	18.0	
Actuated g/C Ratio	0.55	0.49		0.55	0.49		0.33	0.24		0.24	0.18	
v/c Ratio	0.41	0.31		0.19	1.05		1.02	0.57		0.32	0.55	
Uniform Delay, d1	9.2	13.9		9.2	25.6		29.9	31.9		24.3	32.2	
Delay	10.2	14.0		9.4	58.0		74.9	32.3		25.3	32.6	
LOS	B	B		A	E		E	C		C	C	
Approach Delay		13.6			55.5			50.5			31.1	
Approach LOS		B			E			D			C	
Queue Length 50th (ft)	16	80		22	~578		~168	115		33	78	
Queue Length 95th (ft)	38	114		44	#412		#378	166		68	122	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
 Cycle Length: 102  
 Actuated Cycle Length: 102  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 110  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.05  
 Intersection Signal Delay: 44.9 Intersection LOS: D  
 Intersection Capacity Utilization 86.1% ICU Level of Service D  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak

 ø1	 ø2	 ø3	 ø4
 ø5	 ø6	 ø7	 ø8



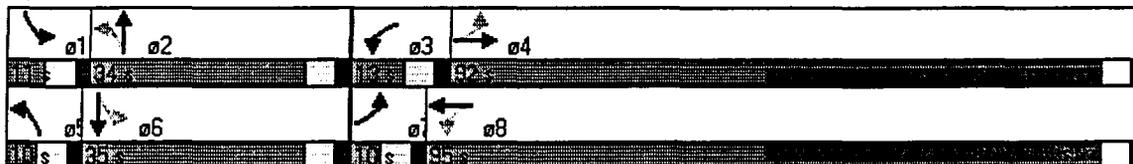
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Fr		0.980			0.980			0.962			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2973	0	1517	2973	0	1517	2918	0	1517	2867	0
Flt Permitted	0.342			0.044			0.133			0.418		
Satd. Flow (perm)	546	2973	0	70	2973	0	212	2918	0	667	2867	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			21			27			70	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	80	2340	360	170	590	90	120	210	70	80	500	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Lane Group Flow (vph)	84	2842	0	179	716	0	126	295	0	84	831	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	92.0	0.0	13.0	95.0	0.0	10.0	34.0	0.0	11.0	35.0	0.0
Total Split (%)	7%	61%	0%	9%	63%	0%	7%	23%	0%	7%	23%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	94.1	88.1		100.1	91.1		36.0	30.0		38.0	31.1	
Actuated g/C Ratio	0.63	0.59		0.67	0.61		0.24	0.20		0.25	0.21	
v/c Ratio	0.22	1.62		1.35	0.40		1.22	0.49		0.40	1.28	
Uniform Delay, d1	8.7	30.6		38.9	14.7		46.4	48.0		41.9	53.0	
Delay	8.8	226.3		175.5	14.9		158.3	48.5		43.3	157.3	
LOS	A	F		F	B		F	D		D	F	
Approach Delay		220.1			47.0			81.3			146.8	
Approach LOS		F			D			F			F	
Queue Length 50th (ft)	27	~2113		~185	176		~107	121		64	~513	
Queue Length 95th (ft)	47	#2224		#347	220		#244	170		112	#650	
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)		5%										
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\Li\00c69\00c69X5MC85Yr2020.sy6  
 bolducphoe-lx51

Area Type: Other  
 Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 150  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.62  
 Intersection Signal Delay: 165.7 Intersection LOS: F  
 Intersection Capacity Utilization 134.7% ICU Level of Service H  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak





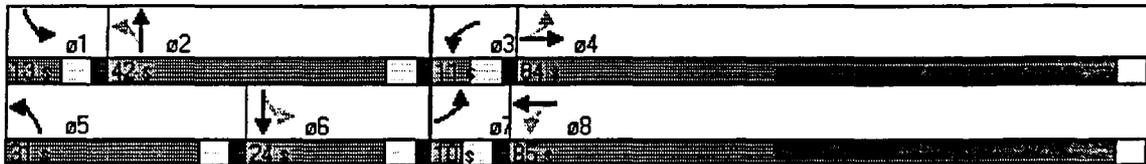
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.970			0.982			0.970			0.958	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	2943	0	1517	2979	0	1517	2943	0	1517	2906	0
Flt Permitted	0.050			0.326			0.167			0.357		
Satd. Flow (perm)	80	2943	0	521	2979	0	267	2943	0	570	2906	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			16			20			31	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	90	510	130	120	1950	270	440	470	120	110	310	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Lane Group Flow (vph)	95	674	0	126	2337	0	463	621	0	116	452	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	84.0	0.0	11.0	85.0	0.0	31.0	42.0	0.0	13.0	24.0	0.0
Total Split (%)	7%	56%	0%	7%	57%	0%	21%	28%	0%	9%	16%	0%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lead/Lag	Lead	Lag										
Lead-Lag Optimize?	Yes	Yes										
Act Effct Green (s)	86.0	80.0		88.1	81.0		51.0	38.0		29.0	20.0	
Actuated g/C Ratio	0.57	0.53		0.59	0.54		0.34	0.25		0.19	0.13	
v/c Ratio	0.92	0.43		0.36	1.45		1.47	0.82		0.69	1.09	
Uniform Delay, d1	26.0	20.0		12.7	34.1		44.7	50.9		37.4	60.1	
Delay	77.2	20.2		13.1	190.3		199.2	52.5		46.6	112.5	
LOS	E	C		B	F		F	D		D	F	
Approach Delay		27.2			181.3			115.1			99.0	
Approach LOS		C			F			F			F	
Queue Length 50th (ft)	50	194		51	~1641		~579	294		81	~247	
Queue Length 95th (ft)	#171	243		82	#1767		#793	372		#152	#365	
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\LI\00c69\00c69X5MC85Yr2020.sy6  
 bolducphoe-lx51

Area Type: Other  
 Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 150  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.47  
 Intersection Signal Delay: 132.8 Intersection LOS: F  
 Intersection Capacity Utilization 123.1% ICU Level of Service H  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak



Lanes, Volumes, Timings  
 MC 85 & 75th Avenue Alternative 2b, Year 2010, AM Peak

08/24/2001



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.484			0.091			0.419			0.659		
Satd. Flow (perm)	773	3034	1357	145	3034	1357	669	3034	1357	1052	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			253			63			53			200
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	60	1550	240	110	390	60	80	140	50	50	330	190
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Lane Group Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Turn Type	pm+pt		Perm									
Protected Phases	7	4		3	6		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	48.0	48.0	10.0	48.0	48.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (%)	11%	53%	53%	11%	53%	53%	11%	24%	24%	11%	24%	24%
Maximum Green (s)	4.0	42.0	42.0	4.0	42.0	42.0	4.0	16.0	16.0	4.0	16.0	16.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	50.0	44.0	44.0	50.0	44.0	44.0	24.0	18.0	18.0	24.0	18.0	18.0
Actuald g/C Ratio	0.56	0.49	0.49	0.56	0.49	0.49	0.27	0.20	0.20	0.27	0.20	0.20
v/c Ratio	0.13	1.10	0.32	0.67	0.28	0.09	0.36	0.24	0.17	0.17	0.57	0.46
Uniform Delay, d1	7.6	23.0	0.0	8.2	13.6	0.0	22.7	30.2	0.0	22.2	32.5	0.0
Delay	7.8	73.6	1.9	21.9	13.8	3.5	23.5	30.6	9.2	22.7	32.9	5.1
LOS	A	E	A	C	B	A	C	C	A	C	C	A
Approach Delay		62.2			14.3			24.5			22.7	
Approach LOS		E			B			C			C	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 90



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NET	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↖	↘	↗	↖	↘	↗	↖	↘	↗	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.098			0.515			0.529			0.518		
Satd. Flow (perm)	158	3034	1357	822	3034	1357	845	3034	1357	827	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95			189			84			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	60	340	90	80	1290	180	290	310	80	70	210	80
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Lane Group Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Turn Type	pm+pt		Perm									
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	45.0	45.0	10.0	45.0	45.0	12.0	25.0	25.0	10.0	23.0	23.0
Total Split (%)	11%	50%	50%	11%	50%	50%	13%	28%	28%	11%	26%	26%
Maximum Green (s)	4.0	39.0	39.0	4.0	39.0	39.0	6.0	19.0	19.0	4.0	17.0	17.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	47.0	41.0	41.0	47.0	41.0	41.0	29.0	21.0	21.0	25.0	19.0	19.0
Actuated g/C Ratio	0.52	0.46	0.46	0.52	0.46	0.46	0.32	0.23	0.23	0.28	0.21	0.21
v/c Ratio	0.37	0.26	0.14	0.18	0.98	0.26	0.92	0.46	0.22	0.27	0.34	0.24
Uniform Delay, d1	9.0	15.1	0.0	9.0	24.1	0.0	26.5	29.6	0.0	20.5	30.2	0.0
Delay	9.3	15.3	3.3	9.2	40.6	2.4	51.7	30.0	6.9	21.1	30.5	7.3
LOS	A	B	A	A	D	A	D	C	A	C	C	A
Approach Delay		12.4			34.5			36.5			23.5	
Approach LOS		B			C			D			C	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 90  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 90

Lanes, Volumes, Timings  
MC 85 & 75th Avenue Alternative 2b, Year 2010, PM Peak

08/24/2001

Control Type: Pretimed

Maximum v/c Ratio: 0.98

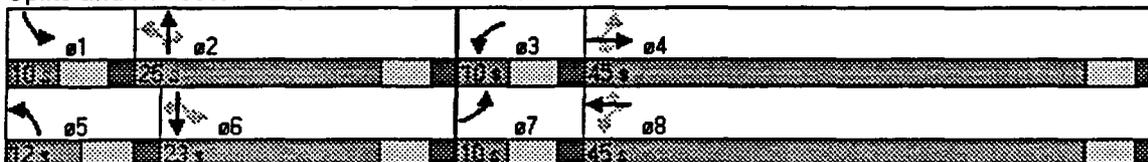
Intersection Signal Delay: 30.2

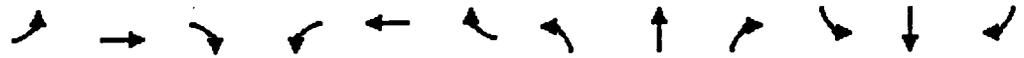
Intersection LOS: C

Intersection Capacity Utilization 77.4%

ICU Level of Service C

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.388			0.044			0.204			0.509		
Satd. Flow (perm)	619	3034	1357	70	3034	1357	326	3034	1357	813	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			157			95			73			305
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	80	2340	360	170	590	90	120	210	70	80	500	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Lane Group Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	92.0	92.0	13.0	95.0	95.0	10.0	34.0	34.0	11.0	35.0	35.0
Total Split (%)	7%	61%	61%	9%	63%	63%	7%	23%	23%	7%	23%	23%
Maximum Green (s)	4.0	86.0	86.0	7.0	89.0	89.0	4.0	28.0	28.0	5.0	29.0	29.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	94.1	88.1	88.1	100.1	91.1	91.1	36.0	30.0	30.0	38.0	31.1	31.1
Actuated g/C Ratio	0.63	0.59	0.59	0.67	0.61	0.61	0.24	0.20	0.20	0.25	0.21	0.21
v/c Ratio	0.20	1.38	0.44	1.35	0.34	0.11	1.00	0.36	0.22	0.35	0.84	0.58
Uniform Delay, d1	8.6	31.0	9.2	38.9	14.6	0.0	48.9	51.8	0.6	41.9	57.1	0.0
Delay	8.8	173.1	9.6	175.5	14.7	2.2	106.6	52.1	10.6	43.2	60.5	5.3
LOS	A	F	A	F	B	A	F	D	B	D	E	A
Approach Delay		147.2			45.5			61.1			40.5	
Approach LOS		F			D			E			D	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 150

MC 85 & 75th Avenue, Alternative 2b, Year 2020, AM Peak

Control Type: Pretimed

Maximum V/c Ratio: 1.38

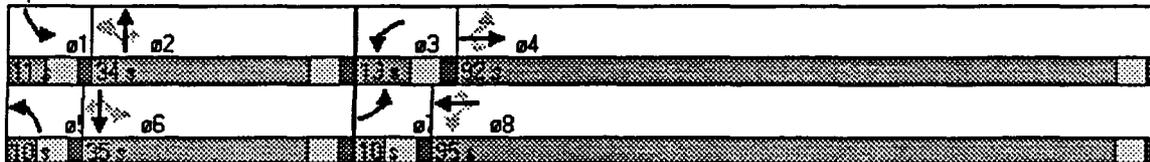
Intersection Signal Delay: 103.6

Intersection LOS: F

Intersection Capacity Utilization: 112.9%

ICU Level of Service G

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak



Lanes, Volumes, Timings  
 MC 85 & 75th Avenue, Alternative 2b, Year 2020, PM Peak

08/24/2001



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	3034	1357	1517	3034	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.050			0.396			0.238			0.471		
Satd. Flow (perm)	80	3034	1357	632	3034	1357	380	3034	1357	752	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			151			126			60
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	90	510	130	120	1950	270	440	470	120	110	310	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Lane Group Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	84.0	84.0	11.0	85.0	85.0	31.0	42.0	42.0	13.0	24.0	24.0
Total Split (%)	7%	56%	56%	7%	57%	57%	21%	28%	28%	9%	16%	16%
Maximum Green (s)	4.0	78.0	78.0	5.0	79.0	79.0	25.0	36.0	36.0	7.0	18.0	18.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	86.0	80.0	80.0	88.1	81.0	81.0	51.0	38.0	38.0	29.0	20.0	20.0
Actuated g/C Ratio	0.57	0.53	0.53	0.59	0.54	0.54	0.34	0.25	0.25	0.19	0.13	0.13
v/c Ratio	0.92	0.33	0.17	0.31	1.25	0.35	1.39	0.64	0.29	0.61	0.80	0.54
Uniform Delay, d1	26.0	19.8	0.0	12.7	34.5	8.3	42.2	50.0	0.0	37.2	63.1	31.1
Delay	77.2	20.0	2.6	13.0	137.1	8.7	179.6	50.4	6.9	40.8	67.3	32.4
LOS	E	C	A	B	F	A	F	D	A	D	E	C
Approach Delay		24.0			116.0			100.5			54.2	
Approach LOS		C			F			F			D	

Intersection Summary

Area Type: Other  
 Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 150

Control Type: Pretimed

Maximum v/c Ratio: 1.39

Intersection Signal Delay: 90.9

Intersection LOS: F

Intersection Capacity Utilization: 110.0%

ICU Level of Service: G

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak

 ø1	 ø2	 ø3	 ø4
13s	12s	11s	14s
 ø5	 ø6	 ø7	 ø8
11s	24s	10s	15s



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑		↘	↑↑↑		↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Frt		0.980			0.980				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4272	0	1517	4272	0	1517	3034	1357	1517	3034	1357
Flt Permitted	0.458			0.118			0.453			0.659		
Satd. Flow (perm)	731	4272	0	188	4272	0	723	3034	1357	1052	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		45		44				53				200
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50		50			50		50		50	
Link Distance (ft)		2176		2624			3447		2553			
Travel Time (s)		29.7		35.8			47.0		34.8			
Volume (vph)	60	1550	240	110	390	60	80	140	50	50	330	190
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Lane Group Flow (vph)	63	1885	0	116	474	0	84	147	53	53	347	200
Turn Type	pm+pt			pm+pt			pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	38.0	0.0	10.0	38.0	0.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (%)	13%	48%	0%	13%	48%	0%	13%	28%	28%	13%	28%	28%
Maximum Green (s)	4.0	32.0		4.0	32.0		4.0	16.0	16.0	4.0	16.0	16.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0		5.0			5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0		11.0			11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0		0			0	0		0	0	0
Act Effct Green (s)	40.0	34.0		40.0	34.0		24.0	18.0	18.0	24.0	18.0	18.0
Actuated g/C Ratio	0.50	0.43		0.50	0.43		0.30	0.23	0.23	0.30	0.23	0.23
v/c Ratio	0.15	1.02		0.60	0.26		0.30	0.22	0.15	0.15	0.51	0.43
Uniform Delay, d1	8.5	22.4		9.0	13.4		18.0	25.2	0.0	17.6	27.1	0.0
Delay	8.8	47.2		14.7	13.5		18.5	25.5	8.1	18.0	27.5	4.5
LOS	A	D		B	B		B	C	A	B	C	A
Approach Delay		46.0		13.7			20.2			19.0		
Approach LOS		D		B			C			B		

**Intersection Summary**

Area Type: Other  
 Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 80

Control Type: Pretimed

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 33.6

Intersection LOS: C

Intersection Capacity Utilization 71.2%

ICU Level of Service C

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak

 10 s	 22 s	 10 s	 36 s
 10 s	 22 s	 10 s	 36 s

Lanes, Volumes, Timings  
 MC 85 & 75th Avenue, Alternative 2c, Year 2010, PM Peak

08/24/2001



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SEB
Lane Configurations	↘	↑↑↑		↘	↑↑↑		↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Fri		0.969			0.982				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4224	0	1517	4280	0	1517	3034	1357	1517	3034	1357
Flt Permitted	0.143			0.468			0.614			0.499		
Satd. Flow (perm)	228	4224	0	747	4280	0	980	3034	1357	797	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		95			38				84			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50				50			50
Link Distance (ft)		2832			2688				3400			2712
Travel Time (s)		38.6			36.7				46.4			37.0
Volume (vph)	60	340	90	80	1290	180	290	310	80	70	210	80
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Lane Group Flow (vph)	63	453	0	84	1547	0	305	326	84	74	221	84
Turn Type	pm+pt			pm+pt			pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	32.0	0.0	10.0	32.0	0.0	10.0	23.0	23.0	10.0	23.0	23.0
Total Split (%)	13%	43%	0%	13%	43%	0%	13%	31%	31%	13%	31%	31%
Maximum Green (s)	4.0	26.0		4.0	26.0		4.0	17.0	17.0	4.0	17.0	17.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0			5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0			11.0
Pedestrian Calls (#/hr)		0			0			0	0			0
Act Effct Green (s)	34.0	28.0		34.0	28.0		25.0	19.0	19.0	25.0	19.0	19.0
Actuated g/C Ratio	0.45	0.37		0.45	0.37		0.33	0.25	0.25	0.33	0.25	0.25
v/c Ratio	0.31	0.28		0.21	0.95		0.82	0.42	0.21	0.23	0.29	0.21
Uniform Delay, d1	9.7	12.7		9.8	22.3		20.2	23.4	0.0	14.9	22.5	0.0
Delay	9.9	12.9		10.0	31.9		31.2	23.8	6.0	15.3	22.8	6.0
LOS	A	B		B	C		C	C	A	B	C	A
Approach Delay		12.5			30.8			24.9			17.6	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 75

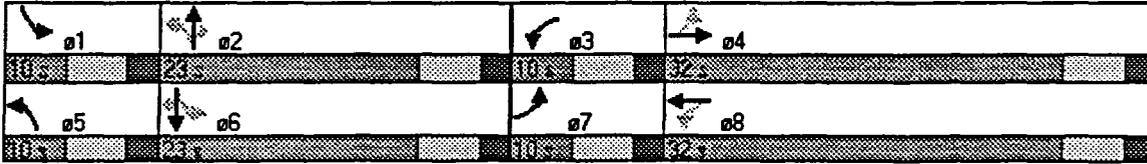
Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Pretimed  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 25.0  
 Intersection LOS: C  
 Intersection Capacity Utilization 70.3%  
 ICU Level of Service C

