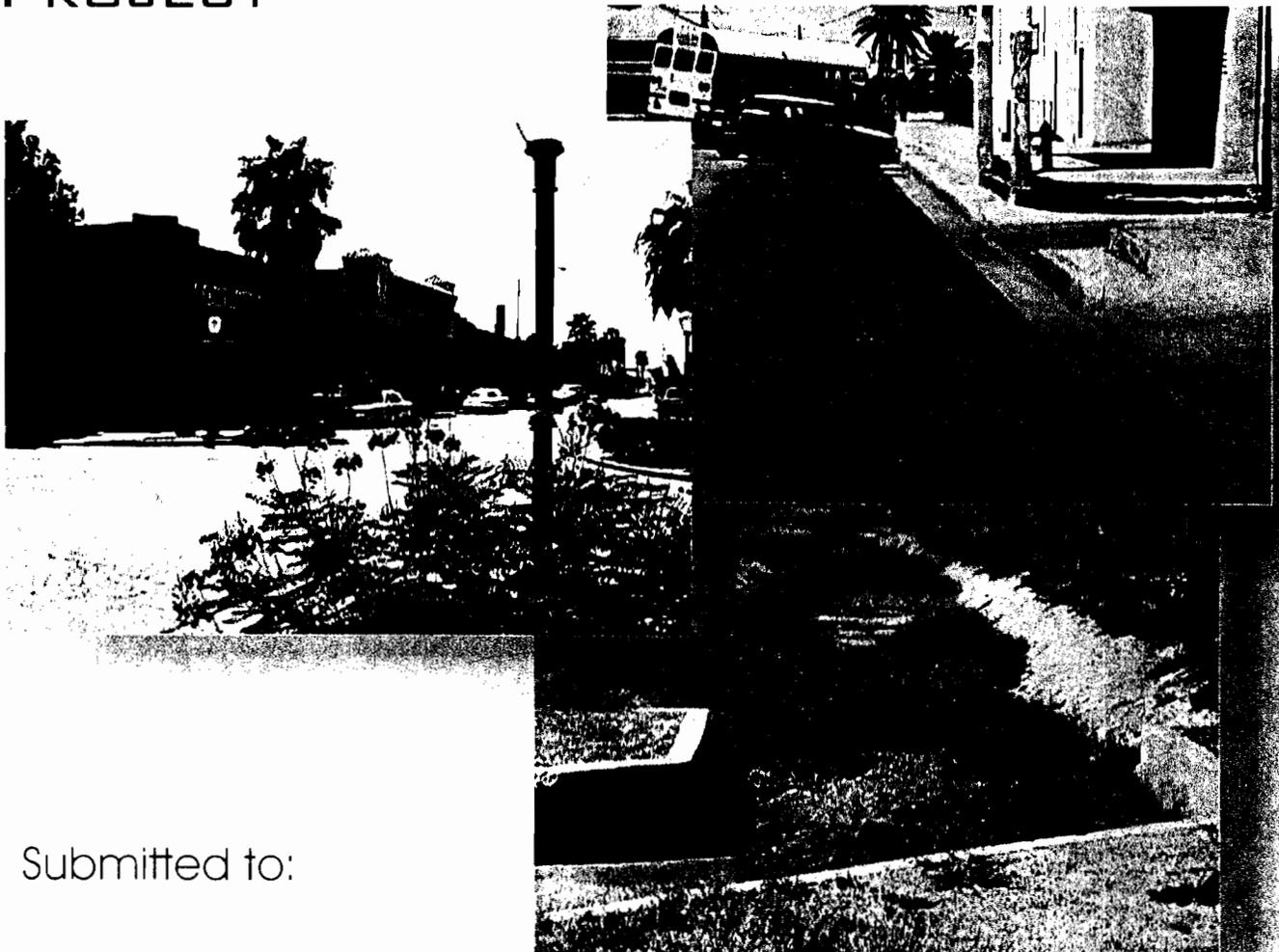




# Final Design Report

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DOWNTOWN  
STREETS  
IMPROVEMENT  
PROJECT



Submitted to:

CITY OF  
CASA GRANDE

June, 2000



ENTRANCO

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## EXECUTIVE SUMMARY

The purpose of this report is to identify and prioritize key elements of the City of Casa Grande's Downtown Streets Improvement Project. Technical specifics will include pavement drainage, utilities and streetscape goals and pavement design-year options. The proposed improvements include pavement rehabilitation/reconstruction, drainage facilities, utility replacement, and streetscape enhancements.