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak



Lanes, Volumes, Timings  
 MC 85 & 75th Avenue, Alternative 2c, Year 2020, AM Peak

08/24/2001



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NBT	NBR	SBL	SBT	SBH
Lane Configurations	↘	↑↑↑		↘	↑↑↑		↘	↑↑	↘	↘	↑↑	↘
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Flt		0.980			0.980				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4272	0	1517	4272	0	1517	3034	1357	1517	3034	1357
Flt Permitted	0.361			0.050			0.190			0.487		
Satd. Flow (perm)	576	4272	0	80	4272	0	303	3034	1357	778	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			41				74			305
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	80	2340	360	170	590	90	120	210	70	80	500	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Lane Group Flow (vph)	84	2842	0	179	716	0	126	221	74	84	526	305
Turn Type	pm+pt			pm+pt			pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	81.0	0.0	13.0	84.0	0.0	10.0	25.0	25.0	11.0	26.0	26.0
Total Split (%)	8%	62%	0%	10%	65%	0%	8%	19%	19%	8%	20%	20%
Maximum Green (s)	4.0	75.0		7.0	78.0		4.0	19.0	19.0	5.0	20.0	20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	82.9	77.0		89.1	80.0		27.0	21.1	21.1	29.0	22.0	22.0
Actuated g/C Ratio	0.64	0.59		0.69	0.62		0.21	0.16	0.16	0.22	0.17	0.17
v/c Ratio	0.20	1.12		1.16	0.27		1.06	0.45	0.26	0.39	1.03	0.63
Uniform Delay, d1	6.7	26.1		33.5	10.8		43.6	49.3	0.0	39.1	54.0	0.0
Delay	6.8	79.2		123.8	10.9		117.5	49.7	10.5	40.3	88.0	5.4
LOS	A	E		F	B		F	D	B	D	F	A
Approach Delay		77.1			33.4			63.1			56.1	
Approach LOS		E			C			E			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 130

Control Type: Pretimed

Maximum v/c Ratio: 1.16

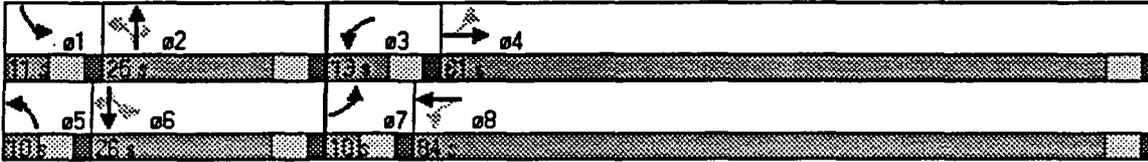
Intersection Signal Delay: 64.7

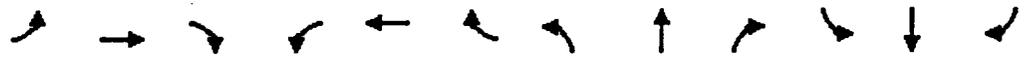
Intersection LOS: E

Intersection Capacity Utilization 100.8%

ICU Level of Service F

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑		↘	↑↑↑		↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	0.91	1.00	0.95	1.00	1.00	0.95	1.00
Fri		0.970			0.982				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4228	0	1517	4280	0	1517	3034	1357	1517	3034	1357
Flt Permitted	0.050			0.346			0.238			0.471		
Satd. Flow (perm)	80	4228	0	552	4280	0	380	3034	1357	752	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		64			26				126			60
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.8			36.7			46.4			37.0	
Volume (vph)	90	510	130	120	1950	270	440	470	120	110	310	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Lane Group Flow (vph)	95	674	0	126	2337	0	463	495	126	116	326	126
Turn Type	pm+pt			pm+pt			pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	84.0	0.0	11.0	85.0	0.0	31.0	42.0	42.0	13.0	24.0	24.0
Total Split (%)	7%	56%	0%	7%	57%	0%	21%	28%	28%	9%	16%	16%
Maximum Green (s)	4.0	78.0		5.0	79.0		25.0	36.0	36.0	7.0	18.0	18.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0			11.0			11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	86.0	80.0		88.1	81.0		51.0	38.0	38.0	29.0	20.0	20.0
Actuated g/C Ratio	0.57	0.53		0.59	0.54		0.34	0.25	0.25	0.19	0.13	0.13
v/c Ratio	0.92	0.29		0.34	1.01		1.39	0.64	0.29	0.61	0.80	0.54
Uniform Delay, d1	26.0	17.3		12.7	34.1		42.2	50.0	0.0	37.2	63.1	31.1
Delay	77.2	17.4		13.0	49.0		179.6	50.4	6.9	40.8	67.3	32.4
LOS	E	B		B	D		F	D	A	D	E	C
Approach Delay		24.8			47.2			100.5			54.2	
Approach LOS		C			D			F			D	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 150  
 Actuated Cycle Length: 150  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 150

Control Type: Pretimed

Maximum v/c Ratio: 1.39

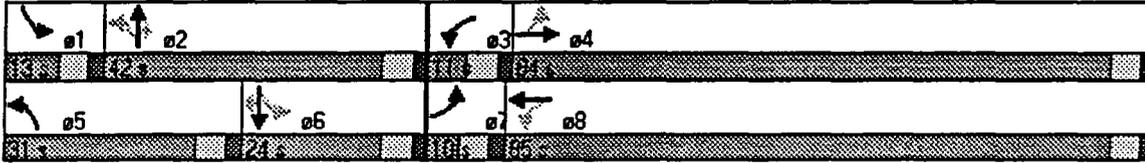
Intersection Signal Delay: 56.3

Intersection LOS: E

Intersection Capacity Utilization 99.3%

ICU Level of Service E

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Fit			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4359	1357	1517	4359	1357	1517	3034	1357	1517	3034	1357
Fit Permitted	0.499			0.138			0.470			0.659		
Satd. Flow (perm)	797	4359	1357	220	4359	1357	750	3034	1357	1052	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			253			63			53			200
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	60	1550	240	110	390	60	80	140	50	50	330	190
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Lane Group Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Turn Type	pm+pt		Perm									
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	33.0	33.0	10.0	33.0	33.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (%)	13%	44%	44%	13%	44%	44%	13%	29%	29%	13%	29%	29%
Maximum Green (s)	4.0	27.0	27.0	4.0	27.0	27.0	4.0	16.0	16.0	4.0	16.0	16.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	35.0	29.0	29.0	35.0	29.0	29.0	24.0	18.0	18.0	24.0	18.0	18.0
Actuated g/C Ratio	0.47	0.39	0.39	0.47	0.39	0.39	0.32	0.24	0.24	0.32	0.24	0.24
v/c Ratio	0.15	0.97	0.37	0.56	0.24	0.11	0.28	0.20	0.14	0.14	0.48	0.42
Uniform Delay, d1	9.1	22.5	0.0	9.6	15.5	0.0	15.7	22.8	0.0	15.4	24.4	0.0
Delay	9.3	34.3	2.5	12.1	15.7	4.5	16.1	23.1	7.4	15.7	24.8	4.2
LOS	A	C	A	B	B	A	B	C	A	B	C	A
Approach Delay		29.4			13.8			18.1			17.1	
Approach LOS		C			B			B			B	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 75  
 Actuated Cycle Length: 75  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 23.6

Intersection LOS: C

Intersection Capacity Utilization 65.5%

ICU Level of Service B

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak

 ø1	 ø2	 ø3	 ø4
10 s	22 s	10 s	33 s
 ø5	 ø6	 ø7	 ø8
10 s	22 s	10 s	33 s

Lanes, Volumes, Timings  
 MC 85 & 75th Avenue, Alternative 2d, Year 2010, PM Peak

08/24/2001



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4359	1357	1517	4359	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.143			0.530			0.614			0.499		
Satd. Flow (perm)	228	4359	1357	846	4359	1357	980	3034	1357	797	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95			189			84			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	60	340	90	80	1290	180	290	310	80	70	210	80
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Lane Group Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Turn Type	pm+pt		Perm pm+pt		Perm pm+pt		Perm pm+pt		Perm pm+pt		Perm	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	32.0	32.0	10.0	32.0	32.0	10.0	23.0	23.0	10.0	23.0	23.0
Total Split (%)	13%	43%	43%	13%	43%	43%	13%	31%	31%	13%	31%	31%
Maximum Green (s)	4.0	26.0	26.0	4.0	26.0	26.0	4.0	17.0	17.0	4.0	17.0	17.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	34.0	28.0	28.0	34.0	28.0	28.0	25.0	19.0	19.0	25.0	19.0	19.0
Actuated g/C Ratio	0.45	0.37	0.37	0.45	0.37	0.37	0.33	0.25	0.25	0.33	0.25	0.25
v/c Ratio	0.31	0.22	0.17	0.19	0.83	0.30	0.82	0.42	0.21	0.23	0.29	0.21
Uniform Delay, d1	9.7	16.0	0.0	9.8	21.4	0.0	20.2	23.4	0.0	14.9	22.5	0.0
Delay	9.9	16.2	4.0	10.0	22.7	2.9	31.2	23.8	6.0	15.3	22.8	6.0
LOS	A	B	A	B	C	A	C	C	A	B	C	A
Approach Delay		13.2			19.8			24.9			17.6	
Approach LOS		B			B			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Lanes, Volumes, Timings  
MC 85 & 75th Avenue, Alternative 2d, Year 2010, PM Peak

08/24/2001

Control Type: Pretimed

Maximum v/c Ratio: 0.83

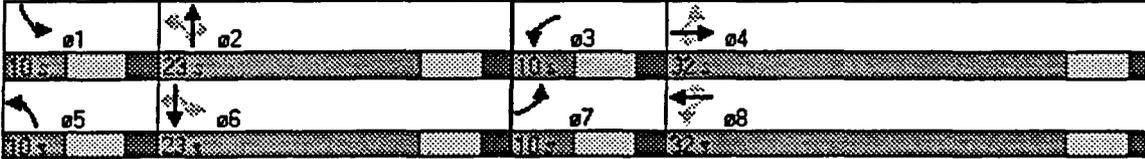
Intersection Signal Delay: 19.6

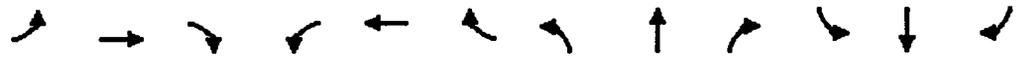
Intersection LOS: B

Intersection Capacity Utilization 66.1%

ICU Level of Service B

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4359	1357	1517	4359	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.404			0.050			0.190			0.487		
Satd. Flow (perm)	645	4359	1357	80	4359	1357	303	3034	1357	778	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			188			95			74			305
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	80	2340	360	170	590	90	120	210	70	80	500	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Lane Group Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Turn Type	pm+pt		Perm									
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	81.0	81.0	13.0	84.0	84.0	10.0	25.0	25.0	11.0	26.0	26.0
Total Split (%)	8%	62%	62%	10%	65%	65%	8%	19%	19%	8%	20%	20%
Maximum Green (s)	4.0	75.0	75.0	7.0	78.0	78.0	4.0	19.0	19.0	5.0	20.0	20.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	82.9	77.0	77.0	89.1	80.0	80.0	27.0	21.1	21.1	29.0	22.0	22.0
Actuated g/C Ratio	0.64	0.59	0.59	0.69	0.62	0.62	0.21	0.16	0.16	0.22	0.17	0.17
v/c Ratio	0.19	0.95	0.43	1.16	0.23	0.11	1.06	0.45	0.26	0.39	1.03	0.63
Uniform Delay, d1	6.7	24.8	6.5	33.5	11.2	0.0	43.6	49.3	0.0	39.1	54.0	0.0
Delay	6.8	29.8	6.8	123.8	11.3	2.0	117.5	49.7	10.5	40.3	88.0	5.4
LOS	A	C	A	F	B	A	F	D	B	D	F	A
Approach Delay		26.2			32.8			63.1			56.1	
Approach LOS		C			C			E			E	

Intersection Summary

Area Type: Other  
 Cycle Length: 130  
 Actuated Cycle Length: 130  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 130

Control Type: Pretimed

Maximum v/c Ratio: 1.16

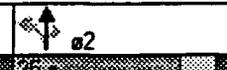
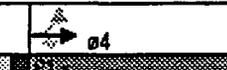
Intersection Signal Delay: 35.7

Intersection LOS: D

Intersection Capacity Utilization 92.4%

ICU Level of Service E

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak

 a1	 a2	 a3	 a4
 a5	 a6	 a7	 a8



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SDR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1517	4359	1357	1517	4359	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.063			0.397			0.247			0.471		
Satd. Flow (perm)	101	4359	1357	634	4359	1357	394	3034	1357	752	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			197			126			89
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	90	510	130	120	1950	270	440	470	120	110	310	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Lane Group Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Turn Type	pm+pt		Perm									
Protected Phases	7	4		3	6		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	67.0	67.0	11.0	68.0	68.0	39.0	46.0	46.0	16.0	23.0	23.0
Total Split (%)	7%	48%	48%	8%	49%	49%	28%	33%	33%	11%	16%	16%
Maximum Green (s)	4.0	61.0	61.0	5.0	62.0	62.0	33.0	40.0	40.0	10.0	17.0	17.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	69.0	63.0	63.0	71.0	64.0	64.0	58.0	42.0	42.0	30.9	19.0	19.0
Actuated g/C Ratio	0.49	0.45	0.45	0.51	0.46	0.46	0.41	0.30	0.30	0.22	0.14	0.14
v/c Ratio	0.86	0.27	0.20	0.34	1.03	0.39	1.04	0.54	0.25	0.50	0.79	0.48
Uniform Delay, d1	18.5	24.1	0.0	17.0	38.0	6.8	36.3	41.0	0.0	29.1	58.6	15.8
Delay	62.6	24.3	3.5	17.6	61.7	7.6	80.2	41.4	5.9	29.6	62.2	19.6
LOS	E	C	A	B	E	A	F	D	A	C	E	B
Approach Delay		25.3			53.2			53.8			46.1	
Approach LOS		C			D			D			D	

**Intersection Summary**

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 140

Control Type: Pretimed

Maximum v/c Ratio: 1.04

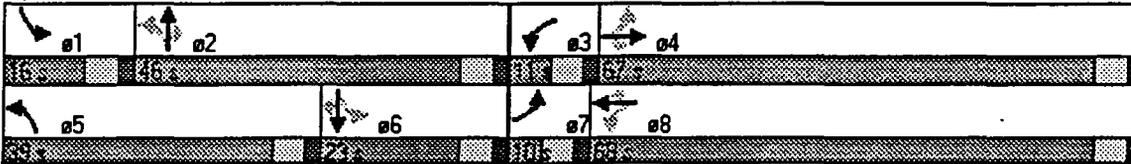
Intersection Signal Delay: 48.1

Intersection LOS: D

Intersection Capacity Utilization 92.9%

ICU Level of Service E

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak



Lanes, Volumes, Timings  
 MC 85 & 75th Avenue, Alternative 2e, Year 2010, AM Peak

08/24/2001



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑↑	↗	↔↔	↑↑↑	↗	↔	↑↑	↗	↔	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.950			0.950			0.470			0.659		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	750	3034	1357	1052	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			253			63			53			200
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	60	1550	240	110	390	60	80	140	50	50	330	190
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Lane Group Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Turn Type	Prot		Perm	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	6		5	2		1	6	
Permitted Phases			4			8		2		2	6	
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	33.0	33.0	10.0	33.0	33.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (%)	13%	44%	44%	13%	44%	44%	13%	29%	29%	13%	29%	29%
Maximum Green (s)	4.0	27.0	27.0	4.0	27.0	27.0	4.0	16.0	16.0	4.0	16.0	16.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	6.0	29.0	29.0	6.0	29.0	29.0	24.0	18.0	18.0	24.0	18.0	18.0
Actuated g/C Ratio	0.08	0.39	0.39	0.08	0.39	0.39	0.32	0.24	0.24	0.32	0.24	0.24
v/c Ratio	0.27	0.97	0.37	0.49	0.24	0.11	0.28	0.20	0.14	0.14	0.48	0.42
Uniform Delay, d1	32.4	22.5	0.0	33.0	15.5	0.0	15.7	22.8	0.0	15.4	24.4	0.0
Delay	32.8	34.3	2.5	33.5	15.7	4.5	16.1	23.1	7.4	15.7	24.8	4.2
LOS	C	C	A	C	B	A	B	C	A	B	C	A
Approach Delay		30.1			18.0			18.1			17.1	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Pretimed

Maximum v/c Ratio: 0.97

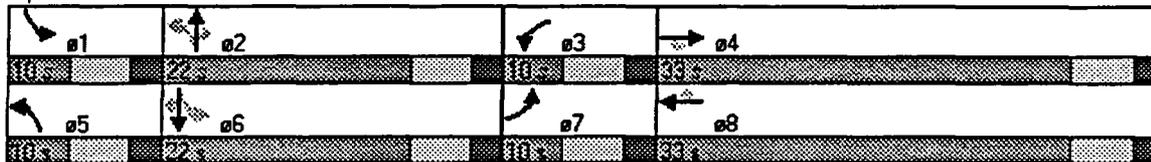
Intersection Signal Delay: 24.8

Intersection LOS: C

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak



MC 85 & 75th Avenue, Alternative 2e, Year 2010, PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑	↖	↗	↑↑↑	↖	↖	↑↑	↖	↖	↑↑	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.950			0.950			0.614			0.499		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	980	3034	1357	797	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95			189			84			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	60	340	90	80	1290	180	290	310	80	70	210	80
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Lane Group Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Turn Type	Prot		Perm	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	32.0	32.0	10.0	32.0	32.0	10.0	23.0	23.0	10.0	23.0	23.0
Total Split (%)	13%	43%	43%	13%	43%	43%	13%	31%	31%	13%	31%	31%
Maximum Green (s)	4.0	26.0	26.0	4.0	26.0	26.0	4.0	17.0	17.0	4.0	17.0	17.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	6.0	28.0	28.0	6.0	28.0	28.0	25.0	19.0	19.0	25.0	19.0	19.0
Actuated g/C Ratio	0.08	0.37	0.37	0.08	0.37	0.37	0.33	0.25	0.25	0.33	0.25	0.25
v/c Ratio	0.27	0.22	0.17	0.36	0.83	0.30	0.82	0.42	0.21	0.23	0.29	0.21
Uniform Delay, d1	32.4	16.0	0.0	32.7	21.4	0.0	20.2	23.4	0.0	14.9	22.5	0.0
Delay	32.8	16.2	4.0	33.1	22.7	2.9	31.2	23.8	6.0	15.3	22.8	6.0
LOS	C	B	A	C	C	A	C	C	A	B	C	A
Approach Delay		16.0			21.0			24.9			17.6	
Approach LOS		B			C			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 75

Lanes, Volumes, Timings  
MC 85 & 75th Avenue, Alternative 2e, Year 2010, PM Peak