The following streets have been included for analysis:

- Main Avenue – Florence Street to Mercedes Street
- Main Street – Casa Grande Avenue to Maricopa Street (Proposed Bypass)
- 1<sup>st</sup> Street – Casa Grande Avenue to Wilson Street
- 2<sup>nd</sup> Street – Casa Grande Avenue to Pinal Avenue (increase on-street parking)
- 2<sup>nd</sup> Street – Pinal Avenue to Wilson Street (removal)
- 3<sup>rd</sup> Street – Picacho Street to west of Florence Street
- 4<sup>th</sup> Street – Picacho Street to Florence Boulevard
- 5<sup>th</sup> Street – Marshall Street to Florence Boulevard (removal)
- Marshall Street – Main Street to Florence Boulevard
- Florence Street – Elm Street to Florence Boulevard (reconfigure north end to align with Walnut Avenue)
- Washington Street – Main Street to alley north of 2<sup>nd</sup> Street
- Sacaton Street – Southern Pacific Railroad to Florence Boulevard
- Maricopa Street – Main Street to Florence Boulevard
- French Street – Wilson Street to Gila Bend Highway (SR 84)
- Casa Grande – 1<sup>st</sup> Street to Main Street/Jimmie Kerr Boulevard (reconfigure south end for a right angle intersection)
- Pinal Avenue – Main Street to Florence Blvd (extension south to intersect Main Street for the Long Term Downtown Bypass alignment)
- Doan Street – Casa Grande Avenue to Cameron Avenue (removal)

Preferred recommendations from the Traffic Analysis for the Downtown Redevelopment Area Report, dated May 8, 2000, prepared by Entranco, are included as part of this report. The purpose of that report is to evaluate the current and future transportation system as well as analyze traffic operation at certain intersections within the downtown area. The report include <sup>5</sup> the following key recommendations:

- Create a downtown bypass utilizing Main Street and Sacaton Street
- Reconfigure Casa Grande Avenue/Main Street intersection
- Reconfigure 2<sup>nd</sup> Street/Sacaton Street intersection
- Reduce the travel lanes of 2<sup>nd</sup> Street from four (4) to two (2) lanes and convert the existing outside lanes of 2<sup>nd</sup> Street to parking stalls
- Reconfigure north end of Florence Street to align with Walnut Avenue at Florence Boulevard and signalize intersection
- Extend Pinal Avenue south to Main Street to develop the Long Term Downtown Bypass Alignment (tie 2<sup>nd</sup> Street into Pinal Avenue)

These recommendations are consistent with the planned and on-going redevelopment of Casa Grande's downtown area, creating a pedestrian friendly core area with lower traffic speeds and on-street parking.

## **Pavement**

The analysis included a detailed examination of the existing pavement including pavement structure, failure types and pavement life. Through this analysis, it was determined which streets have adequate pavement, which require pavement rehabilitation and which streets require pavement replacement. Pavement designs for four to five-year, 10-year and 20-year design lives were generated. Based on the difference between costs associated with the different design lives, the 20-year design life should be utilized since cost savings between the shorter-term design lives and the full 20-year design life are minimal.

Two additional pavement treatments were analyzed.

- Fiber-reinforced Ultra-thin Whitetopping (Concrete)
- Grid-reinforced interlayer (Asphaltic Concrete)

Both of these alternates offer improved strength and durability over conventional pavement mix design, but at an increase in cost. The costs associated with these two alternate pavement treatments are addressed within the cost estimate.

## **Utilities**

The various utility companies having facilities within the downtown area were contacted to determine if their facilities were in need of replacement or whether they had any plans to install new utilities in the project area. Most of the utility companies did not have any plans to expand or update their facilities. They expressed their appreciation to this proactive approach and indicated that they would work with the final design team to ensure the inclusion of any improvements or new facilities planned for those areas where existing pavement would be replaced or rehabilitated.

## **Sewer Replacement/Rehabilitation**

The City of Casa Grande has identified several sewer lines that are in need of replacement or rehabilitation within the project limits. It was determined that Casa Grande sanitary sewer throughout the area is in need of replacement or repair. Costs associated with that construction is added to the costs of the various street segments. The urgency of those sewer line replacements was considered in determining the priority of street reconstruction. A map depicting sewer line condition is shown in Figure 4.

## **Drainage**

Drainage in the downtown area was analyzed to determine means to lessen flooding related to storm events. Review of the 1987 Master Drainage Study for the City of Casa Grande prepared by Carter Associates, Inc. indicated that the drainage problems were related to insufficient capacity of the drainage channel and box culverts near the French Street/SR 84 intersection to which all of the downtown area drains. A GPS survey was conducted of the gutter elevations at every intersection in the downtown area to help define flow patterns.

The key finding was that 2<sup>nd</sup> Street acts as a dividing line whereby storm water from all areas to the north of 2<sup>nd</sup> Street are collected along the north gutter line of 2<sup>nd</sup> Street and conveyed to the northwest. This separates the downtown drainage into two separate areas. For the purposes of identification, this report will describe the drainage area north of 2<sup>nd</sup> Street as the North Drainage Area and the area south of 2<sup>nd</sup> Street as the South Drainage Area.

A major contributor to the storm water flows for the North Drainage Area is the neighborhood located east of Casa Grande Avenue, between Florence Blvd. and Jimmie Kerr Blvd. 1<sup>st</sup> Street

collects storm water from those areas between 2<sup>nd</sup> Street and the SPRR tracks. From elevation data, it was also determined that Florence Street blocks water flowing from the east on Florence Street, leading to localized flooding at the Main Street/Marshall Street intersection until sufficient surcharge occurs to overtop Florence Street and allow water to flow west on Main Street to 1<sup>st</sup> Street and eventual discharge to the French Street/SR 84 channel and box culvert. The flooding also occurs at the 2<sup>nd</sup> Street/Florence Street intersection.

### **South Drainage Area**

A key recommendation, for the area south of 2<sup>nd</sup> Street, is to create three retention basins in the area south of 2<sup>nd</sup> Street to capture road borne storm water, removing it from the streets and thereby lessening the chance of pavement damage due to standing water. The basins would be located in the southwest corner of Hermosilla Street and 1<sup>st</sup> Street, along the west side of Dry Lake Street between Main Street and 1<sup>st</sup> Street and along the east side of Maricopa Street between Main Street and 1<sup>st</sup> Street. Besides storage of storm water, these basins would reduce the flows to the French Street/SR 84 channel and box culvert, reducing the size of the replacement box culvert recommended in the Master Drainage Study.

In addition to construction of the retention basins, regrading of the Main Street/Marshall Street intersection to allow water to flow towards the Main Street/Dry Lake Street intersection and raising of the Washington Street/1<sup>st</sup> Street and Washington Street/Main Street intersections to allow water to flow towards Florence Street and Sacaton Street are also recommended.

### **North Drainage Area**

As described above, 2<sup>nd</sup> Street is acting as a physical barrier separating the storm water flows within the downtown area. It is recommended, for the area north of 2<sup>nd</sup> Street, that a shallow-cover storm drain trunk line be installed on the north side of 2<sup>nd</sup> Street from Toltec Street to Florence Blvd, then along Florence Blvd to French Street. Catch basins would be installed at the curb returns of intersections along 2<sup>nd</sup> Street. 2<sup>nd</sup> Street is proposed for reconstruction and the storm drain trunk line installation could be included in this street improvement project. No catch basins would be installed along the intercepting streets. To ensure positive drainage at all the locations, some intersections will need to be reconstructed. Due to the flat grades and restricted right-of-way to install the storm drain, a "bleed off" installed along the system would be helpful to keep the trunk size to a minimum and maximize the outfall slope. The "bleed off", a below grade, storm water detention system could be installed to also help reduce the peak runoff and meter the flow to the outfall location. One system, "Infiltrator Chamber", is made to be placed under a parking lot and could be considered. The ultimate outlet for this system would occur at the existing box culvert located under SR 84 at 1<sup>st</sup> Street. The storm drain system should also include another storm water detention facility prior to the outfall location at the concrete box culvert to reduce the peak runoff and meter the flow to the concrete box culvert.

In order to finalize the drainage analysis for the entire downtown area and all of the contributing areas, there is a need for a localized design-level analysis. This would ensure the exact drainage limits for basin and pipe sizing.

### **Streetscape**

The area north of 2<sup>nd</sup> Street and east of Florence Street along with Florence Street from 2<sup>nd</sup> Street to Main Street has been improved in the past to include standard curbs, gutter and sidewalk, lighting, parking and streetscape improvements including landscaping and street furniture. An inventory of the various street design elements along the study area streets was conducted and a list of recommended improvements including new curb and gutter, sidewalks,

lighting, street trees, landscaping and curb ramps was developed. Preliminary costs associated with those improvements were identified.

### Right-of-Way

R/W areas have been identified for the improvements to Main Street and the realignments of Casa Grande Avenue, 2<sup>nd</sup> Street and Florence Street as well as the Pinal Avenue extension to Main Street. Phase estimates do not include right-of-way costs. The R/W takes necessary are identified in square feet on Table 6 – Street Improvement Costs.

### Construction Phasing

Five different construction phases are recommended for the City of Casa Grande's Downtown Streets Improvement Project. The five phases take into account the urgency of sanitary sewer line replacement/rehabilitation, correction of drainage conditions, pavement replacement/rehabilitation, as well as the sequence of construction for the proper function of the proposed Main Street Bypass, both interim and long term alignments.