08/24/2001

Control Type: Pretimed

Maximum v/c Ratio: 0.83

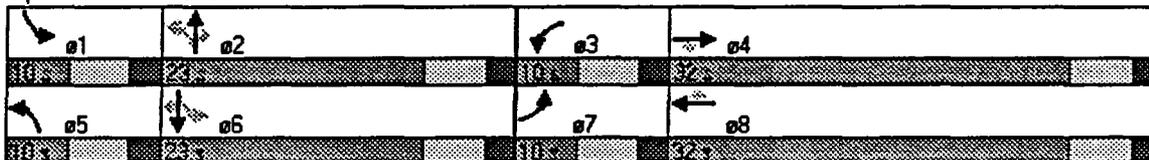
Intersection Signal Delay: 20.6

Intersection LOS: C

Intersection Capacity Utilization 65.9%

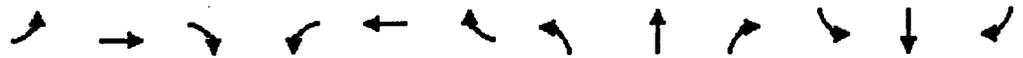
ICU Level of Service B

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak



Lanes, Volumes, Timings  
 MC 85 & 75th Avenue, Alternative 2e, Year 2020, AM Peak

08/24/2001



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑↑	↖	↖↗	↑↑↑	↖	↖	↑↑	↖	↖	↑↑	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.950			0.950			0.211			0.513		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	337	3034	1357	819	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191			95			74			304
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	80	2340	360	170	590	90	120	210	70	80	500	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Lane Group Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Turn Type	Prot		Perm	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	6		5	2		1	6	
Permitted Phases			4			8	2		2		6	6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	66.0	66.0	10.0	66.0	66.0	10.0	23.0	23.0	11.0	24.0	24.0
Total Split (%)	9%	60%	60%	9%	60%	60%	9%	21%	21%	10%	22%	22%
Maximum Green (s)	4.0	60.0	60.0	4.0	60.0	60.0	4.0	17.0	17.0	5.0	18.0	18.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	6.1	62.0	62.0	6.1	62.0	62.0	25.0	19.0	19.0	27.0	20.0	20.0
Actuated g/C Ratio	0.06	0.56	0.56	0.06	0.56	0.56	0.23	0.17	0.17	0.25	0.18	0.18
v/c Ratio	0.52	1.00	0.45	1.11	0.25	0.12	0.89	0.42	0.25	0.34	0.95	0.62
Uniform Delay, d1	50.6	24.0	6.2	52.0	12.2	0.0	33.3	40.6	0.0	30.8	44.5	0.1
Delay	51.0	39.1	6.6	130.8	12.3	2.3	73.3	41.0	9.4	31.6	64.6	4.9
LOS	D	D	A	F	B	A	E	D	A	C	E	A
Approach Delay		35.3			34.9			45.1			41.7	
Approach LOS		D			C			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 110

Control Type: Pretimed

Maximum v/c Ratio: 1.11

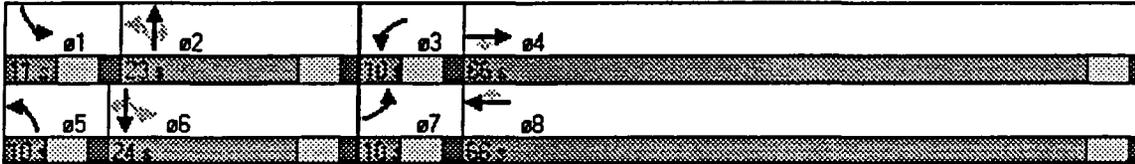
Intersection Signal Delay: 37.1

Intersection LOS: D

Intersection Capacity Utilization 87.6%

ICU Level of Service D

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak



MC 85 & 75th Avenue, Alternative 2e, Year 2020, PM Peak



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑↑	↖	↖↗	↑↑↑	↖	↖	↑↑	↖	↖	↑↑	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	1517	3034	1357	1517	3034	1357
Flt Permitted	0.950			0.950			0.247			0.471		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	394	3034	1357	752	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			197			126			89
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	90	510	130	120	1950	270	440	470	120	110	310	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Lane Group Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Turn Type	Prot		Perm	Prot		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2		2	6		6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	67.0	67.0	11.0	68.0	68.0	39.0	46.0	46.0	16.0	23.0	23.0
Total Split (%)	7%	48%	48%	8%	49%	49%	28%	33%	33%	11%	16%	16%
Maximum Green (s)	4.0	61.0	61.0	5.0	62.0	62.0	33.0	40.0	40.0	10.0	17.0	17.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Walk Time (s)		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0
Flash Dont Walk (s)		11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)		0	0		0	0		0	0		0	0
Act Effct Green (s)	6.0	63.0	63.0	7.0	64.0	64.0	58.0	42.0	42.0	30.9	19.0	19.0
Actuated g/C Ratio	0.04	0.45	0.45	0.05	0.46	0.46	0.41	0.30	0.30	0.22	0.14	0.14
v/c Ratio	0.75	0.27	0.20	0.86	1.03	0.39	1.04	0.54	0.25	0.50	0.79	0.48
Uniform Delay, d1	66.2	24.1	0.0	66.0	38.0	6.8	36.3	41.0	0.0	29.1	58.6	15.8
Delay	81.3	24.3	3.5	92.3	61.7	7.6	80.2	41.4	5.9	29.6	62.2	19.6
LOS	F	C	A	F	E	A	F	D	A	C	E	B
Approach Delay		27.6			57.0			53.8			46.1	
Approach LOS		C			E			D			D	

**Intersection Summary**  
 Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 140

Control Type: Pretimed

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 50.4

Intersection LOS: D

Intersection Capacity Utilization 91.0%

ICU Level of Service E

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak

 01	 02	 03	 04
16	46	11	67
 05	 06	 07	 08
29	23	10	69



Lane Group	EBL	EBI	EBR	WBL	WBI	WBR	NBL	NBI	NBR	SBL	SBI	SBR
Lane Configurations	↖↖	↖↖↖	↖	↖↖	↖↖↖	↖	↖↖	↖↖	↖	↖↖	↖↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Frt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Frt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			253			63			53			200
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	60	1550	240	110	390	60	80	140	50	50	330	190
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Lane Group Flow (vph)	63	1632	253	116	411	63	84	147	53	53	347	200
Turn Type	Prot		Perm									
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	33.0	33.0	10.0	33.0	33.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (%)	13%	44%	44%	13%	44%	44%	13%	29%	29%	13%	29%	29%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Act Effct Green (s)	6.0	29.0	29.0	6.0	29.0	29.0	6.0	18.0	18.0	6.0	18.0	18.0
Actuated g/C Ratio	0.08	0.39	0.39	0.08	0.39	0.39	0.08	0.24	0.24	0.08	0.24	0.24
v/c Ratio	0.27	0.97	0.37	0.49	0.24	0.11	0.36	0.20	0.14	0.23	0.48	0.42
Uniform Delay, d1	32.4	22.5	0.0	33.0	15.5	0.0	32.7	22.8	0.0	32.3	24.4	0.0
Delay	32.8	34.3	2.5	33.5	15.7	4.5	33.1	23.1	7.4	32.7	24.8	4.2
LOS	C	C	A	C	B	A	C	C	A	C	C	A
Approach Delay		30.1			18.0			23.1			18.6	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)	14	265	0	27	46	0	19	28	0	12	73	0
Queue Length 95th (ft)	32	#376	42	52	67	21	40	52	25	28	112	46
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Analyst: LL  
 U:\Li\00c69\00c69X5LTMC85Yr2010.sy6  
 bolducphoe-ix51

Area Type: Other  
 Cycle Length: 75  
 Actuated Cycle Length: 75  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 75  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.97  
 Intersection Signal Delay: 25.5 Intersection LOS: C  
 Intersection Capacity Utilization 61.1% ICU Level of Service B  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak





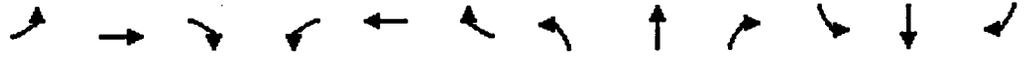
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↖↖↗	↖	↖↗	↖↖↗	↖	↖↗	↖↖	↖	↖↗	↖↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frnt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			95			189			84			84
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	60	340	90	80	1290	180	290	310	80	70	210	80
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Lane Group Flow (vph)	63	358	95	84	1358	189	305	326	84	74	221	84
Turn Type	Prot		Perm									
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	29.0	29.0	10.0	29.0	29.0	13.0	26.0	26.0	10.0	23.0	23.0
Total Split (%)	13%	39%	39%	13%	39%	39%	17%	35%	35%	13%	31%	31%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Act Effct Green (s)	6.0	25.0	25.0	6.0	25.0	25.0	9.0	22.0	22.0	6.0	19.0	19.0
Actuated g/C Ratio	0.08	0.33	0.33	0.08	0.33	0.33	0.12	0.29	0.29	0.08	0.25	0.25
v/c Ratio	0.27	0.25	0.18	0.36	0.93	0.33	0.86	0.37	0.18	0.31	0.29	0.21
Uniform Delay, d1	32.4	18.1	0.0	32.7	24.2	0.0	32.4	21.0	0.0	32.5	22.5	0.0
Delay	32.8	18.3	4.5	33.1	32.0	3.3	47.7	21.3	5.4	33.0	22.8	6.0
LOS	C	B	A	C	C	A	D	C	A	C	C	A
Approach Delay		17.6			28.7			30.7			21.1	
Approach LOS		B			C			C			C	
Queue Length 50th (ft)	14	43	0	19	220	0	73	62	0	17	43	0
Queue Length 95th (ft)	32	65	29	40	#315	40	#141	97	30	37	72	30
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
 Cycle Length: 75  
 Actuated Cycle Length: 75  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 75  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 26.5 Intersection LOS: C  
 Intersection Capacity Utilization 57.7% ICU Level of Service A  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak



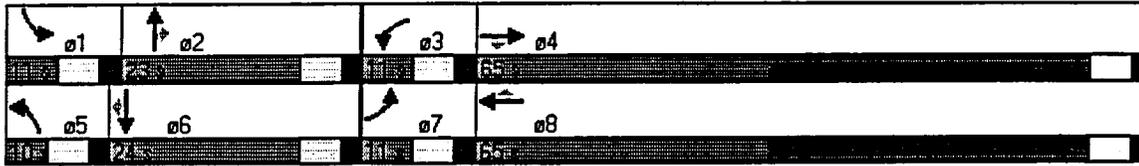


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑↑	↗	↖↗	↑↑↑	↗	↖↗	↑↑	↗	↖↗	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Fr <sub>t</sub>			0.850			0.850			0.850			0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Fl <sub>t</sub> Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			186			95			74			303
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2176			2624			3447			2553	
Travel Time (s)		29.7			35.8			47.0			34.8	
Volume (vph)	80	2340	360	170	590	90	120	210	70	80	500	290
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Lane Group Flow (vph)	84	2463	379	179	621	95	126	221	74	84	526	305
Turn Type	Prot		Perm									
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	11.0	65.0	65.0	11.0	65.0	65.0	10.0	23.0	23.0	11.0	24.0	24.0
Total Split (%)	10%	59%	59%	10%	59%	59%	9%	21%	21%	10%	22%	22%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Act Effct Green (s)	7.0	61.1	61.1	7.0	61.1	61.1	6.1	19.0	19.0	7.0	20.0	20.0
Actuated g/C Ratio	0.06	0.56	0.56	0.06	0.56	0.56	0.06	0.17	0.17	0.06	0.18	0.18
v/c Ratio	0.45	1.02	0.45	0.96	0.26	0.12	0.78	0.42	0.25	0.45	0.95	0.62
Uniform Delay, d <sub>1</sub>	49.6	24.5	6.6	51.3	12.7	0.0	51.3	40.6	0.0	49.6	44.5	0.2
Delay	50.1	44.7	7.1	93.9	12.8	2.4	66.5	41.0	9.4	50.1	64.6	5.0
LOS	D	D	A	F	B	A	E	D	A	D	E	A
Approach Delay		39.9			27.9			43.1			43.4	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)	29	-676	69	65	79	0	46	74	0	29	195	0
Queue Length 95th (ft)	56	#770	140	#137	102	22	#97	113	40	56	#304	81
Internal Link Dist (ft)		2096			2544			3367			2473	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

Intersection Summary

Area Type: Other  
 Cycle Length: 110  
 Actuated Cycle Length: 110  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 110  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.02  
 Intersection Signal Delay: 38.7 Intersection LOS: D  
 Intersection Capacity Utilization 84.2% ICU Level of Service D  
 Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: MC 85 & 75th Avenue AM Peak



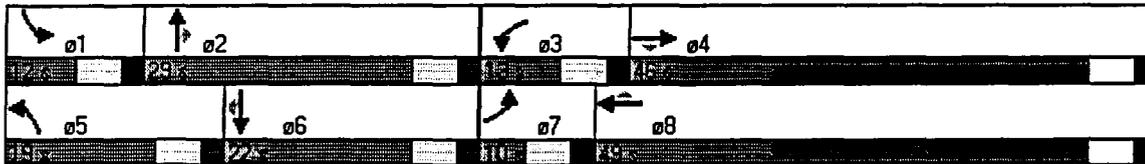


Lane Group	EBL	EBP	EBR	WBL	WBP	WBR	NBL	NBT	NBR	SBL	SBP	SBR
Lane Configurations	↖↗	↑↑↑	↗	↖↗	↑↑↑	↗	↖↗	↑↑	↗	↖↗	↑↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt		0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	2943	4359	1357	2943	4359	1357	2943	3034	1357	2943	3034	1357
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			272			126			89
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		50			50			50			50	
Link Distance (ft)		2832			2688			3400			2712	
Travel Time (s)		38.6			36.7			46.4			37.0	
Volume (vph)	90	510	130	120	1950	270	440	470	120	110	310	120
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Lane Group Flow (vph)	95	537	137	126	2053	284	463	495	126	116	326	126
Turn Type	Prot		Perm									
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases			4			8			2			6
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0	10.0	22.0	22.0
Total Split (s)	10.0	46.0	46.0	13.0	49.0	49.0	19.0	29.0	29.0	12.0	22.0	22.0
Total Split (%)	10%	46%	46%	13%	49%	49%	19%	29%	29%	12%	22%	22%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag									
Lead-Lag Optimize?	Yes	Yes	Yes									
Act Effct Green (s)	6.0	42.0	42.0	9.0	45.0	45.0	15.0	25.0	25.0	8.0	18.0	18.0
Actuated g/C Ratio	0.06	0.42	0.42	0.09	0.45	0.45	0.15	0.25	0.25	0.08	0.18	0.18
v/c Ratio	0.54	0.29	0.21	0.48	1.05	0.37	1.05	0.65	0.29	0.49	0.60	0.40
Uniform Delay, d1	45.6	19.2	0.0	43.2	27.5	0.6	42.5	33.6	0.0	44.0	37.6	10.2
Delay	46.1	19.3	3.3	43.7	55.6	2.6	86.0	34.0	5.7	44.5	38.1	13.5
LOS	D	B	A	D	E	A	F	C	A	D	D	B
Approach Delay		19.8			48.8			52.9			33.9	
Approach LOS		B			D			D			C	
Queue Length 50th (ft)	30	80	0	40	~523	4	~166	148	0	37	101	0
Queue Length 95th (ft)	57	108	34	69	#620	50	#266	206	45	65	148	71
Internal Link Dist (ft)		2752			2608			3320			2632	
50th Up Block Time (%)												
95th Up Block Time (%)												
Turn Bay Length (ft)												
50th Bay Block Time %												
95th Bay Block Time %												
Queuing Penalty (veh)												

**Intersection Summary:**

Area Type: Other  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 100  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.05  
 Intersection Signal Delay: 43.4 Intersection LOS: D  
 Intersection Capacity Utilization 78.6% ICU Level of Service C  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: MC 85 & 75th Avenue PM Peak





**Stantec**

## **Appendix F: Environmental Analysis**

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**MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION  
ENVIRONMENTAL PLANNING BRANCH**

**Environmental Determination**

**Project Name:** 75<sup>th</sup> Avenue  
**Project Limits:** Maricopa County Route 85 (MC 85) to Van Buren Street  
**Work Order Number:** 68986

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**1. PROJECT DESCRIPTION**

The Maricopa County Department of Transportation (MCDOT) is proposing to improve a portion of 75<sup>th</sup> Avenue, extending from Maricopa County Route 85 (MC 85) to Van Buren Street, within the City of Phoenix, the City of Tolleson and Unincorporated Maricopa County, Arizona. The purpose of these improvements is to increase the traffic capacity of 75<sup>th</sup> Avenue, and enhance roadway safety. Between MC 85 and Van Buren Street, 75<sup>th</sup> Avenue is a paved two-lane road that serves as a boundary between the City of Phoenix and the City of Tolleson. The City of Phoenix is on the east side of 75<sup>th</sup> Avenue while there is a county island and the City of Tolleson along the west side. Increased heavy-truck traffic to and from major commercial distribution centers along 75<sup>th</sup> Avenue, traffic from Interstate 10 and other recent land development have contributed to the increase in traffic and the need for road improvements. The average daily traffic (ADT) volume for the year 1999 was 9782 according to MCDOT records. The Maricopa County Association of Governments projects an increase to 23,345 vehicles per day (vpd) by the year 2020.

Three alternative designs were developed for review (refer to Typical Sections following this page). Alternative C, the preferred alternative, is recommended as a MCDOT Urban Minor Arterial Road. This alternative consists of four through lanes, a continuous center left turn lane, curb, gutter and sidewalk. A minor adjustment in the Urban Minor Arterial Roadway lane configuration will be made to include bike lanes through the project area. As indicated on the following page, approximately 20 feet of additional right-of-way will be required on each side of the roadway.

A total of 59 collisions were reported along 75<sup>th</sup> Avenue from MC 85 to Van Buren Street from January 1, 1991 to December 31, 1996. Thirty-nine percent of these collisions occurred at the intersections, twenty percent occurred at the junctions of minor streets with 75<sup>th</sup> Avenue, and the remaining forty-one percent occurred at non-intersection localities.

## 2. IMPACT EVALUATION

### **A. Natural Environment**

#### Vegetation

Native vegetation exists along the east side of 75<sup>th</sup> Avenue, north of MC 85, for roughly 0.5 miles. The vegetation consists of mesquite (*Prosopis* spp.), desert broom (*Baccharis sarothroides*), and palo verde (*Cercidium* spp.). In addition to the native vegetation, three to four small palm trees exist in the same vicinity. A palo verde (*Cercidium* spp.) and palm tree are also present on the southwest corner of 75<sup>th</sup> Avenue and Washington. The majority of the land in the project area is commercial and agricultural, with a heavy emphasis on industrial towards the north end of the project. These industrial and distribution centers have adapted ornamental native landscaping, including saguaro cactus (*Cereus giganteus*), palo verde (*Cercidium* spp.), and gravel, along the corridor. Some native vegetation will be disturbed as a result of the proposed roadway improvement project, therefore coordination with the Arizona Department of Agriculture will ensure that native plants are protected and salvaged when practicable.

#### Threatened, Endangered, and Sensitive Species

The United States Fish and Wildlife Service's (USFWS) list of federally endangered, threatened, proposed and candidate species for Maricopa County was reviewed by a qualified biologist (Mary Darling, M.S., J.D.). It was determined that no listed species or designated critical habitat will be affected by the construction of this project because there is no critical habitat within the limits of the project area and there is no potential habitat for any listed species. Therefore, a biological survey within the project limits will not be necessary.

A list of species from the Arizona Game and Fish Department's (AGFD) Heritage Data Management System of Wildlife of Special Concern (WSC) in Arizona for the project area was also reviewed by a qualified biologist (Mary Darling). It was determined that no species of concern will be affected by construction of this project because the area does not support suitable habitat for any of the listed species.

#### 100-Year Floodplain

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Maps for the project area indicates that the project is located within the 100-year floodplain. The Roosevelt Irrigation District Canal crosses 75<sup>th</sup> Avenue at approximately the midpoint of the proposed project area. The map indicates that there is an approximate 150 meters (500 feet) parallel strip, from the north edge of the canal, which lies within Zone A of the FEMA classification. Zone "A" is defined as "no base flood elevation determined". Impacts on floodplains typically occur when the topography within the floodplain is substantially modified either by placement or removal of materials within the floodplain. Because the majority of the improvements to 75<sup>th</sup> Avenue occur outside the floodplain, the project will not substantially modify the topography in the project area. The majority of the land adjacent to the proposed project area is either agricultural or commercial, thus obliterating all original drainage patterns. Significantly deteriorated tailwater ditches and irrigation supply generally serve as drainage flow paths. The

drainage area contributing to the project is 2.6 square kilometers (approximately 1 square mile). Minor impacts to the floodplain are anticipated from implementation of the proposed action, however, early coordination on the design of the bridge with the Flood Control District of Maricopa County will minimize the impacts. The anticipated minor impacts would include erosion of sediment and minor traffic interruptions during construction.

#### Section 404/401 Requirements

Jurisdictional waters of the United States, riparian habitats, and wetlands are not present within the project vicinity and subsequently will not require the Army Corps of Engineers involvement. The existing irrigation ditches are not considered jurisdictional waters of the United States, and therefore, are not subject to the Section 404 process of the Clean Water Act.

#### Jurisdiction/Zoning/Land Use

The Southern Pacific Railroad runs east and west and intersects 75<sup>th</sup> Avenue approximately halfway between MC 85 and Van Buren Street. Just north of the railroad, the Roosevelt Irrigation District Canal also crosses 75<sup>th</sup> Avenue. Land east of 75<sup>th</sup> Avenue between Van Buren Street and MC 85 is under the jurisdiction of the City of Phoenix and is zoned light industrial (A-1) and general commercial (C-3). There are no formal residential areas within the vicinity of the project, however, there are a few scattered homes in the southern portion of the project area. Land north of MC 85 for 0.66 kilometers (0.4101 miles) and west of 75<sup>th</sup> Avenue is under the jurisdiction of Maricopa County and is zoned as rural (RURAL-43) with the exception of one very small area just northwest of the intersection of 75<sup>th</sup> Avenue and MC 85, which is zoned as general commercial (C-3). The remaining land, 0.33 kilometers (0.2051 mile) between Van Buren Street and Buckeye Road, west of 75<sup>th</sup> Avenue, is under the jurisdiction of the City of Tolleson and is zoned mainly as general industrial park (I-2) with the exception of two small areas. One of these small areas is zoned as Maricopa County Rural 43 and the other is Maricopa County Heavy Industrial (IND-3).

The majority of the land is being used for commercial and agricultural purposes. There is a fruit stand on the northeast corner of 75<sup>th</sup> Avenue and Van Buren. There is an AutoZone Warehouse on the northwest corner of 75<sup>th</sup> Avenue and Washington. Just north of the railroad tracks, on the west side of 75<sup>th</sup> Avenue, there exists a "Southwest Pet Products" and "Coast Grain Co." plant/factory. South of the railroad tracks, on the east side of 75<sup>th</sup> Avenue, there exists an "Ameri Cold Logistics" sign near an empty field. There is also an "Economy Warehouse" and "Service Wine Co." on the east side of 75<sup>th</sup> Avenue. On the northwest corner of 75<sup>th</sup> Avenue and Buckeye, there exists a fenced compound that includes an abandoned building called "Jill and Judy's Cocktails" as well as some occupied trailers immediately north of that building. It is anticipated that this fenced area will be acquired as part of the additional right-of-way required for the project. An area at the southeast corner of 75<sup>th</sup> Avenue and Van Buren has been graded for construction of a Target store as well.

### Visual Resources

The project area is located on relatively flat terrain in the suburban development associated within the City of Phoenix and the City of Tolleson. The Estrella Mountains to the south and White Tank Mountains to the west are visible from the project area. Some natural vegetation remains in the project area as ornamental landscaping. The agricultural and industrial setting is a mixture of architectural and agricultural styles with a variety of materials and colors typical of agricultural and industrial areas. The proposed improvements will not have an adverse impact on the visual character or quality of the visual resources within, or adjacent to, the project area. In relation to the overall disturbance present in the foreground by other development, the resulting viewshed alteration for motorists using the improved facility would be negligible.

### **B. Physical/Construction**

#### Noise

There are four potential noise receptors in the project area, two homes west of 75<sup>th</sup> Avenue south of the railroad tracts and two mobile homes behind Jill and Judy's Cocktails on the northwest corner of 75<sup>th</sup> Avenue and Buckeye Road. While it is currently planned to acquire the land on which the mobile homes are located, the project will need to be reviewed for additional receptors when it is fully funded.

MCDOT adopted a Noise Abatement Policy in April 1998, updated April 2001, to establish guidelines determining the need, feasibility, and reasonableness of noise abatement measures for all roadway projects. For all construction projects, MCDOT is committed to identifying any potential noise receptors, ascertain existing conditions, nature of the project and its potential to impact those potential noise receptors. If the predicted noise level will approach or exceed the noise abatement criterion, or cause a substantial (15dBA) increase over the existing traffic noise level, MCDOT will evaluate the impacted properties for possible abatement. Noise abatement measures must be reasonable and feasible. Feasibility is based on engineering considerations (e.g., can a barrier be built given the topography of the location; can a substantial noise reduction be achieved given certain access, drainage, safety, or maintenance requirements; are other noise sources present in the area, etc.) The reasonableness of any noise abatement measure will be discussed with the affected property owner, and mutual agreement is required for construction of a barrier.

Any new sub-divisions will have to provide adequate shielding from roadway noise in accordance with the MCDOT Noise Abatement Policy.

#### Air

There are four potential air pollution receptors in the project area, two homes west of 75<sup>th</sup> Ave. south of the railroad tracts and two mobile homes behind Jill and Judy's Cocktails on the northwest corner of 75<sup>th</sup> Avenue and Buckeye Road. While current plans are to acquire the land on which the mobile homes are located, the project will need to be reviewed for additional receptors when it is fully funded.

This corridor is located in the Maricopa County PM10, carbon monoxide and ozone non-attainment areas. Maricopa County Non-Attainment Area means that air quality in the region does not meet National Ambient Air Quality Standards for ozone, carbon monoxide, and particulates (O3, CO, and PM10). This project is a capacity-enhancing project that requires a conformity finding and inclusion in the regional Transportation Improvement Program. It should be submitted by the MCDOT Capital Improvement Program (CIP) programming manager (Program and System Analysis Branch) for inclusion in the MAG Transportation Improvement Program to ensure MCDOT improvements are accurately modeled. The construction activities can result in some deterioration of the existing air quality on a temporary basis. Such impacts are expected to be localized and temporary. Construction activities must control dust in accordance with County Air Pollution Regulations and must obtain and comply with stipulations of a County earthmoving permit.

#### Hazardous Materials

During field investigations, no hazardous waste sites or landfills were observed within the project vicinity. A database check conducted by VISTA Information Solutions made note of five locations in the project area: One underground storage tank (UST) was removed at C.S. McCrossen Contracting (288 S. 75<sup>th</sup> Avenue). There was no evidence of leakage or soil contamination. A second UST was removed at EJM Development near the intersection of 75<sup>th</sup> Avenue and Van Buren. Again, there was no evidence of leakage or soil contamination. At Southwest Feed and Seed (350 S. 75<sup>th</sup> Avenue), a leaking underground storage tank (LUST) has contaminated the surrounding soil. However, the contamination is below the Risk Based Concentrations and therefore does not present a hazard to residents or workers in the area. This LUST case is still open, but only due to unfulfilled administrative requirements. The Autozone at 7502 W. Washington is a RCRA Small Quantity Generator, with no record of non-compliance. The West Van Buren Site is listed on the State Equivalent CERCLIS list. It is an underground plume bounded by Van Buren Street on the north, 7<sup>th</sup> Avenue on the east, Buckeye Road on the south and 83<sup>rd</sup> Avenue on the west. The plume passes beneath the center of the project area. It consists of tetrachloroethene (PCE) and trichloroethene (TCE) present in the groundwater at a depth of forty to eighty feet. There should be no danger of contact for people living or working in the area. Construction activity for this project will require the demolition or disturbance of existing structures, specifically, the abandoned Jill and Judy's Cocktails at the northwest corner of 75<sup>th</sup> Avenue and Buckeye Road. The potential existence of asbestos within the building may present a threat to residents or workers during demolition. Therefore, testing for asbestos, as well as appropriate mitigation, should be conducted prior to demolition of this building. If additional suspected hazardous materials are encountered during construction, work will cease at that location and the MCDOT Engineer will be contacted to arrange for proper treatment or disposal of these materials. .

#### NPDES Requirements

Erosion/sediment controls required for this project will be implemented in accordance with the Flood Control District of Maricopa County (FCDMC) manual entitled Drainage Design Manual for Maricopa County Arizona Volume III Erosion Control (Best

Management Practices and Erosion Control Manual for Construction Sites). The proposed widening of 75<sup>th</sup> Avenue from MC 85 to Van Buren Street will disturb more than 5 acres of land, therefore a NPDES (National Pollutant Discharge Elimination System) permit and a SWPPP (Storm Water Pollution Prevention Plan) will be required.

#### Traffic Control

Traffic will be managed by detailed traffic control plans, and by procedures and guidelines specified in the Revised 1995 Maricopa County Association of Governments Uniform Standard Specifications for Public Works Construction, Right-of-Traffic control, Section 401, Traffic Control. Existing traffic can be maintained during construction on the existing 75<sup>th</sup> Avenue pavement. The roadway improvements east of the existing pavement can be completed after the east side widening of the Roosevelt Irrigation District bridge is complete. Traffic can then be rerouted to the new pavement to allow for replacement of the existing pavement structural section. The possibility of minor (short duration) roadway closures for the railroad crossing improvements should be investigated during the design phase of the project. Final construction sequencing/phasing plans will stipulate that significant construction activities that disrupt traffic are to be performed during off-peak hours. Access to adjacent properties will be maintained during construction.

#### Traffic Patterns/Service

Potential construction impacts will be minor since existing traffic can be maintained during construction on 75<sup>th</sup> Avenue. The roadway improvements east of the existing pavement width can be completed first after the relocation of the SRP power poles and the east side widening of the Roosevelt Irrigation District bridge. Traffic can then be rerouted to the new pavement to allow for replacement of the existing pavement structural section. There exists the possibility of minor (short duration) roadway closures for the railroad crossing and improvements should be investigated during the design phase of the project. Access to businesses will be maintained on 75<sup>th</sup> Avenue during construction. These proposed improvements will upgrade the safety of the roadway by creating controlled left-turn pockets at the intersections. It will accommodate the projected increased traffic volumes due to the addition of a continual left turn for the entire length of the project. There will be minimal adverse impact to traffic patterns or services as a result of the proposed project.

#### Utilities

Please refer to the Design Concept Report for a detailed chart of existing utilities.

The following utilities are noted to be within or adjacent to the right-of-way of 75<sup>th</sup> Avenue. There is an underground sanitary sewer line (City of Phoenix) running approximately down the centerline of 75<sup>th</sup> Avenue. There is an underground waterline (City of Phoenix) running approximately down the centerline of 75<sup>th</sup> Avenue. There are four existing fire hydrants along the east side of 75<sup>th</sup> Avenue, south of the railroad line. There are water valves located at the intersections of Washington and Madison Streets. Santa Fe Pipeline Company has an underground petroleum line along the east side of 75<sup>th</sup> Avenue throughout the project limits. Southwest Gas Company has an underground gas line along the east side of 75<sup>th</sup> Avenue throughout the project limits. Salt River Project

Power has overhead 12kv power lines on the east side of 75<sup>th</sup> Avenue, running north-south, the entire length of the project. There is a 64 kv crossing at the railroad line. US West has underground conduit and pedestal boxes along the east side of 75<sup>th</sup> Avenue throughout the project limits. Additionally, fiber optic cable exists at the northern limits of the project and terminates at a junction box near the southeast corner of Van Buren Street at 75<sup>th</sup> Avenue. Roosevelt Irrigation District (RID) Canal crosses at the midpoint of the project limits. Additionally there is a concrete lined irrigation canal running parallel to Van Buren Street (south side), crossing under 75<sup>th</sup> Avenue, via dual 600 mm (24") pipe culverts. A RID pump station exists at the southeast corner of Van Buren Street at 75<sup>th</sup> Avenue. A Salt River Project- Irrigation well site exists south of the RID Canal bridge, east of 75<sup>th</sup> Avenue. There is a junction structure located at the northeast corner of MC Highway 85 and 75<sup>th</sup> Avenue. There is a Southern Pacific Railroad crossing at approximately the mid-point of the project. The following utility relocations will need to be made: overhead SRP power lines along the east side of 75<sup>th</sup> Avenue for the northern half-mile; RID irrigation canal crossing at Van Buren Street, including possible relocation of the well in the southeast quadrant; US West pedestal and junction boxes - no conflicts are anticipated with the sanitary sewer line, water line, underground petroleum pipeline, underground gas line and U.S. West fiber optics conduit. The following structural re-constructions will be required: Southern Pacific Railroad crossing upgrade for full roadway width for either the Low or Full Cost Alternatives; RID irrigation canal bridge widening; new ROW will be required. Adjustments to facilities will be coordinated with the utility owner prior to the start of construction. Prior rights will be determined during final design to identify responsibility for paying relocation costs. Utility companies with prior right will be compensated.

### **C. Socioeconomic**

The area surrounding 75<sup>th</sup> Avenue within the project limits is primarily commercial and agricultural. There is an AutoZone Distribution Center and Southwest Feed and Grain and Pet Food Processing plants located along the west side of 75<sup>th</sup> Avenue and a Freezer Services Distribution center located on the east side. The remainder of the project corridor contains neighboring agricultural fields. A Target store is under construction on the southeast corner of 75<sup>th</sup> Avenue and Van Buren Street. Access to businesses along 75<sup>th</sup> Avenue will be maintained during construction, therefore it is anticipated that economic impacts will be avoided. The mobile home residents at the northwest corner of 75<sup>th</sup> Avenue and Buckeye Road will be displaced, but will be compensated for the loss of their property.

### **Environmental Justice and Title VI**

Title VI of the Civil Rights Act of 1964 and related statutes assure that individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance, on the basis of Race, Color,

National Origin, Age, Sex, Disability. Executive Order 12898 on Environmental Justice directs that; programs, policies, and activities not have a disproportionately high and adverse human health and environmental effect on minority and low income populations. The proposed project, for operational improvement and safety enhancement, will have minimal construction impact on the residents and businesses in the existing alignment, and will not result in significant impacts on the surrounding area.

Therefore, the project is not anticipated to have any disproportionately high and adverse effects on these populations. Benefits of this project for all motorists utilizing the improved facility include increased safety, improved access, and reduced traffic congestion.

#### **D. Cultural Resources**

Limited archival information is available for the proposed 75th Avenue project area. Rodgers (2000) completed an archaeological inventory (literature review, site file check, and intensive field survey) for the proposed Buckeye Basin No. 3, a 39-acre facility located south of Van Buren Street, between 67th Avenue and 71st Avenue. Rodger's report reviews early research and archaeological mapping in the region. Figure 2 of Rodger's report indicates that the proposed 75th Avenue project area is situated near three known archaeological sites: the Fowler Ruin; the Tolleson Ruin (or El Termino), Phoenix (Phx) 1:2 GP; and, an unnamed site, AZ T:12:52(ASU). In addition, the proposed 75th Avenue project area is intersected by two historic canals (Roosevelt Canal; Salt River Valley Canal), and by at least one prehistoric canal (Canal Tolleson).

Current site file records indicate that the footprint of the proposed project area has not received the benefit of cultural resources survey. Therefore, prior to development of the property or initiation of the engineering project, the project area should be surveyed by a qualified archaeologist to determine if cultural resources are present. If an archaeological survey determines that cultural resources are present within the footprint of the project area, additional steps (eg., avoidance, testing, mitigation) may be needed. Where site avoidance is not feasible, and direct or indirect impacts to sites are anticipated, archaeological testing (limited excavation) may be used to determine if sites are significant, and hence, eligible to the State and National Register of Historic Places. Archaeological mitigation (full-scale excavation for data recovery) may be required to mitigate impacts to significant, state and national register-eligible sites.

The three phases of archaeological work (survey, testing, mitigation) generally require a permit and the completion of a consultation process. A permit to conduct archaeological work may be issued by the Arizona State Museum. In the case of a federal undertaking, Archaeological Resources Protection Act (ARPA) permits are issued by a lead federal agency. Consultation for state and federal compliance purposes requires review and comment by all parties involved in the project, and documented review and consultation with the Arizona State Historic Preservation Office (SHPO). In addition, federal requirements [as identified in Section 106 of the National Historic Preservation Act, in 36

CFR 800 implementing regulations, and by the Advisory Council on Historic Preservation and the Arizona SHPO] specify that consultations must be conducted with Native American tribes, even if the project is not located on tribal lands.

It is recommended that an archaeological survey be completed for the 75th Avenue project area. Regardless of the outcome of this survey, cultural resources consultations and archaeological testing are also recommended. The extensive nature of Hohokam land use, the presence of prehistoric and historic canals and sites, the lengthy historic occupation of the area, and modern surface disturbances, all argue in favor of a post-survey program of focused, limited subsurface testing to assure that the project area has been thoroughly investigated.

### **3. Public Involvement**

A public information meeting was held on July 11, 2001. The mobile home residents at the northwest corner of 75<sup>th</sup> Avenue and Buckeye Road expressed concern regarding the loss of their home. There were no additional unfavorable responses offered at the meeting, therefore, additional meetings or further public participation will not be necessary.

### **4. Mitigation Measures and Special Provisions**

#### Maricopa County Department of Transportation Responsibilities:

A Phase II asbestos investigation will be conducted at the abandoned building "Jill and Judy's Cocktails", located at the northwest corner of 75<sup>th</sup> Avenue and Buckeye Road.

Protected native plants within the construction limits will be impacted by the project; therefore, MCDOT will notify the Arizona Department of Agriculture at least 60 days prior to the start of construction to afford commercial salvagers the opportunity to remove and salvage these plants.