The final outcome was a prioritization and phasing plan for the improvements to the downtown streets:

- Phase I:
  - Construct Hermosilla Street, Dry Lake Street and Maricopa Street Retention Basins
  - Improve 1<sup>st</sup> Street from Casa Grande Avenue to Wilson Street
  
- Phase II:
  - Improve Main Street from Casa Grande Avenue to Sacaton Street
  - Improve Florence Street from Elm St to Florence Blvd
  - 2<sup>nd</sup> Street/Sacaton Street Intersection Reconstruction
  - 2<sup>nd</sup> Street/Casa Grande Avenue Intersection Reconstruction
  
- Phase III:
  - Improve 2<sup>nd</sup> Street from Casa Grande Avenue to Florence Boulevard including storm drain system
  
- Phase IV:
  - Improve Remaining Downtown Streets – Main Avenue, Main Street (Sacaton St to Maricopa St), French Street, Maricopa Street, Sacaton Street, Washington Street, Marshall Street, 3<sup>rd</sup> Street, 4<sup>th</sup> Street and 5<sup>th</sup> Street
  
- Phase V:
  - Improve the intersection at Pinal Avenue, Florence Blvd and the Gila Bend Highway (SR 84), extension of Pinal Ave to Main Street

The approximate construction costs (without right-of-way) associated with each phase are:

|            |              |
|------------|--------------|
| Phase I:   | \$ 930,000   |
| Phase II:  | \$ 1,572,800 |
| Phase III: | \$ 1,168,100 |
| Phase IV:  | \$ 878,000   |
| Phase V:   | \$ 658,800   |

The recommended improvements will provide adequate pavement with a reasonable design life, reduce flooding, improve failing sewer facilities and continue the street improvement/streetscape theme developed in the downtown area.

The next step in the process is to begin further refining and defining the individual projects recommended herein. The eventual goal is to produce construction documents for these improvements so the projects can be bid and built, thereby dramatically improving the downtown area.

## 1.0 INTRODUCTION

The purpose of this report is to identify and prioritize key elements of the City of Casa Grande's Downtown Streets Improvement Project. Technical specifics will include storm drainage, utilities, streetscape goals and pavement design-year options. The proposed improvements include pavement rehabilitation/reconstruction, drainage facilities, utility replacement, and streetscape enhancements.

The overall objective for the improvements is to include the above referenced items with a downtown redevelopment plan, developing a unifying theme for the downtown area.

The report evaluates pavement conditions and makes pavement rehabilitation/replacement recommendations, discusses the storm drainage system in the study area and makes recommendations to improve storm drainage conditions, investigates the needs for current and future utilities, inventories the current street design/streetscape elements and recommends additional street design/streetscape needs associated with this area of the City of Casa Grande. The development and evaluation process has involved the City of Casa Grande's engineering staff throughout the duration of the study.

The Downtown Streets Improvement Project involves enhancements to the following city streets:

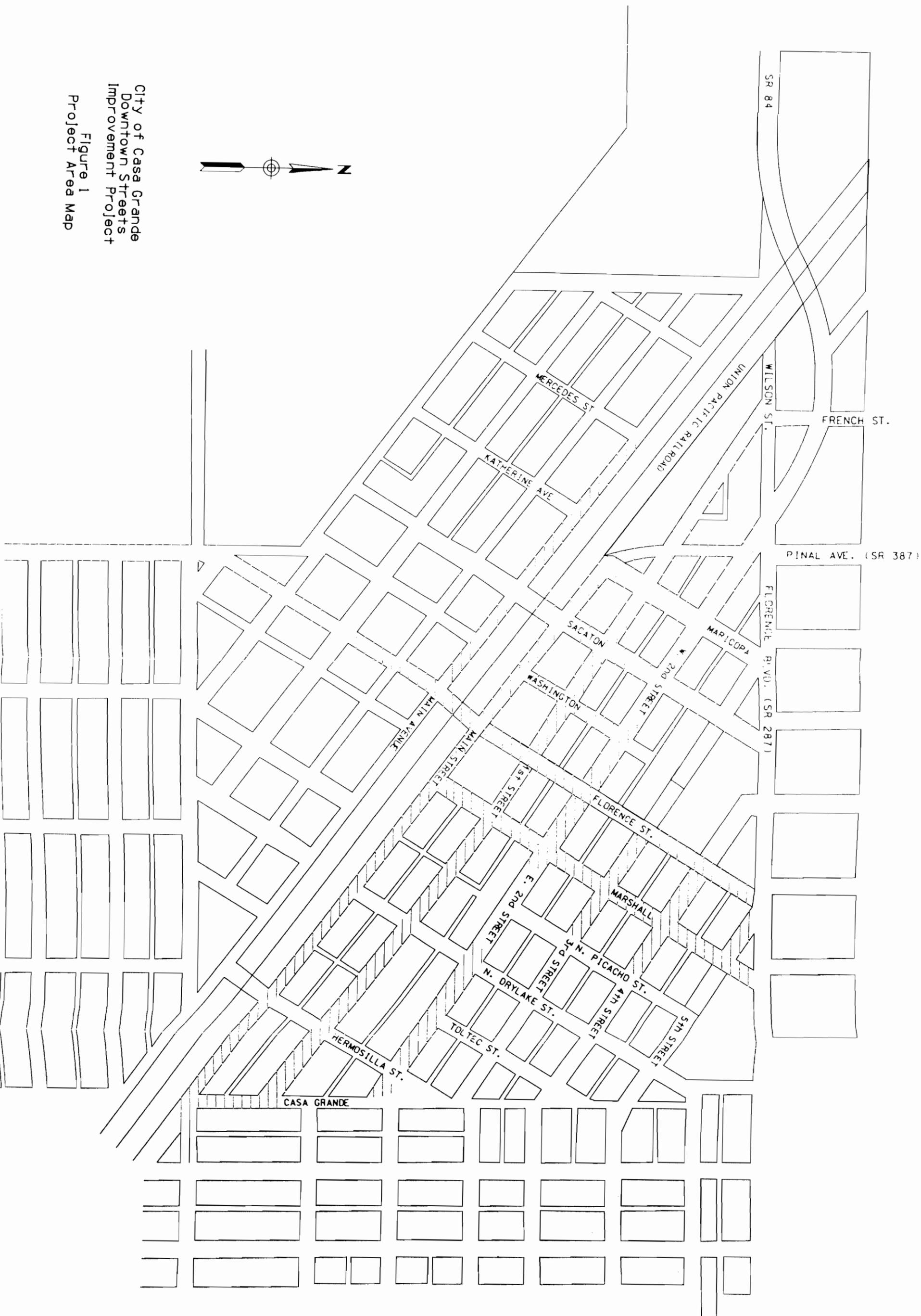
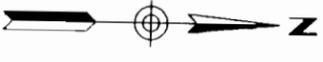
- Main Avenue – Florence Street to Mercedes Street
- Main Street – Casa Grande Avenue to Maricopa Street (Proposed Bypass)
- 1<sup>st</sup> Street – Casa Grande Avenue to Wilson Street
- 2<sup>nd</sup> Street – Casa Grande Avenue to Pinal Avenue (increase on-street parking)
- 2<sup>nd</sup> Street – Pinal Avenue to Wilson Street (removal)
- 3<sup>rd</sup> Street – Picacho Street to west of Florence Street
- 4<sup>th</sup> Street – Picacho Street to Florence Boulevard
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- Marshall Street – Main Street to Florence Boulevard
- Florence Street – Elm Street to Florence Boulevard (reconfigure north end to align with Walnut Avenue)
- Washington Street – Main Street to alley north of 2<sup>nd</sup> Street
- Sacaton Street – Southern Pacific Railroad to Florence Boulevard
- Maricopa Street – Main Street to Florence Boulevard
- French Street – Wilson Street to Gila Bend Highway (SR 84)
- Casa Grande – 1<sup>st</sup> Street to Main Street/Jimmie Kerr Boulevard (reconfigure south end for a right angle intersection)
- Pinal Avenue – Main Street to Florence Blvd (extension south to intersect Main Street for the Long Term Downtown Bypass alignment)
- Doan Street – Casa Grande Avenue to Cameron Avenue (removal)

The project area is shown in Figure 1.

Enhancements will include; pavement rehabilitation and replacement, improvement of existing and installation of new storm drainage facilities, replacement/upgrade of existing utilities, installation of new curbs and sidewalks and construction of various street design/streetscape amenities such as curb bulbs, new on-street parking, benches, lighting and landscaping.

This report was developed in close coordination with the Traffic Analysis Report of the Downtown Redevelopment area submitted to the City of Casa Grande, May 8, 2000, by Entranco.

City of Casa Grande  
Downtown Streets  
Improvement Project  
Figure 1  
Project Area Map



## **2.0 PAVEMENT RECOMMENDATIONS**

### **2.1 Existing Conditions & Deficiencies**

In most instances, the existing pavement conditions of the project streets show some degree of failure, either due to extensive utility patching, inadequate drainage or simply deterioration due to age. Some sections of pavement have received preventive maintenance and will require little or no rehabilitation, while other sections are in need of complete pavement replacement. While most of the streets are asphaltic concrete (AC) pavement, some of the existing streets have a mixture of the original concrete pavement (PCCP) with the widened portion comprised of AC pavement.