#### Contractor Responsibilities:

The Contractor shall prepare the Storm Water Pollution Prevention Plan (SWPPP).

The Contractor will submit the Notice of Intent (NOI) and the Notice of Termination (NOT) to the Environmental Protection Agency (EPA) and copies to the Arizona Department of Environmental Quality (ADEQ).

If suspected hazardous materials are encountered during construction, work shall cease at that location and MCDOT will arrange for proper treatment or disposal of those materials.

If previously unidentified cultural resources are identified during construction, work shall cease at that location and MCDOT will arrange for proper treatment of these resources.

#### **5. Clearance**

An on-call consultant, Stantec, completed this Environmental Determination Report.

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_

Craig Seppelfrick, Manager  
Environmental Planning Branch  
Maricopa County Department of Transportation

#### **Attachments**

Environmental Issues Worksheets

U.S. Fish and Wildlife Service, Listed, Candidate and Proposed Species for Maricopa County.

Arizona Game and Fish Department Correspondence Letter.

# ENVIRONMENTAL ISSUES

Project Name: 75<sup>th</sup> Avenue  
Work Order No.: 68986

Date: 7/24/01  
Site Visit: 3/29/01  
Photos: Yes

Issue	Yes	No	Study
Archaeology			X
Aquatic Ecology		X	
Terrestrial Ecology		X	
T&E Species - Fed.		X	
T&E Species - State		X	
Native Protected Plants		X	
Wildlife		X	
Riparian		X	
Wetlands		X	
Floodplains		X	
Hazardous Waste Sites			X
Prime/Statewide Farmland		X	
Section 4(f), 6(f)		X	
Social		X	
Sole Source Aquifer		X	
Air			X
Land Use		X	
ROW Required	X		
Noise			X
Visual		X	
Economic		X	
Other		X	

## ENVIRONMENTAL CLEARANCES/PERMITS REQUIRED

Clearance/Permit	Yes	No
ADEQ Water Quality Certification		X
Corps – Section 404 Individual		X
Corps – Section 404 Nationwide (NWP) NWP 14, NWP 26		X
Corps – Pre-construction Notification		X
USFWS – Section 7 or 10(a.) Consultation		X
NPDES – National Pollutant Discharge Elimination System		X
Tribal Communities	X	
State Historic Preservation Office (SHPO)	X	
Flood Control District		X
Federal Land Management Agencies		X
Other: State Land Office (ROW)		X
AZ Dept. of Agriculture Notice		X

Comments (significant impacts, unique features, special problems, sensitive issues):

**Appendix G: Geotechnical Analysis**

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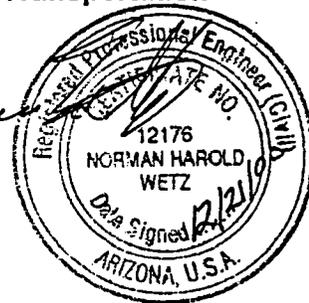
**Stantec**



**Geotechnical Investigation  
75<sup>th</sup> Avenue Road Improvements  
Between Buckeye Road (MC85) and Van Buren Street  
Maricopa County, Arizona**

Submitted to:

**Maricopa County Department of Transportation  
Phoenix, Arizona**



Submitted by:

**AMEC Earth & Environmental, Inc.  
Phoenix, Arizona**

21 December, 2000

AMEC Job No. 0-117-001121



21 December, 2000  
AMEC Job No. 0-117-001121

Joseph A. Phillips, P.E.  
Maricopa County Department of Transportation  
2901 West Durango  
Phoenix, Arizona 85009

Dear Mr. Phillips:

**Re: Geotechnical Investigation  
75<sup>th</sup> Avenue Improvements  
Between Buckeye Road (MC85)  
and Van Buren Street  
Maricopa County, Arizona**

Submitted herewith is our Geotechnical Investigation Report for the above referenced project. Included are the results of test drilling, laboratory analysis and recommended criteria for foundation design, backfill and excavation.

Should you have any questions concerning the recommendations presented in this report, please do not hesitate in contacting us.

Respectfully submitted,

**AMEC Earth & Environmental, Inc.**

Daniel N. Fréchette, Ph.D., E.I.T.

Reviewed by:



Norman H. Wetz, P.E.  
Senior Geotechnical Engineer

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c: Addressee (3)

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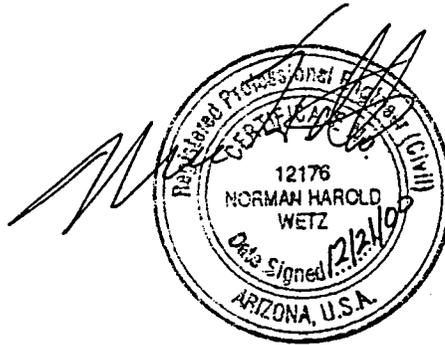


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**LIST OF APPENDICES**

- Appendix A – Field Investigation
- Appendix B – Laboratory Test Results
- Appendix C - Calculations



## **1.0 INTRODUCTION**

This report presents the results of a geotechnical investigation performed by AMEC Earth & Environmental, Inc. (AMEC) of 75<sup>th</sup> Avenue from Buckeye Road (MC85) to Van Buren Street in Maricopa County, Arizona. The purpose of the investigation was to examine the geotechnical profile beneath the site and to evaluate the engineering properties of the subsurface materials. This information was used to provide criteria for the design of foundations and pavements and to prepare recommendations related to site grading, excavation and other aspects of the project where soil properties or behavior should be considered.

## **2.0 PROJECT DESCRIPTION**

Details of the project were provided to us by Joseph A. Phillips, P.E. of the Maricopa County Department of Transportation (MCDOT). It is understood that 75<sup>th</sup> Avenue between Buckeye Road (MC85) and Van Buren Street will be improved by widening the roadway to include two lanes in each direction and a center left-turn lane. The existing bridge over the Roosevelt Irrigation District (RID) Canal also will be widened to accommodate an ultimate five-lane roadway. In addition, an at-grade railroad crossing will be upgraded.

## **3.0 INVESTIGATION**

### **3.1 Subsurface Exploration**

Six borings were advanced to depths of 5 to 30 feet below existing site grades. The borings were advanced using a CME-75 drill rig equipped with a 6 5/8-inch O.D. hollow stem auger. Standard penetration testing and open-end drive sampling were performed at selected intervals in the borings. The soils encountered during drilling were continuously examined, visually classified and logged.

Results of the field investigation are presented in Appendix A, including a brief description of drilling and sampling equipment and procedures, a site plan showing the boring locations and logs of the test borings. The field investigation was supervised by Daniel N. Fr chet, Ph.D., E.I.T., of this firm.

### **3.2 Laboratory Testing**

The moisture contents of selected soil samples were determined. Results of these tests are shown on the boring logs. Sieve analysis, plasticity index and R-values were performed on selected samples.

## **4.0 SITE CONDITIONS AND GEOTECHNICAL PROFILE**

### **4.1 Site Conditions**

The site runs the length of 75<sup>th</sup> Avenue between Buckeye Road (MC85) and Van Buren Street. 75<sup>th</sup> Avenue along this corridor is primarily a two-lane asphalt concrete paved road with occasional right turn lanes along the northbound lane. Directly to the east and west of 75<sup>th</sup> Avenue are dirt shoulders for the majority of the project. North of the railroad tracks on the east side of 75<sup>th</sup> Avenue is an agricultural field. South of the railroad tracks on the east side of 75<sup>th</sup> Avenue are industrial buildings. An irrigation canal runs along the west side of 75<sup>th</sup> Avenue. North of the railroad tracks on the west side of 75<sup>th</sup> Avenue are some buildings. South of the railroad tracks on the west side of 75<sup>th</sup> Avenue is an agricultural field. Approximately 300 feet north of the railroad tracks is an existing bridge over the Roosevelt Irrigation District (RID) Canal.

### **4.2 Geotechnical Profile**

The subsurface soils encountered at the site can be generalized into a four-strata system as follows:

- A. From the surface to depths of about 5.5 to 7.5 feet below existing grade, sandy clays and clay with lesser deposits of sandy silt were encountered. The soils varied primarily from soft to moderately firm at their in situ moisture contents.
- B. Stratum B underlies Stratum A and extends to a depth of 13.5 to 14 feet below existing grade. The soils are comprised of sandy clay similar to that of Stratum A. The soils are primarily moderately firm and appear to be more firm than Stratum A.
- C. Clayey sand and sand underlie Stratum B and extends to a depth of 29 feet below existing grade. The soils are moderately firm to firm at their relatively low moisture contents.
- D. Silty sand underlies Stratum C and extends to the full depth of the borings. These soils are generally moderately to strongly cemented and are hard.

### **4.3 Groundwater and Soil Moisture Conditions**

No free groundwater was encountered in the borings. Measured moisture contents of the soils were in the range of 5 to 27 percent.

## **5.0 DISCUSSION AND RECOMMENDATIONS**

The native soils at the surface are primarily soft and provide nominal support for asphalt concrete pavements in their current state. It is recommended that soil stabilization techniques be considered to improve the subgrade. The soil stabilization techniques examined by this firm were lime stabilization and geogrid reinforcement. Additionally, it is recommended that drilled shaft foundations be used to support the bridge spanning the RID canal.

### **5.1 Drilled Cast-in-Place Concrete Piers**

#### **5.1.1 Design Considerations**

Drilled piers are recommended for the support of the bridge crossing the RID Canal. Straight, drilled, cast-in-place concrete piers have been used extensively for the support of bridge foundations in central Arizona.

Considerable caving and sloughing of the Stratum C soils should be anticipated during the construction of drilled piers. It is anticipated that casing or slurry-assisted construction may be necessary to advance drilled pier excavations.

#### **5.1.2 Vertical Capacities**

The following Table presents safe recommended downward capacities of drilled shafts having diameters varying from 2 to 5 feet. The recommendations are for a minimum depth of embedment of 20 feet. Recommended safe downward capacities apply to full dead plus live loads and may be safely increased by one-third for total loads, including wind or seismic forces.

Drilled Shaft Diameter [ft]	Downward Capacities [kips]	
	Depth of Embedment	
	20 [ft]	25 [ft]
2.0	54	71
2.5	72	93
3.0	93	116
3.5	115	141
4.0	138	168
4.5	164	196
5.0	192	226

### 5.1.3 Lateral Loads

It is recommended that the lateral resistance of the drilled piers be analyzed using the L-Pile computer program. This procedure estimates lateral load displacement behavior using a finite difference technique based on elastic beam column theory. The behavior of the soil surrounding the laterally loaded pier is described by lateral load-transfer functions referred to as p-y curves. The soil reaction p is related to the pier deflection y for various depths below the ground surface. In general, these curves are nonlinear and depend on several parameters, including, depth, pier diameter, soil shear strength, and strain ratio or lateral subgrade reaction. Deflection, bending moment and shear profiles at specific intervals along the length of the pier are computed. The soils are sufficiently firm, and tie beams between piers are not required to resist seismic loads.

Recommended soil parameters for use in the computer program L-Pile are as follows:

Stratum	Depth (feet)	Cohesion C (psf)	$\phi$ (degrees)	Unit Weight (pcf)	Modulus of Subgrade Reaction k (pci)	Strain at 50% $\epsilon_{50}$
A	0-7.5	300	25	100	30	0.02
B	7.5-14	750	28	110	50	0.015
C	14-29	0	32	115	90	—
D	Below 29	500	36	120	225	—

### 5.1.4 Estimated Settlements

It is estimated that settlements of drilled shafts designed and constructed in accordance with the criteria presented herein will not exceed 1/2 inch.

### **5.1.5 Construction Quality Assurance**

Continuous observations of the construction of drilled shafts should be carried out by a representative of the geotechnical engineer. The geotechnical engineer should verify the proper diameter of the shafts and the nature of materials encountered in the shaft excavation. Concrete placement should be continuously observed to ensure that it meets requirements. A quality control report should be submitted on each shaft stating in writing that construction details have been observed and meet the requirements.

### **5.1.6 Cleaning of Drilled Shaft Excavations**

Drilled shaft excavations should be advanced with a single flight auger or bucket auger bits to the recommended depth. It should be verified by inspection and measurement that the excavation is open to that depth. The pier excavations should be cleaned such that no more than 3 inches of slough or loose material is present in the bottom of the hole.

### **5.1.7 Placement of Concrete**

For open holes, concrete should be placed through a hopper or other device approved by the geotechnical engineer so that it is channeled in such a manner to free-fall and clear the walls of the excavation and reinforcing steel until it strikes the bottom. Adequate compaction will be achieved by free-fall of the concrete up to the top 5.0 feet. The top 5.0 feet of concrete should be vibrated in order to achieve proper compaction. Concrete should be designed, from a strength standpoint, so that the slump during placement is in the range of 5 to 7 inches.

### **5.1.8 Geotechnical Conditions for Construction of Straight Drilled Construction**

The amount of caving is an important consideration in design and construction of drilled shafts. It is anticipated that some caving of shaft excavations will occur in the sandy Stratum C soils. Therefore, contract documents should be written to allow the contractor to employ hole stabilization and construction methods of his choice, subject to approval by the geotechnical engineer.

It also is recommended that contract documents be written in such a manner that payment will be made on the basis of "net volume" or "linear footage" in the case of straight drilled shafts. In this manner, the contractor will be responsible for selecting and employing techniques for hole stabilization and will be responsible for concrete overruns.

## 5.2 Pavements

### 5.2.1 Existing Pavement Structure

The existing pavement structure was determined from coring the pavement at four locations marked on the site plan and identified as 1, 2, 3 and 4. The results of these pavement cores are presented in the following table.

Core Location	Asphaltic Concrete (AC) Thickness (in)	Base Course Thickness (in)	Select Material Thickness (in)
1	6	6	6
2	5	6	6
3	5	4	6
4	5	4	7

### 5.2.2 Pavement Design

Pavement design analysis was performed for the paving based on grain-size analysis and Atterberg limits test data, R-value determinations, and this firm's experience with similar projects.

R-values were obtained at specified locations and are presented in the following table.

Boring No.	Depth (ft)	R-Value
1	0-5	< 5
2	0-5	5
3	0-5	< 5

R-values obtained through correlations between gradation, as provided in Arizona Department of Transportation (ADOT, 1989)<sup>1</sup> design procedures and plasticity index ranged from 12 to 26. However, these values had no influence on the design R-value based on the lack of variation in the measured R-values and the large standard deviation for correlated R-values.

Arizona Department of Transportation (ADOT, 1989) design procedures, which have been sanctioned for use by municipalities belonging to the Maricopa Association of Governments (MAG), were used to develop the thickness recommendations. Design parameters used in the analysis are summarized below:

- Design Life = 20 years
- Mean R-value = 5
- Design Resilient Modulus ( $M_r$ ) = 5,000 psi
- Traffic Data (see table below)
- Serviceability Loss = 1.4

Street Type	Average Daily Traffic (ADT)	Reliability, %	ESAL
Arterial	17,751	95	7,327,000

The solution of the AASHTO design equation using these parameters resulted in a structural number (SN) of 6.05. Upon obtaining the structural number the pavement sections were calculated. Calculations for the derivation of the structural number are presented in Appendix C.

### 5.2.3 Conventional Asphaltic Concrete

Recommendations for conventional asphaltic concrete over granular base and full thickness asphaltic concrete pavement are provided in Sections 5.2.4 and 5.2.5, respectively.

### 5.2.4 Asphaltic Concrete Over Granular Base

A typical section is defined as asphalt concrete (AC) over aggregate base course (ABC). The structural coefficients used for AC and ABC are 0.44 and 0.14. The calculated typical pavement section is presented in the table below:

<sup>1</sup> References are listed at the end of this report.



Pavement Section ID #	Asphaltic Concrete [in]	Aggregate Base Course [in]
1	6	24.5

**5.2.5 Full Depth Asphaltic Concrete**

Pavement Section ID #	Asphaltic Concrete [in]	Aggregate Base Course [in]
2	14	0

**5.2.6 Soil Stabilization Techniques**

Examining the design parameters and the subsequent pavement sections it is clear that the R-value of 5 is low resulting in relatively thick pavement sections. Due to the low R-value it is recommended that soil stabilization techniques be considered to increase the soil stability and decrease the thickness of pavement sections. Two possible techniques are lime slurry stabilization and geogrid base reinforcement, as described in Sections 5.2.6.1 and 5.2.6.2, respectively.

**5.2.6.1 Lime Stabilization**

The process of lime slurry stabilization is to mix lime and water with the soil to increase the stability of the soil. Using this technique in pavement design results in an unchanged resilient modulus, but the lime-stabilized soil is treated as part of the pavement structure, having a structural coefficient of 0.17. The structural coefficient of 0.17 is based upon the minimum design strength of 160 pounds per square inch (psi) at five days. If the strength of the actual lime-stabilized subgrade mixture is greater than 200 psi then the structural coefficient can be increased.

Based on the previous experience of this firm, it is recommended that pavement section 5 with a lime-stabilized section of 16 inches be used in design.



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Pavement Section ID #	Asphaltic Concrete [in]	Aggregate Base Course [in]	Lime Stabilized Subgrade [in]
3	6	15	8
4	6	10	12
5	6	5	16

### 5.2.6.2 Geogrid Reinforcement

In accordance with Section 202.02 of the ADOT Pavement Engineering and Design Manual (1992) the R-value used for design should be increased by 10 when a geosynthetic is used. Upon increasing the design R-value from 5 to 15, the resilient modulus was determined to be 9,500 psi.

When using a geogrid base reinforcement it is recommended that a separation geotextile fabric be placed beneath the geogrids to prevent contamination of the aggregate base materials from the underlying clays.

Pavement Section ID #	Asphaltic Concrete [in]	Aggregate Base Course [in]
6	6	16
7	11.5	0

### 5.2.7 Materials Quality and Construction Requirements

The materials quality and construction requirements should conform to the following sections of the current "Uniform Standard Specifications for Public Works Construction" sponsored and prepared by the Maricopa Association of Governments (MAG):

<u>Item</u>	<u>Section(s)</u>
Untreated Base	310 & 702.2
Asphaltic Concrete	321 & 710
Lime Slurry Stabilization	309
Subgrade Preparation	301



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The current "Uniform Standard Specifications for Public Works Construction" sponsored and prepared by the Maricopa Association of Governments (MAG) does not include a section on the materials and construction requirements for geogrid and geotextiles. Therefore, it is recommended that the "ADOT Standard Specifications for Road and Bridges" (2000) Section 306 be followed as a guideline.

The type of seal coat should be determined based on construction performance.

### **5.2.8 Asphaltic Concrete**

Asphaltic concrete mixtures should be designed to meet the requirements of the most recent version (MAG, 2000) of MAG 710 using Marshall or Superpave™ mix design methods. Marshall mix designs should be performed in accordance with the requirements of The Asphalt Institute's MS-2. Superpave™ mix designs should be performed in accordance with The Asphalt Institute's SP-2. It is recommended that 'below the restricted zone' aggregate gradings be used for the arterial and collector roads. Aggregate gradings 'above or below the restricted zone' may be used for the general local roads. Mixtures utilizing aggregate gradings above the restricted zone generally have a finer appearance and are preferred where aesthetics are important to the end user or agency (e.g., parking lots and local residential roads).



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## REFERENCES

Arizona Department of Transportation (ADOT), Materials Group, 1999, Materials Testing Manual.

Maricopa Association of Governments, 1998, Uniform Specifications for Public Works Construction.

Arizona Department of Transportation (ADOT) Standard Specifications for Road and Bridge Construction, 2000.

Arizona Department of Transportation (ADOT), Materials Group, 1992, Materials, Preliminary Engineering and Design Manual.

**APPENDIX A**  
**FIELD INVESTIGATION**



## TEST DRILLING EQUIPMENT & PROCEDURES (Cont.)

Sampling Procedures Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In many cases, 2-inch O.D., 1 3/8-inch I.D. samples are used to obtain the standard penetration resistance. "Undisturbed" samples of firmer soils are often obtained with 3-inch O.D. samples lined with 2.42-inch I.D. brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samples in 6-inch increments. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per 6 inches on the boring logs. "Undisturbed" sampling of softer soils is sometimes performed with thin walled Shelby tubes (ASTM D1587), pitcher samplers, Denison samplers or continuous CME samplers. Where samples of rock are required, they are obtained by NQ diamond core drilling (ASTM D2113). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Also, representative samples are obtained from the cuttings from the hammer and Schramm drill rig.

Boring Records Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares the boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the boring logs.



## TEST DRILLING EQUIPMENT & PROCEDURES

### Description of Subsurface Exploration Methods

**Auger Boring** Drilling through overburden soils is performed with 6 5/8-inch O.D., 3 1/4-inch I.D. hollow stem auger or 4 1/2-inch solid stem continuous flight auger. Carbide insert teeth are normally used on bits so they can penetrate soft rock or very strongly cemented soils. A CME-75 truck-mounted drill rig is used to advance the auger. The drill rigs are powered with six-cylinder Cummins diesel engines capable of delivering about 11.4 kN-m torque to the drill spindle. The spindle is advanced with twin hydraulic rams capable of exerting 90 kN (20,000 pounds) downward force.

Generally, refusal to penetration of the auger is adopted as top of the SGC or "river-run" material or harder bedrock, which require other techniques for penetration. Grab samples or auger cuttings may be taken as necessary. Standard penetration tests or 2.42-inch diameter ring samples are taken in conjunction with the auger borings as needed, with the sampling interval and type being indicated on the boring logs.

**Hammer Drill** Drilling with the Hammer drill is accomplished with a Drill Systems AP-1000 drill rig advancing a double-walled drive casing with a link-belt 180 diesel pile driving hammer, having a rated energy of 8,100 foot-pounds per blow. Where noted on the boring log, the hammer is equipped with a supercharger which can boost the energy to approximately 12,000 foot-pounds per blow. The supercharger is used only in portions of the boring where blow counts are relatively high. Cuttings are removed with compressed air by a reverse circulation process, and are collected in a cyclone from which grab samples are obtained. The drive casing is either 9-inch O.D. by 6-inch I.D. or 6 5/8-inch O.D. by 4-inch I.D. and employs an expendable bit of slightly larger diameter than the O.D. of the casing. Hammer blows required to advance the drive casing are recorded in 1-foot increments, as noted on the boring logs. Standard penetration tests or 2.42-inch diameter ring samples taken are noted on the boring logs.

**Core Boring** Rock core samples are retrieved using a CME-75 drill rig, SAITECH GH 3 rig or Burley 2500, 4500 or 4000. The GH 3 is a portable hydraulic core drill. The GH 3 is powered by a Kohler two-cylinder 25-horsepower engine. The hydraulics motor which feeds a two-speed transmission and powers the BW spindle. This unit has a 3-foot stroke and is hand-fed with a 2,000 pound push-pull capability. The GH 3 has the capability of drilling with either B- or N-size core steel using standard or wireline systems. N-size core is the preferred size and it has a nominal O.D. of about 2 inches. The Burley 2500 and 4500 series are portable hydraulic core drills. The 4500 series is capable of a track-mounted or skid-type chassis. The Burley 2500 and 4500 series are powered by 44 and 75 HP power units, respectively, provide up to 2,000 foot-pounds (ft.-lbs.) of torque and in excess of 1,000 revolutions per minute (RPM) of spindle speed. Both rigs are capable of retrieving either N- or H-sized core using wireline systems. The N-size core has a nominal O.D. of about 2 inches and the H-size of about 2.4 inches. The Burley 4000 is a track-mounted core drill.

The CME-75 utilizes a wireline core drilling system that takes N-size cores. Using the NQ wireline system, core is recovered quickly by retrieving the core-laden inner tube through the drill string.



## TEST DRILLING EQUIPMENT & PROCEDURES (Cont.)

Sampling Procedures Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In many cases, 2-inch O.D., 1 3/8-inch I.D. samples are used to obtain the standard penetration resistance. "Undisturbed" samples of firmer soils are often obtained with 3-inch O.D. samples lined with 2.42-inch I.D. brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samples in 6-inch increments. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per 6 inches on the boring logs. "Undisturbed" sampling of softer soils is sometimes performed with thin walled Shelby tubes (ASTM D1587), pitcher samplers, Denison samplers or continuous CME samplers. Where samples of rock are required, they are obtained by NQ diamond core drilling (ASTM D2113). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Also, representative samples are obtained from the cuttings from the hammer and Schramm drill rig.

Boring Records Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares the boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the boring logs.

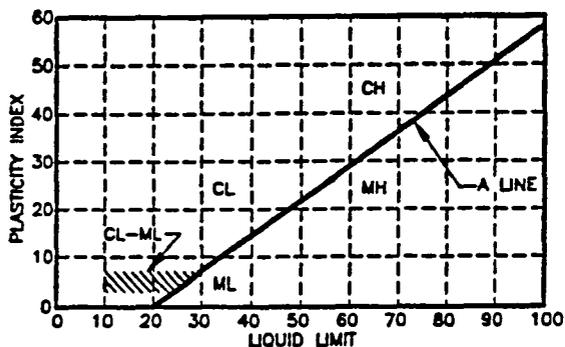
## UNIFIED CLASSIFICATION SYSTEM FOR SOILS

Soils are visually classified by the Unified Soil Classification System on the boring logs presented in this report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System" ASTM Designation: D2487.

MAJOR DIVISION		GRAPH SYMBOL	GROUP SYMBOL	TYPICAL DESCRIPTION	
<b>COARSE-GRAINED SOILS</b> (Less than 50% passes No. 200 sieve)	<b>GRAVELS</b> (50% or less of coarse fraction passes No. 4 sieve)		GW	Well graded gravels, gravel-sand mixtures or sand-gravel-cobble mixtures.	
			GP	Poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.	
		<b>GRAVELS WITH FINES</b> (More than 12% passes No. 200 sieve)		GM	Silty gravels, gravel-sand-silt mixtures.
				GC	Clayey gravels, gravel-sand-clay mixtures.
	<b>SANDS</b> (More than 50% of coarse fraction passes No. 4 sieve)		SW	Well graded sands, gravelly sands.	
			SP	Poorly graded sands, gravelly sands.	
		<b>SANDS WITH FINES</b> (More than 12% passes No. 200 sieve)		SM	Silty sands, sand-silt mixtures.
				SC	Clayey sands, sand-clay mixtures.
<b>FINE-GRAINED SOILS</b> (50% or more passes No. 200 sieve)	<b>SILTS</b> LIMITS PLOT BELOW "A" LINE & HATCHED ZONE ON PLASTICITY CHART		ML	Inorganic silts, clayey silts with slight plasticity.	
			MH	Inorganic silts of high plasticity, silty soils, elastic silts.	
	<b>CLAYS</b> LIMITS PLOT ABOVE "A" LINE & HATCHED ZONE ON PLASTICITY CHART		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	
			CH	Inorganic clays of high plasticity, fat clays, silty and sandy clays of high plasticity.	

**NOTE:** Coarse-grained soils with between 5% & 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone on the plasticity chart to have dual symbol.

**PLASTICITY CHART**



**DEFINITIONS OF SOIL FRACTIONS**

SOIL COMPONENT	PARTICLE SIZE RANGE
Boulders	Above 300mm (12in.)
Cobbles	300mm to 75mm (12in. to 3in.)
Gravel	75mm (3in.) to No. 4 sieve
Coarse gravel	75mm to 19mm (3in. to 3/4in.)
Fine gravel	19mm (3/4in.) to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

**TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY,  
CONSISTENCY OR FIRMNESS OF SOILS**

The terminology used on the boring logs to describe the relative density, consistency or firmness of soils relative to the standard penetration resistance is presented below. The standard penetration resistance (N) in blows per foot is obtained by the ASTM D1586 procedure using 2" O.D., 1 3/8" I.D. samplers.

1. **Relative Density.** Terms for description of relative density of cohesionless, uncemented sands and sand-gravel mixtures.

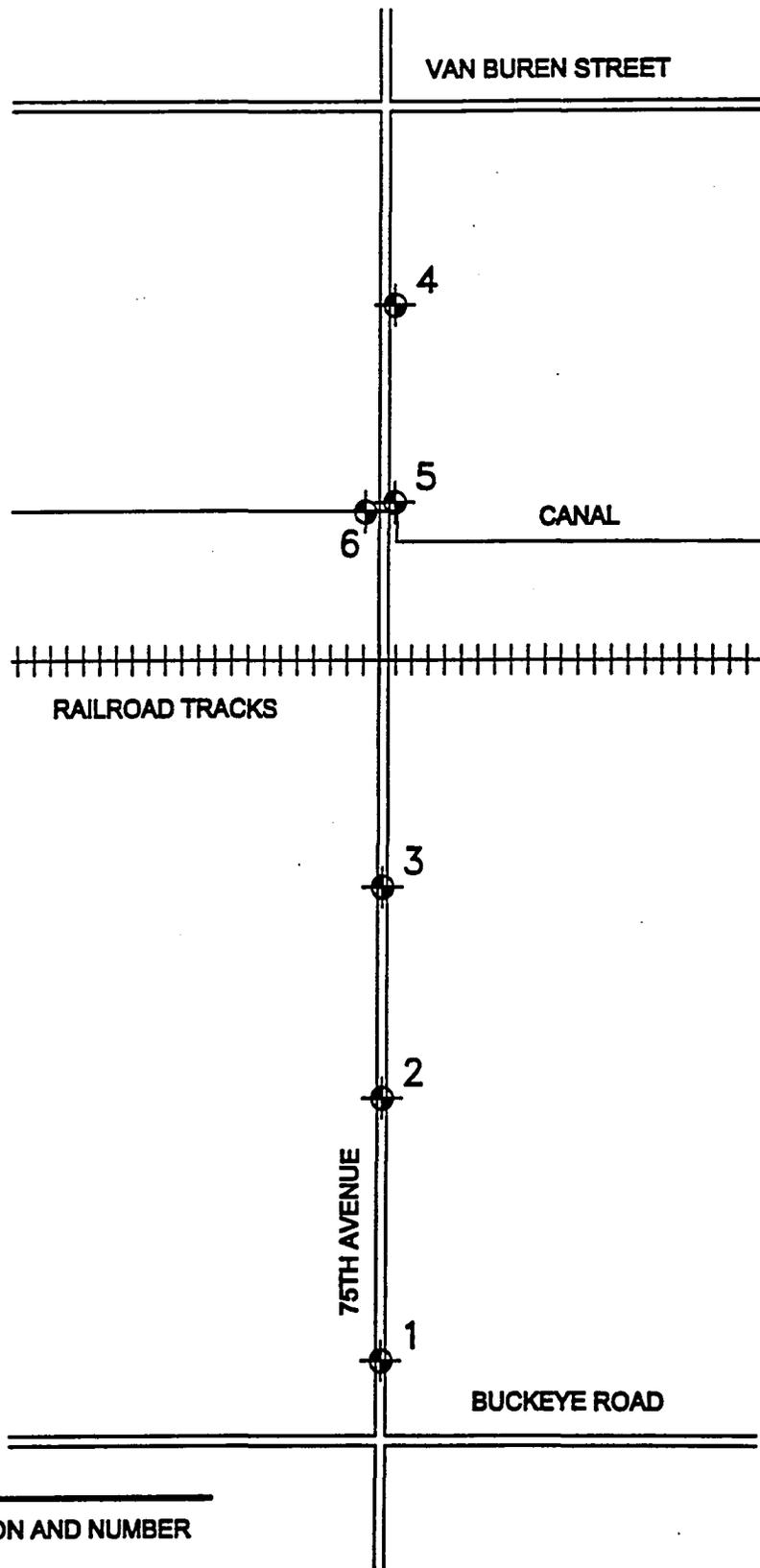
<u>N</u>	<u>Relative Density</u>
0-4	Very loose
5-10	Loose
11-30	Medium dense
31-50	Dense
50+	Very dense

2. **Relative Consistency.** Terms for description of clays which are saturated or near saturation.

<u>N</u>	<u>Relative Consistency</u>	<u>Remarks</u>
0-2	Very soft	Easily penetrated several inches with fist.
3-4	Soft	Easily penetrated several inches with thumb.
5-8	Medium stiff	Can be penetrated several inches with thumb with moderate effort.
9-15	Stiff	Readily indented with thumb, but penetrated only with great effort.
16-30	Very stiff	Readily indented with thumbnail.
30+	Hard	Indented only with difficulty by thumbnail.

3. **Relative Firmness.** Terms for description of partially saturated and/or cemented soils which commonly occur in the Southwest including clays, cemented granular materials, silts and silty and clayey granular soils.

<u>N</u>	<u>Relative Firmness</u>
0-4	Very soft
5-8	Soft
9-15	Moderately firm
16-30	Firm
31-50	Very firm
50+	Hard



**EXPLANATION**

 BORING LOCATION AND NUMBER



JOB NO. 0-117-001121

DESIGN: DNF

DRAWN: GWH

DATE: 10/00

SCALE: 1"=750'

**SITE PLAN SHOWING  
BORING LOCATIONS**

**75TH AVENUE  
IMPROVEMENTS**



PROJECT 75th Avenue Improvements



JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth In Feet	Blows Per Foot	Graphical Log	Sample	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
									0	
			A						moderately firm	
			S	3-4-5			15			
5			S	5-7- 12						
10										
15										
20										
25										

Stopped Auger at 4'6"  
 Stopped Sampler at 6'

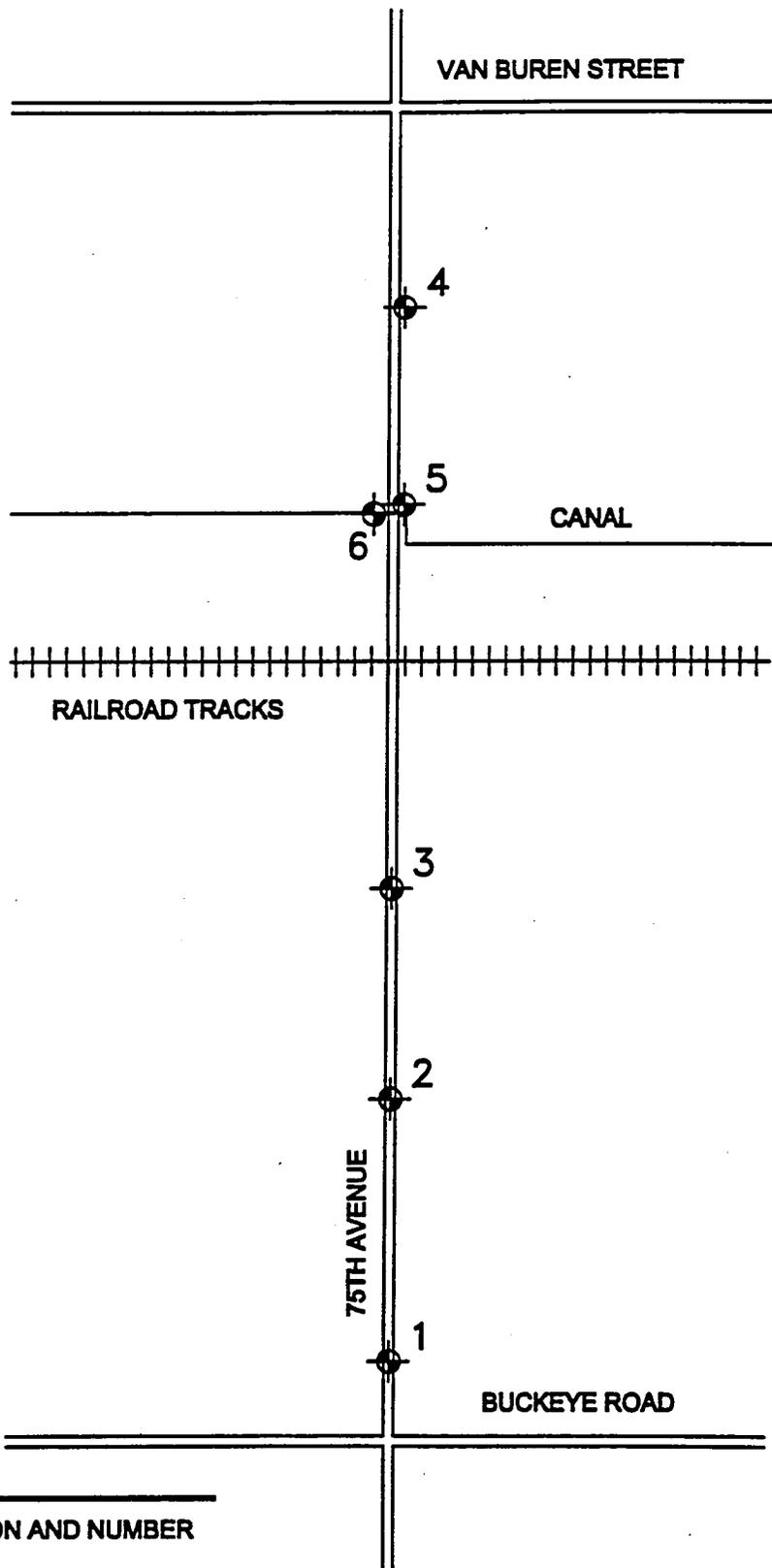
BORING LOG 01171121.GPJ AGRA\_PHX.GDT 11/27/00

GROUNDWATER

SAMPLE TYPE

DEPTH(ft)	HOUR	DATE
▽	none	
▽		
▽		
▽		

- A - Drill cuttings; NR - No Recovery
- S - 2" O.D. 1.38" I.D. tube sample
- U - 3" O.D. 2.42" I.D. tube sample
- T - 1" O.D. thin-walled tube sample
- D - 2.5" O.D. 1.9" I.D. tube sample
- C - California sample



**EXPLANATION**

 BORING LOCATION AND NUMBER

JOB NO. 0-117-001121
DESIGN: DNF
DRAWN: GWH
DATE: 10/00
SCALE: 1"=750'

**SITE PLAN SHOWING  
BORING LOCATIONS**

---

**75TH AVENUE  
IMPROVEMENTS**



PROJECT 75th Avenue Improvements



JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth in Feet	Blows Per Foot	Graphical Log	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
								0	
			A				moderately firm		
			S	3-4-5		15			
5			S	5-7- 12					
10									
15									
20									
25									

REMARKS: slightly moist to moist, moderately firm

VISUAL CLASSIFICATION: 6" of Asphaltic Concrete over 6" of Aggregate Base Course, 6" of select SANDY CLAY, predominantly fine grained sand, weakly lime cemented, medium to high plasticity, brown