A pavement report, titled "Pavement Design Analysis for Downtown Streets, March 1999", has been prepared by Kleinfelder, Inc. and is included in the Appendix. This report evaluates the existing pavement structure on study area streets for future rehabilitation or reconstruction. The recommendations of this report were based on a 20-year pavement design life. A supplement to this report, "Addendum to Pavement Design Analysis for Downtown Streets, April 1999" was prepared by Kleinfelder, Inc. (see appendix) that added a 10-year design pavement life option for pavement reconstruction. The 20-year and 10-year design pavement life options along with a four to five-year design pavement life option will be included in the Pavement Option Matrix described in Section 2.2.

According to the pavement report, all the reviewed street segments are beyond 50 percent of their design life and 19 of these street segments are beyond their intended design life. Existing pavement characteristics including existing conditions, ages and estimated loads are listed within the appended pavement report (Table 1).

### **2.2 Options**

Based on the assumed traffic volumes, pavement recommendations for the four to five-, 10- and 20-year design pavement life options are developed using equivalent axle loads (ESALs).

Two additional pavement treatments were analyzed.

- Fiber-reinforced Ultra-thin Whitetopping (Concrete)
- Grid-reinforced interlayer (Asphaltic Concrete)

Both of these alternates offer improved strength and durability over conventional pavement mix design, but at an increase in cost.

#### **2.2.1 20-year Pavement Design Life**

Streets with existing PCCP are recommended to have the PCCP removed and replaced with AC. The two remaining streets should have the PCCP crack sealed with a 2" to 3" AC overlay. Five of the existing AC paved streets are recommended for a 2" to 3" AC overlay. The remaining AC paved streets are to be completely reconstructed using new AC pavement and base. (see Table 1 – Pavement Options Matrix)

The recommended pavement structural section consists of a 3" AC over 6" to 7" of aggregate base (AB) (see Table 3 in the appended pavement report).

### **2.2.2 10-year Pavement Design Life**

The 10-year design recommends similar PCCP replacement and AC pavement options as the 20-year design for the streets with the exception of reducing the AC thickness from 3" average to 2.5" average and the AB thickness from 7" to 6" average.

### **2.2.3 Four to Five-Year Pavement Design Life**

Several short-term repair options were explored, including chip and slurry seals, edge grinding, thin AC overlay and mill and fill of 1½" AC. Conventional overlay treatments do not hold up to wear very well in the extreme heat of the southwest. However, the use of thin overlay (1½") impregnated with crumb rubber (Asphalt Rubber) has the durability to withstand reflective cracking. The asphalt rubber has elastic properties to withstand the stresses of pavement contraction/expansion on a daily basis. While the unit cost of AC overlays increase with the addition of crumb rubber, the end result from reduced maintenance cost, durability and smooth ride seems to have a positive effect on traveling public in addition to providing long term cost savings to the City of Casa Grande. The design of the asphalt rubber mix is not addressed in this report. The AC pavement listed in the pavement report is conventional Hot-Mix Asphalt (HMA).

The addition of a chip or slurry seal would result in no more than a one to three year extension of the pavements life, while edge grinding and mill and fill options would extend roadway life no more than four to six years.

The use of edge grinding and overlay would result in raising the crown of the roadway. This modification could potentially improve drainage conditions. The combination of the modified crown elevation and the controlled placement of AC would ensure positive drainage. In general, the removal of water from the streets as soon as possible is essential to avoid the potential degradation of the new pavement structure.

Table 1 summarizes the existing pavement conditions and presents improvement recommendations. Pavement costs are summarized in Table 2.

### **2.2.4 Pavement Surface Treatment**

#### **Fiber-Reinforced Ultra-thin Whitetopping (Concrete)**

The ultra thin whitetopping allows the placement of concrete pavement utilizing ready-mix concrete construction methods to place a 2 to 4-inch overlay. Concrete pavement offers strength and durability to City streets, especially at intersection, where the braking, acceleration and turning movements of vehicles places the most amount of stress on the pavement surface.

Scoring or "tining" of the concrete pavement surface results in additional skid resistance. Concrete pavement also has the added benefit of a stronger resistance to deterioration as a result of standing water compared to asphaltic concrete. Concrete also resists deformation from the extreme hot weather conditions of the Southwest.

In order for the ultra thin whitetopping concrete overlay to be effective, the existing structural section and subgrade section must be adequate for the future design loads.