Stopped Auger at 4'6"  
 Stopped Sampler at 6'

BORING LOG 01171121.GPJ\_AGRA\_PHX\_GDT 11/27/00

GROUNDWATER

SAMPLE TYPE

DEPTH(R)	HOUR	DATE
▽	none	
▽		
▽		
▽		

- A - Drill cuttings; NR - No Recovery
- S - 2" O.D. 1.38" I.D. tube sample
- U - 3" O.D. 2.42" I.D. tube sample
- T - 1" O.D. thin-walled tube sample
- D - 2.5" O.D. 1.9" I.D. tube sample
- C - California sample

PROJECT 75th Avenue Improvements



JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth in Feet	Blows Per Foot	Graphical Log	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0							CL	slightly moist to moist	5" of Asphaltic Concrete over 6" of Aggregate Base Course over 6" of Select <b>SANDY CLAY</b> , predominantly fine grained sand, medium plasticity, brown  note: weakly lime cemented below 5'
	A							moderately firm to firm	
	S 5-5-6			17					
5			S 6-9-10						
10									Stopped Auger at 4'6" Stopped Sampler at 6'
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

BORING LOG 01171121.GPJ AGRA\_PHX.GDT 11/27/00

GROUNDWATER		
DEPTH(ft)	HOUR	DATE
▽	none	
▽		
▽		
▽		

- SAMPLE TYPE**
- A - Drill cuttings; NR - No Recovery
  - S - 2" O.D. 1.38" I.D. tube sample
  - U - 3" O.D. 2.42" I.D. tube sample
  - T - 1" O.D. thin-walled tube sample
  - D - 2.5" O.D. 1.9" I.D. tube sample
  - C - California sample

PROJECT 75th Avenue Improvements



JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth In Feet	Blows Per Foot	Graphical Log	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0							CL	slightly moist to moist	5" of Asphaltic Concrete over 4" of Aggregate Base Course over 6" of Select
			A					moderately firm	<b>SANDY CLAY</b> , trace of silt, medium to fine grained, medium to high plasticity, brown
			S	3-4-5		15			note: trace of root in hole
5			S	5-7-8					
									Stopped Auger at 4'6" Stopped Sampler at 6'
10									
15									
20									
25									

BORING LOG 01171121.GPJ AGRA\_PIX.GDT 11/27/00

GROUNDWATER

DEPTH(ft)	HOUR	DATE
∇	none	
∇		
∇		
∇		

**SAMPLE TYPE**  
 A - Drill cuttings; NR - No Recovery  
 S - 2" O.D. 1.38" I.D. tube sample  
 U - 3" O.D. 2.42" I.D. tube sample  
 T - 1" O.D. thin-walled tube sample  
 D - 2.5" O.D. 1.9" I.D. tube sample  
 C - California sample



PROJECT 75th Avenue Improvements

JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth In Feet	Blows Per Foot	Graphical Log	Sample	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								CL	moist soft 5" of Asphaltic Concrete over 4" of Aggregate Base Course over 7" of Select CLAY, trace of fine grained sand, medium to high plasticity, brown	SANDY CLAY, predominantly fine grained sand, medium plasticity, brown
			A							
			S	3-2-3			27			
			S	3-4-4						
5								CL	moist soft	Stopped Auger at 4'6" Stopped Sampler at 6'
10										
15										
20										
25										

BORING LOG 01171121.GPJ AGRA\_PHX.GDT 11/27/00

DEPTH(ft)	HOUR	DATE
▽	none	
▽		
▽		
▽		

**SAMPLE TYPE**  
 A - Drill cuttings; NR - No Recovery  
 S - 2" O.D. 1.38" I.D. tube sample  
 U - 3" O.D. 2.42" I.D. tube sample  
 T - 1" O.D. thin-walled tube sample  
 D - 2.5" O.D. 1.9" I.D. tube sample  
 C - California sample

PROJECT 75th Avenue Improvements



JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth in Feet	Blows Per Foot	Graphical Log	Sample Type	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			S	9-7-5				CL	slightly moist to moist  moderately firm	SANDY CLAY, trace of gravel, predominantly fine grained sand, medium plasticity, dark brown to brown
			S	2-3-3				CL-CH	moist  soft	CLAY, trace of sand, medium to high plasticity, dark brown to brown
5			S	3-4-3						
								CL	moist  soft to moderately firm	SANDY CLAY, medium to fine grained sand, medium plasticity, brown to light brown
10			U	20	99.5	20				
								SM	moist  firm	SILTY SAND, trace of fine grained gravel, predominantly fine grained, nonplastic, brown
15			S	7-7-10			7			
								SC	moist  firm	CLAYEY SAND, medium to fine grained, low plasticity, brown
20			S	8-9-12						
								SP-SM	moist  firm	SAND, trace of silt, fine grained gravel, well graded, nonplastic, brown
25			S	8-10-12			5			

BORING LOG 01171121.GPJ AGRA\_PHX.GDT 11/27/00

GROUNDWATER

SAMPLE TYPE

- A - Drill cuttings; NR - No Recovery
- S - 2" O.D. 1.38" I.D. tube sample
- U - 3" O.D. 2.42" I.D. tube sample
- T - 1" O.D. thin-walled tube sample
- D - 2.5" O.D. 1.9" I.D. tube sample
- C - California sample

DEPTH(ft)	HOUR	DATE
▽	none	
▽		
▽		
▽		

PROJECT 75th Avenue Improvments



JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth in Feet	Blows Per Foot	Graphical Log	Sample	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
25			X					SP-SM	moist firm	SAND, continued
30			X S	50/6"				SM	slightly moist hard	SILTY SAND, predominantly fine grained, moderately to strongly cemented, low plasticity, light brown
35										Stopped Auger at 29'6" Stopped Sampler at 30'
40										
45										
50										

BORING LOG 01171121.GPJ\_AGRA\_PHX.GDT 11/27/00

GROUNDWATER

SAMPLE TYPE

DEPTH(ft)	HOUR	DATE
▽	none	
▽		
▽		
▽		

- A - Drill cuttings; NR - No Recovery
- S - 2" O.D. 1.38" I.D. tube sample
- U - 3" O.D. 2.42" I.D. tube sample
- T - 1" O.D. thin-walled tube sample
- D - 2.5" O.D. 1.9" I.D. tube sample
- C - California sample



JOB NO. 0-117-001121 DATE 11/3/00

LOCATION See Site Plan  
 RIG TYPE CME-75  
 BORING TYPE 6 5/8" Hollow Stem Auger  
 SURFACE ELEV. \_\_\_\_\_  
 DATUM \_\_\_\_\_

Depth In Feet	Blows Per Foot	Graphical Log	Sample	Sample Type	Blow Count	Dry Density lbs. per Cubic ft.	Moisture Content Percent of Dry Weight	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			S	10-7-8				ML	slightly moist moderately firm	SANDY SILT, medium to fine grained sand, trace of fine grained gravel, low plasticity, light brown
								CL		
			S	3-4-5			17		slightly moist to moist moderately firm	SANDY CLAY, medium to fine grained sand, medium plasticity, brown
			S	3-3-2			24	CL	moist soft	CLAY, trace of fine grained sand, medium to high plasticity, brown to dark brown
5								CL		
								CL	moist moderately firm	SANDY CLAY, medium to fine grained sand, medium plasticity, brown to dark brown
			S	6-7-8			16			
10										
			U	14		102.5	11	SC	moist moderately firm to firm	SILTY SAND, trace of fine grained gravel, predominantly fine grained sand, low plasticity to nonplastic, brown  note: clay content increases from 19' to 22'
15										
			S	4-6-10			24			
20										
			S	6-7-8			7	SP		SAND
25										

BORING LOG 01171121.GPJ AGRA\_PHX.GDT 11/27/00

GROUNDWATER

DEPTH(ft)	HOUR	DATE
▽	none	
▽		
▽		
▽		

**SAMPLE TYPE**  
 A - Drill cuttings; NR - No Recovery  
 S - 2" O.D. 1.38" I.D. tube sample  
 U - 3" O.D. 2.42" I.D. tube sample  
 T - 1" O.D. thin-walled tube sample  
 D - 2.5" O.D. 1.9" I.D. tube sample  
 C - California sample

**APPENDIX B**  
**LABORATORY TEST RESULTS**





PROJECT: 75th Ave Road Improvements  
LOCATION: Van Buren to Buckeye  
MATERIAL: insitu  
SAMPLE SOURCE: SEE BORING

JOB NO: 0-117-001121  
WORK ORDER NO: 1  
LAB NO: SEE BELOW  
DATE SAMPLED: 11/7/00

DENSITY OF SOIL IN PLACE BY THE DRIVE-CYLINDER METHOD(ASTM D2937)

LAB #	BORING	MOISTURE			NUMBER OF RINGS	WET WGT. + RINGS (g)	WEIGHT OF RINGS (g)	DRY DENSITY (pcf)
		WET WT. (g)	DRY WT. (g)	MOISTURE CONTENT				
16	#5 @ 9.5-10.5	829.5	692.9	19.7%	5.0	945.3	225.9	99.5
25	#6 @ 14.5-15.5	438.0	395.3	10.8%	5.0	914.1	228.2	102.5



PROJECT: 75th Avenue Road Improvements  
LOCATION: Van Buren to Buckeye  
MATERIAL: Gravel, sand and clay  
SAMPLE SOURCE: #1 @ 1.5-5"

JOB NO: 117001121  
WORK ORDER NO: 1  
LAB NO: 3  
DATE SAMPLED: 11/07/00

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RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (ASTM D2844)

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**SPECIMEN I. D.**

Moisture Content  
Compaction Pressure (psi)  
Specimen Height (inches)  
Dry Density (pcf)  
Horiz. Pres. @ 1000lbs (psi)  
Horiz. Pres. @ 2000lbs (psi)  
Displacement  
Expansion Pressure (psi)  
Exudation Pressure (psi)  
R Value

R - VALUE IS LESS THAN 5

SAMPLE EXTRUDED FROM BOTTOM OF MOLD

**APPENDIX C**  
**CALCULATIONS**



**Description: Development of Structural Number using in-situ soil**

Arizona Department of Transportation  
 Pavement Design Procedure  
 Preliminary Engineering and Design Manual, 1989  
 Chapter 2 - Pavement Design

$$R_{mean} = \frac{N_t R_t \sigma_c^2 + N_c R_c \sigma_t^2}{N_t \sigma_c^2 + N_c \sigma_t^2}$$

Number of R-Value Tests

Number of Correlated R-Values

5	
5	
5	

19		
26		
19		
12		

Mean of R-value Tests   
 Strd. Dev. of R-Value Tests   
 Mean R-value

Mean of Correlated R-Values   
 Strd. Dev. of Correlated Values   
 Seasonal Variation Factor

Calculated Resilient Modulus  psi  
 ADOT Recommended  
 Maximum Resilient Modulus  psi  
 Design Resilient Modulus  psi

$$M_R = \frac{1815 + 225 * R_{mean} + 2.4 * R_{mean}^2}{0.6 * SVF^{0.6}}$$

Standard Normal Deviate

Equivalent 18-k Single Axle Loads

Design Sevicability Loss

Structural Number  -0.0004

To Calculate Structural Number go to "Formula" Pulldown  
 Select "Goal Seek" Enter Set Cell   
 To Value   
 By Changing Cell

$$\log_{10}(W_{18}) = Z_R * S_O + 9.36 * \log_{10}(SN + 1) - 0.20 + \frac{\log_{10} \frac{\Delta PSI}{1094}}{0.40 + \frac{1}{(SN + 1)^{5.19}}} + 2.32 * \log_{10}(M_R) - 8.07$$



**Description: Development of Structural Number Using Geogrid**

Arizona Department of Transportation  
 Pavement Design Procedure  
 Preliminary Engineering and Design Manual, 1989  
 Chapter 2 - Pavement Design

$$R_{mean} = \frac{N_t R_t \sigma_c^2 + N_c R_c \sigma_t^2}{N_t \sigma_c^2 + N_c \sigma_t^2}$$

Number of R-Value Tests

Number of Correlated R-Values

5	
5	
5	

19		
26		
19		
12		

Mean of R-value Tests   
 Strd. Dev. of R-Value Tests   
 Mean R-value   
 Calculated Resilient Modulus  psi  
 ADOT Recommended Maximum Resilient Modulus  psi  
 Design Resilient Modulus  psi

Mean of Correlated R-Values   
 Strd. Dev. of Correlated Values   
 Seasonal Variation Factor

$$M_R = \frac{1815 + 225 * R_{mean} + 2.4 * R_{mean}^2}{0.6 * SVF^{0.5}}$$

Standard Normal Deviate   
 Design Sevicability Loss

Equivalent 18-k Single Axle Loads   
 Structural Number

To Calculate Structural Number go to "Formula" Pulldown  
 Select "Goal Seek" Enter Set Cell   
 To Value   
 By Changing Cell

$$\log_{10}(W_{18}) = Z_R * S_O + 9.36 * \log_{10}(SN + 1) - 0.20 + \frac{\log_{10} \frac{\Delta PSI}{4.2 - 1.5}}{0.40 + \frac{1094}{(SN + 1)^{5.19}}} + 2.32 * \log_{10}(M_R) - 8.07$$



**Stantec**

## **Appendix H: Public Meetings**

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**The Right System The Right Time The Right Cost**

**PUBLIC INVOLVEMENT**

**&**

**GOVERNMENT RELATIONS PLAN**

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**75<sup>TH</sup> AVENUE**

Design Concept Report  
*MC 85 to Van Buren Street*

**WO# 40068986**

May 21, 2001

**NOTE: THIS PROJECT IS CURRENTLY FUNDED FOR DCR ONLY**

**District 5**

**COMMUNITY AND GOVERNMENT RELATIONS DIVISION**

*The purpose of this document is to serve as a guideline only. Project components,  
dates / schedules and participants may change.*

75<sup>th</sup> Avenue  
MC 85 to Van Buren Street  
Public Involvement Plan

Design Concept Report (DCR) Phase

**Introduction**

Public information management has become increasingly important to cities, counties, state and federal government agencies. A thorough approach to public information planning and implementation is crucial to ensuring that a two-way dialogue with residents and businesses affected by construction is effective and well orchestrated.

County residents and the business community need and deserve open, ongoing communication and input for public projects that affect their homes, livelihood and community. Public information management is vitally important to Maricopa County Department of Transportation (MCDOT). Public information planning and well-organized execution of this *RightRoads Program* Public Involvement Plan and Government Relations Plan ensures two-way dialogue between affected individuals, businesses and MCDOT, as well as coordination with affected local, state, and federal agencies and jurisdictions.

The goal of this community and government relations plan (CGRP) is to share information with agencies and the general public and obtain their feedback on 75<sup>th</sup> Avenue/MC 85 to Van Buren Street Design Concept Report (DCR).

The development of a public information plan prior to project design will help guide MCDOT personnel through the public information process. The purpose of the plan is to provide an internal document to be used by the MCDOT public involvement and community relations staff, project manager and design consultant as an overview of the key elements that are crucial to successful public information management. This plan addresses a number of issues including target audiences/stakeholders, public notification needs, public meeting planning and follow-up and evaluation.

**Overview and Identification of Key Elements**

**Project Scope:** Stantec Consulting has been retained by Maricopa County Department of Transportation to develop a design concept report to study proposed improvements for 75<sup>th</sup> Avenue between MC 85 (Buckeye Road) and Van Buren Street. The purpose of this study is to use projected traffic data along with existing roadway, drainage and environmental conditions to determine the need for improvements to this section of roadway.

It is anticipated that 75<sup>th</sup> Avenue between MC 85 and Van Buren Street will be upgraded to a five-lane roadway section with curb, gutter and sidewalk. Roadway drainage will be collected by scuppers or catch basins and conveyed to landscaped trapezoidal detention basins. Recommendations for improvements will be made to widen the bridge over the Roosevelt Water Conservation District

Canal. Upgrades to the Union Pacific Railway crossing and associated utility relocations may also be included.

**Key Participants:**

- Sami Ayoub, MCDOT Project Manager
- Dan Kaminski, Stantec
- Joe Pinto, MCPOT Environmental Planning
- Roberta Crowe, MCDOT Community Relations
- Brenda Zambelli, MCDOT Governmental Relations
- Chris Banks, MCDOT Right-of-Way
- Terri Smith, ACS

**Identified Project Issues:**

- Coordination with Flood Control District of Maricopa County (FCDMC) flood plain study
- Canal/irrigation coordination
- Power line relocation
- Railroad crossing upgrade
- Addressing roadway usership: heavy truck traffic
- Canal crossing bridge upgrade
- Value Engineering to be performed on this project
- Addressing the issues and concerns of the impacted public
- Identification of agencies and concerned public
- Right-of-Way acquisition
- Multi-agency involvement and coordination
- Identification of partners and level of participation with developers and local jurisdictions
- Project scheduling and implementation phasing prioritization

**Proposed Public Meeting Schedule**

(Public Scoping-DCR)

July 11, 2001

**Stakeholders**

Public involvement activities will target many different stakeholders. These different groups include government agencies, property owners along the project area, developers, businesses, the general public, neighborhoods, civic organizations, elected officials, trucking and transportation organizations, travelers and the media. Stakeholders shall include but not be limited to the following:

- Flood Control District of Maricopa County
- City of Phoenix
- City of Tolleson
- Caesar Chavez High School
- Maricopa County Department of Transportation

- Arizona Department of Transportation
- Roosevelt Water Conservation District
- APS
- Qwest
- Union Pacific Railway
- SRP
- Developers
- Trucking industry
- Local businesses and residents

### **Public Notification**

MCDOT Community Relations will notify all interested parties of public information meetings at least two weeks prior to the meeting. Several methods can be undertaken by the MCDOT Community Relations to notify the public of design plans, upcoming meetings, and to elicit public input. These methods include:

- Paid advertising
- News releases
- Direct mail

### **Public Participation Meetings**

The goal of this public participation program is to encourage active public participation in MCDOT project design; to provide an ongoing dialogue with residents and business owners affected by County projects; to provide comprehensive, timely follow-up to concerns and needs for information; to promote good will among the public and other interested stakeholders affected by the proposed project; and to integrate measures that add value to stakeholders and remove/mitigate those features that stakeholders feel will negatively affect them.

An open house format is recommended in order to facilitate one-on-one discussion with community residents and business owners. MCDOT Community Relations should provide a sign-in sheet, an easel for staff to write public concerns and comments and evaluation cards at all meetings. In addition, a preliminary meeting summary report outlining citizen concerns and comments should be prepared by the MCDOT Community Relations within two weeks after all meetings. A final summary report will be provided thirty days after the meeting to allow the public time to mail comments to MCDOT.

The initial meeting should be held early in the project DCR schedule. The intent of this meeting is to receive input from the potentially affected public as to concerns and interests with regard to the project design. The intent, however, is not to allow the public to make decisions which are dictated by engineering conditions; it is to consider and support their input. An aerial photograph of the project area, a handout outlining the purpose, and a description of the scope of the project will be made available by the engineering consultant for citizen review.

The proposed roadway alignment(s) should be shown and alternatives. Graphic renderings of the proposed improvements and preferred alignment, cross sections, drainage plans, drainage studies,

flood way maps, aerial photographs, handouts and data used to determine the design of the improvements should be made available for citizen perusal. The expected outcome of this meeting is to find the best consensus possible among stakeholders on the project information available to date, and to provide a system for feedback to MCDOT on possible significant problems between MCDOT and their partners which need to be addressed.

### **Follow Up**

Communication is important to the successful implementation of any public participation effort. During the design process, ongoing communication with stakeholders must be maintained by the project manager through regular progress newsletters (monthly or quarterly, depending on the scope of the project), telephone conversations or one-on-one meetings.

In addition, follow-up communication should be developed and disseminated as changes and progress merits, especially with regard to specific public concerns, issues, feedback from evaluation cards (public meetings) or as events warrant.

### **Summary of Responsibilities DCR and Design Phase**

#### **MCDOT Project Manager shall:**

- Coordinate with MCDOT Community and Government Relations Division and Engineering Consultant for MCDOT to determine the necessary information to provide at public meetings
- Attend public meetings and respond to questions

#### **Stantec Consulting shall:**

- Provide names and addresses for key government agencies and public stakeholders involved in the project (Level One Stakeholders)
- Provide collateral materials for public meetings such as project fact sheets, display boards and a PowerPoint presentation, if necessary, of the proposed improvements showing alignments, typical sections, drainage features, right-of-way, and environmental considerations, project schedule, purpose/goals, issues concerns, etc.
- Develop database of stakeholders (agencies, property owners, and residences)
- Disseminate meeting notices to "Level One" stakeholders
- Prepare presentation materials for public meetings
- Provide staff assistance at public meetings
- Document and analyze comments
- Coordinate with and assist MCDOT Community and Government Relations staff as required

#### **MCDOT Community Relations shall:**

- Write and disseminate press releases as needed
- Review and approve materials prepared by Public Information Consultant for MCDOT
- Arrange meeting location

- Contract for paid advertisement as required
- Write and disseminate press kits or releases as needed
- Notify MCDOT staff of public meetings
- Provide sign-in sheets, badges, easels, audio/visual equipment, and comment cards
- Coordinate with engineering consultant for MCDOT in preparation of public meeting displays and presentations
- Compose Public Meeting Summary and Analysis Report
- Oversee and coordinate all community and/or public relations activities

**MCDOT Government Relations shall:**

- Coordinate with the MCDOT project manager and engineering Consultant for MCDOT to identify government agency contacts
- Disseminate project information to agency contacts
- Negotiate and compose required documents



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# 75th Avenue: MC 85 to Van Buren Street

## Project Purpose

A Design Concept Report is being prepared for Maricopa County Department of Transportation to assess the viable options of improving 75th Avenue.

## Proposed Improvement Goals:

- Enhance Operational Capacity of the Roadway to Accommodate Existing and Future Growth
- Increase Safety for Pedestrians and Motor Vehicles
- Control Roadway Drainage



Maricopa County  
Department of Transportation

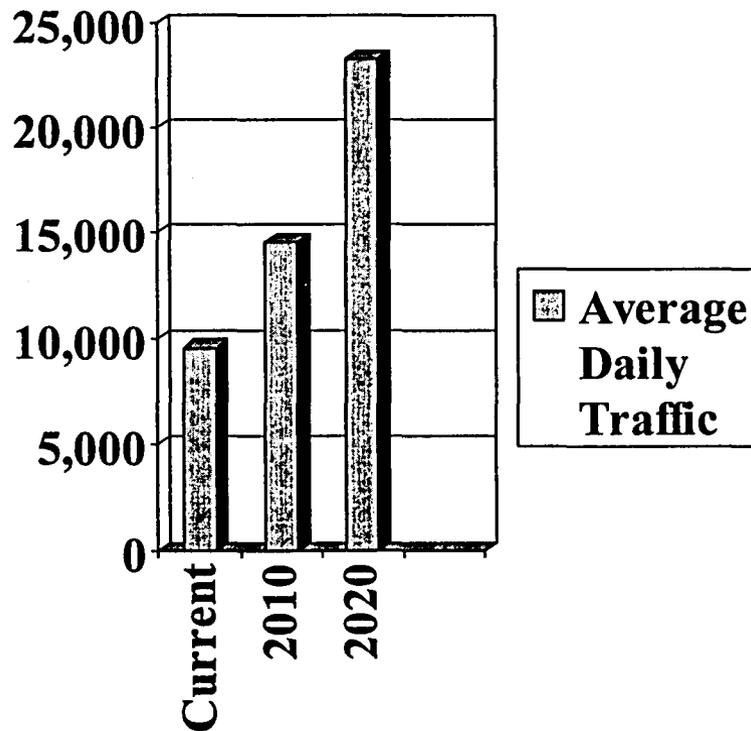




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# 75th Avenue: MC 85 to Van Buren Street

## Existing 2-Lane Roadway Traffic Data



- **Current:** Roadway is performing at a level of service which may cause drivers appreciable tension.
- **Year 2010:** With proposed City of Phoenix improvements at Van Buren Street the roadway will perform at a projected level of service which drivers will experience increased delay and tension.
- **Year 2020:** Roadway performs at a projected level of service which vehicle backups and high levels of driver delay at intersections.



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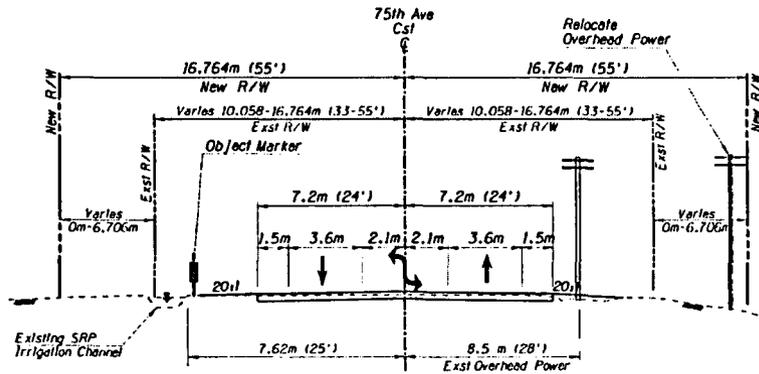




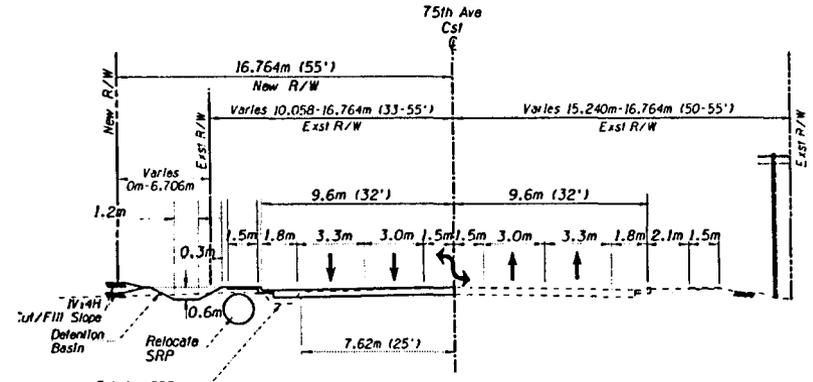
The Right System The Right Time The Right Cost

# 75th Avenue: MC 85 to Van Buren Street

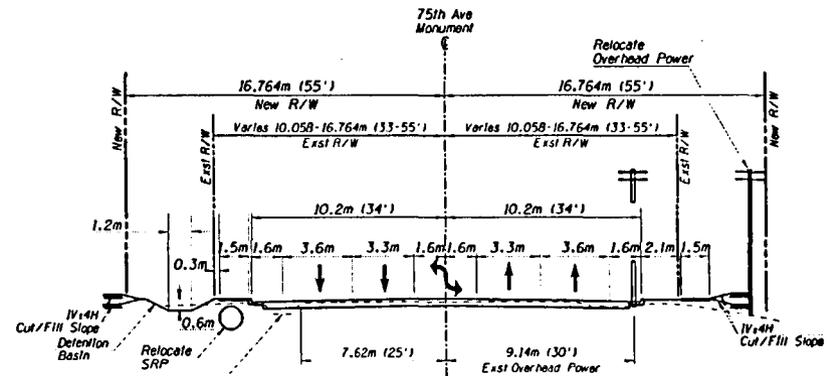
## Typical Sections



Alternative A  
3-Lane MCDOT Rural Minor Collector with Continuous Left Turn Lane



Alternative B  
5-Lane City of Phoenix Urban Arterial with Continuous Left Turn Lane



Alternative C  
5-Lane MCDOT Urban Minor Arterial with Continuous Left Turn Lane



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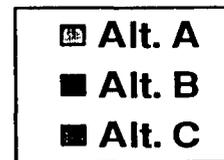
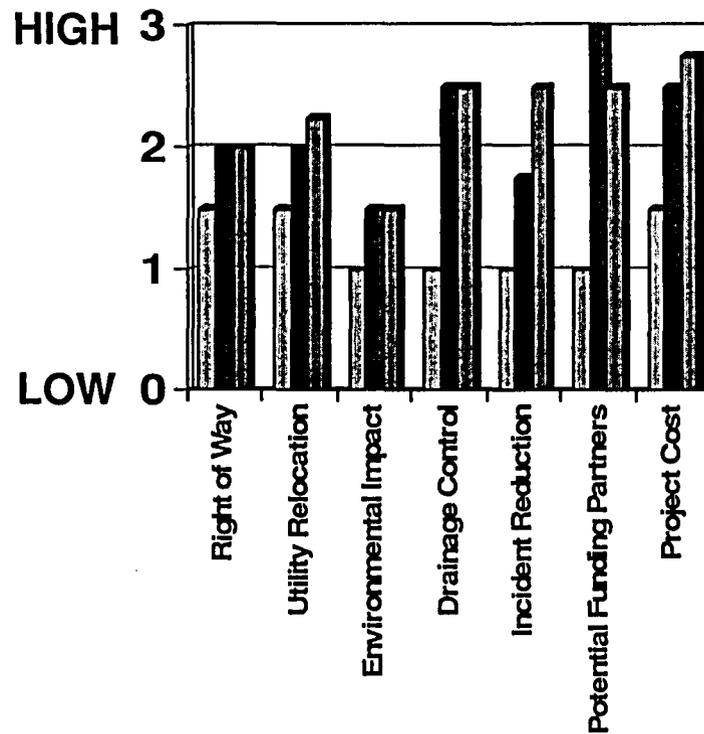




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# 75th Avenue: MC 85 to Van Buren Street

## Alternative Impact Comparison



Issues



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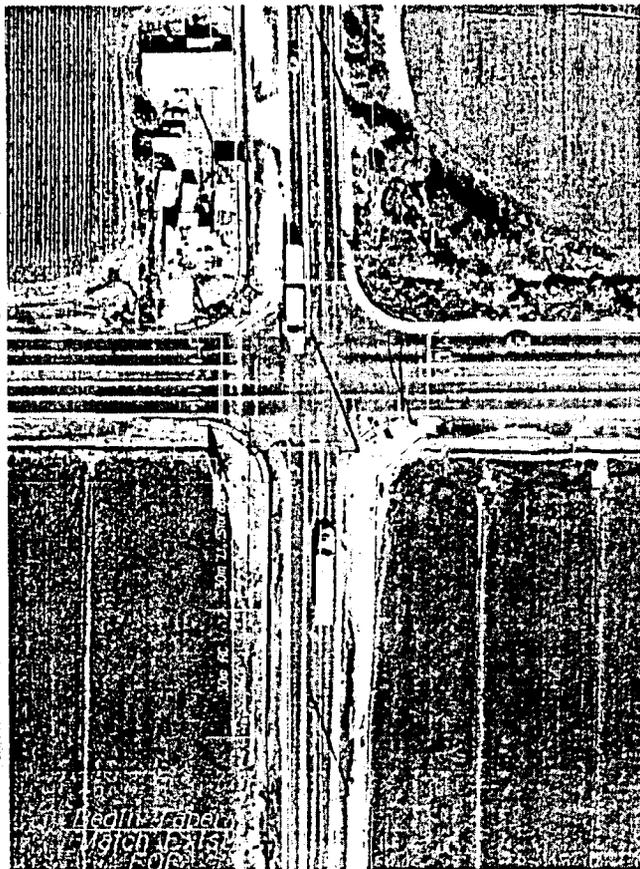


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## 75th Avenue:

# MC 85 to Van Buren Street

## 75th Avenue & MC 85



- **Alternative B & C (Shown):** Five-Lane Section on 75th Avenue and Existing Five-Lane Configuration on Buckeye Road
- **Alternative A:** No Improvements to the Intersection of 75th Avenue and Buckeye Road.



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# 75th Avenue: MC 85 to Van Buren Street

## Potential Funding Partners & Impacted Jurisdictions

- MCDOT
- City of Phoenix
- Future Developers
- City of Tolleson



Maricopa County  
Department of Transportation



Maricopa County Department of Transportation

# We Need Your Input

## 75th Avenue MC 85 to Van Buren Street

Public Open House 5:00 p.m. to 7:00 p.m.

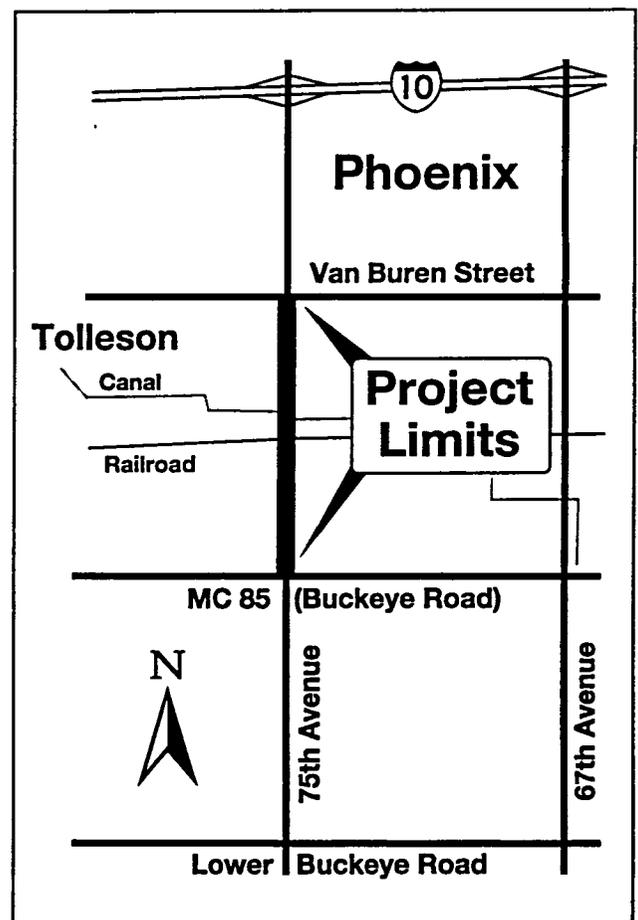
Wednesday, July 11, 2001

Santa Maria Middle School Cafeteria  
7250 West Lower Buckeye Road, Phoenix

The Maricopa County Department of Transportation's (MCDOT) **RightRoads Program** is hosting a public open house meeting to gather public input about potential improvements on 75th Avenue between MC 85 and Van Buren Street. This project is currently funded for design concept phase only. Future improvements under consideration include widening 75th Avenue to a 3-lane roadway including a continuous left-turn lane. Project goal is to increase roadway travel capacities and traffic safety. Stop by anytime between 5:00 and 7:00 p.m. to speak with MCDOT project team members.

For more information, contact Sami Ayoub at (602) 506-4662 or write to Ayoub at: MCDOT, 2901 W. Durango Street, Phoenix, AZ 85009, or e-mail at: SamiAyoub@mail.maricopa.gov.

Reasonable accommodations may be made available for people with disabilities with a minimum 72-hour notice. For more information on such accommodations, contact Roberta Crowe at (602) 506-8003.



[www.mcdot.maricopa.gov](http://www.mcdot.maricopa.gov)



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**MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION**

**COMMUNITY AND GOVERNMENT RELATIONS DIVISION**

**MEMORANDUM**

DATE: August 16, 2001

TO: Sami Ayoub, MCDOT

CC: Mike Sabatini, MCDOT; Dan Karminski, Stantec; Anh Harambasic, Stantec; Terri Leija, District 5

FROM: Roberta Crowe, MCDOT

SUBJECT: 75<sup>th</sup> Avenue/MC85-Van Buren Street DCR project overview presentation to Estrella Village Planning Committee

On Tuesday evening, August 7, 2001 Dan Karminski and Anh Harambasic, Stantec, and I appeared before the Estrella Village Planning Committee at the Fowler School District Office to present design concepts for improvements to 75<sup>th</sup> Avenue between MC85 and Van Buren Street. We discussed purpose: increased capacity, improved drainage and enhanced safety and need: 18 percent truck traffic and ADT 2010 projection of 15,000 and 2020 projection of 23,000 and coordination/partnership with developers, FCD and City of Phoenix.

Following a Q and A period, I requested the Planning Committee "endorse" or approve alternative B (City of Phoenix Urban Arterial typical section) for Design Concept phase and on through to Design phase in partnership with City of Phoenix. City of Phoenix staff (street transportation) recommended approval.

The Estrella Village Planning Committee voted unanimously to approve MCDOT's design Concept phase recommendations and to endorse the project on through design phase.



**Stantec**

## **Appendix I: Unresolved Issues**

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**Unresolved Issues-** Since we are currently at the design concept phase of this project there are issues which will require additional attention during the design phase. These issues are as follows:

A. Recommended Alternative A allows MCDOT the option to provide bike lanes along 75<sup>th</sup> Avenue within the project limits. Since 75<sup>th</sup> Avenue north and south of the project termini are within the City of Phoenix's jurisdiction providing bike lanes along 75<sup>th</sup> Avenue between the project limits may be a mute point if the City of Phoenix does not construct a typical section which offers bike lanes. The continuity of a bike lane will be disrupted. Further discussion between MCDOT and the City of Phoenix will be required to resolve this issue.

B. Recommended Alternative A provides a 20.4 meter (68 foot) typical section yet City of Phoenix 75<sup>th</sup> Avenue and Van Buren Street intersection improvements provides for a 19.2 meter (64 foot) typical section. This discontinuity in typical sections will require further discussion. The City of Phoenix's proposed typical section includes a 3.0 meter (10 foot) inside through lanes in each direction, 3.3 meter (11 foot) outside through lanes in each direction, a 3.0 meter (10 foot) continuous left turn lane, 1.8 meter (6 foot) bike lanes in each direction, curb, gutter and sidewalk. At this time it is not certain whether the striping plan for intersection improvements to Van Buren Street and 75<sup>th</sup> Avenue will offer bike lanes. The provision of bike lanes to the City of Phoenix's typical section will mean a narrower lane configuration. The 3.0 meter (10 foot) travel lane will not provide safe travel conditions for the high volume of truck traffic along this strip of roadway.

Although Alternative A has been recommended by this report, further discussion between MCDOT and the City of Phoenix may result in the construction of Alternative B or a combination of alternatives A and B. The issues addressed above are concerns pending resolution and will require additional attention during the design phase.



**Stantec**