Existing concrete surfaces would require its complete removal, due to the lack of cost effectiveness to grind or remove a few inches of the existing concrete pavement. Edge

grinding, necessary to maintain a constant whitetopping thickness at the lip of gutter, would be required if an overlay is placed on the existing PCCP surface.

Existing asphalt surfaces would require milling to the depth equal to the new ultra thin whitetopping layer.

#### **Grid-Reinforced Interlayer (Asphaltic Concrete)**

Grid-reinforced interlayer involves a simple construction method where a fiber glass material is placed between layers of asphaltic concrete. This product can also be utilized between existing PCCP and new asphalt concrete overlay. The placement of this material simply controls cracking and is not a solution for pavement failures that are in need of pavement replacement.

Using this method to overlay the existing PCC pavement would require a 1-inch leveling course, placement of the grid mesh material, then the final 1 ½ to 2-inch overlay. Edge grinding would be required to maintain the overlay thickness to the top of the existing gutter. For compaction of aggregate, it is recommended not to taper the overlay smaller than 1½-inch.

Another installation method for grid-reinforced asphaltic concrete requires milling of the existing asphalt. The milling depth should be 1½ to 2-inches below existing gutter lip.

In order for the grid-reinforced asphaltic concrete overlay to be effective, the existing structural section and subgrade section must be adequate.

#### **2<sup>nd</sup> Street Pavement Treatment**

A one-inch overlay is proposed for 2<sup>nd</sup> Street to allow the removal of existing pavement marking and to place new parking stall markings as well as build rigidity for the new brick paver crosswalks without removing any of the existing pavement structural thickness.

Table 1 – Pavement Options Matrix

| Street      | Location                     | Length (ft) | Existing Pavement | 20 Year        |    | 10 Year                  |                | 4-5 Year   |                          | 1-2 Year | Fiber Reinf. Ultra Thin White Topping PCCP | Grid Reinf. Interlayer AC |                       |
|-------------|------------------------------|-------------|-------------------|----------------|----|--------------------------|----------------|--|--------------------------|----------|--|---------------------------|-----------------------|
|             |                              |             |                   | Reconstruct AC | AB | Crack, Seat & Overlay AC | Reconstruct AC | AB   | Crack, Seat & Overlay AC |          |  |                           | Overlay Edge Grind AC |
| Main Ave    | Florence to Sacaton          | 563         | PCC               | 3              | 6  | 2.5                      | 6              |  |                          |          |  | 1.5                       |                       |
| Main Ave    | Sacaton to Mercedes          | 898         | AC                | 3              | 6  | 2.5                      | 6              |  |                          |          | 2  | 1.5                       |                       |
| Main St     | Casa Grande to Sacaton       | 2870        | PCC/AC            | 3              | 6  | 2.5                      | 6              |  |                          |          | 2  | 1.5                       |                       |
| Main St     | Sacaton to Maricopa          | 300         | AC                | 3              | 6  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| 1st St      | Casa Grande to Florence      | 1936        | AC                | 3              | 7  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| 1st St      | Florence to Sacaton          | 1432        | PCC               | 3              | 7  | 2.5                      | 6              | 2.5  | 1.5                      | 1.5      |  | 1.5                       |                       |
| 1st St      | Sacaton to Wilson            | 1376        | PCC/AC            | 3              | 7  | 2.5                      | 6              |  |                          |          | 2  | 1.5                       |                       |
| 2nd St      | Casa Grande to Florence Blvd | 3300        | AC                |                |    |                          |                | 1" Asphaltic Overlay or 1" Asphaltic Concrete Mill and Replace |                          |          |  |                           |                       |
| 3rd St      | Picacho to Florence          | 604         | AC                | 3              | 6  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| 3rd St      | Florence – west              | 197         | PCC               | 2              | 4  | 2                        | 4              |  | 1.5                      | 1.5      |  | 1.5                       |                       |
| 4th St      | Picacho to Florence          | 610         | AC                | 4              | 8  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| Marshall St | Main St to Florence Blvd     | 1631        | AC                | 3              | 6  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| Florence St | Elm St to Florence Blvd      | 4255        | PCC               | 3              | 7  | 2.5                      | 7              |  |                          |          |  | 1.5                       |                       |
| Washington  | 1st St to 2nd St             | 268         | AC                | 2              | 4  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| Sacaton St  | Main St to 3rd St            | 1170        | PCC               | 3              | 7  | 2.5                      | 6              | 2.5  | 1.5                      | 1.5      |  | 1.5                       |                       |
| Sacaton St  | 3rd St to Florence Blvd      | 391         | AC                | 3              | 7  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| Maricopa St | 1st St to 2nd St             | 230         | AC                | 3              | 7  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |
| French St   | Wilson St to Florence Blvd   | 230         | AC                | 3              | 7  | 2.5                      | 6              |  | 1.5                      | 1.5      | 2  | 1.5                       |                       |

Note: Crack and seat involves utilizing the existing pavement as a base material.

**Table 2 – Pavement Cost Matrix**

| 1st Street              | Pavement Design Year |          |          | Pvmt Surface Trmt   |
|-------------------------|----------------------|----------|----------|---------------------|
|                         | 5 Year               | 10 Year  | 20 Year  |                     |
| <i>Wilson - Sacaton</i> |                      |          |          | 1.5" AC IL          |
| AC Cost                 | N/A                  | \$23,782 | \$28,465 | \$103,200/PCCP+Mesh |
| AB Cost                 | N/A                  | \$6,450  | \$31,050 | \$13,760/Mill       |
| Total Pavement          | N/A                  | \$30,232 | \$59,515 | \$116,960           |

| 1st Street                | Pavement Design Year |          |          | Pvmt Surface Trmt  |
|---------------------------|----------------------|----------|----------|--------------------|
|                           | 5 Year               | 10 Year  | 20 Year  |                    |
| <i>Sacaton - Florence</i> |                      |          |          | 1.5" AC IL         |
| AC Cost                   | \$11,765             | \$19,608 | \$23,403 | \$84,900/PCCP+Mesh |
| AB Cost                   | N/A                  | \$21,850 | \$25,300 | \$11,320/Mill      |
| Total Pavement            | \$11,765             | \$41,458 | \$48,703 | \$96,220           |

| 1st Street              | Pavement Design Year |          |          | Pvmt Surface Trmt   |
|-------------------------|----------------------|----------|----------|---------------------|
|                         | 5 Year               | 10 Year  | 20 Year  |                     |
| <i>Florence - SR 84</i> |                      |          |          | 1.5" AC IL          |
| AC Cost                 | \$20,114             | \$33,396 | \$39,974 | \$145,200/PCCP+Mesh |
| AB Cost                 | N/A                  | \$37,145 | \$43,355 | \$19,360/Mill       |
| Total Pavement          | \$20,114             | \$70,541 | \$83,329 | \$164,560           |

| 2nd Street                    | 1" Overlay |          |         |
|-------------------------------|------------|----------|---------|
|                               | 5 Year     | 10 Year  | 20 Year |
| <i>Casa Grande - Florence</i> |            |          |         |
| AC Cost                       |            | \$25,500 |         |
| AB Cost                       |            | N/A      |         |
| Total Pavement                |            | \$25,500 |         |

| 3rd Street              | Pavement Design Year |          |          | Pvmt Surface Trmt  |
|-------------------------|----------------------|----------|----------|--------------------|
|                         | 5 Year               | 10 Year  | 20 Year  |                    |
| <i>East of Florence</i> |                      |          |          | 1.5" AC IL         |
| AC Cost                 | \$5,946              | \$9,741  | \$11,765 | \$42,285/PCCP+Mesh |
| AB Cost                 | N/A                  | \$10,925 | \$10,925 | \$5,700/Mill       |
| Total Pavement          | \$5,946              | \$20,666 | \$22,690 | \$47,985           |

**Table 2: Pavement Cost Matrix – continued**

| <b>3rd Street</b>       | Pavement Design Year |         |         | Pvmt Surface Trmt  |                 |
|-------------------------|----------------------|---------|---------|--------------------|-----------------|
|                         | 5 Year               | 10 Year | 20 Year | 2" UTWT            | 1.5" AC IL      |
| <i>West of Florence</i> |                      |         |         |                    |                 |
| AC Cost                 | \$2,024              | \$2,657 | \$2,657 | \$13,800/PCCP+Mesh | \$6,200/AC+Grid |
| AB Cost                 | N/A                  | \$2,415 | \$2,415 | \$1,840/Mill       | \$1,840/Mill    |
| Total Pavement          | \$2,024              | \$5,072 | \$5,072 | \$15,640           | \$8,040         |

| <b>4th Street</b>         | Pavement Design Year |          |          | Pvmt Surface Trmt  |                  |
|---------------------------|----------------------|----------|----------|--------------------|------------------|
|                           | 5 Year               | 10 Year  | 20 Year  | 2" UTWT            | 1.5" AC IL       |
| <i>Florence - Picacho</i> |                      |          |          |                    |                  |
| AC Cost                   | \$5,946              | \$9,867  | \$15,813 | \$42,700/PCCP+Mesh | \$14,300/AC+Grid |
| AB Cost                   | N/A                  | \$11,040 | \$14,605 | \$5700/Mill        | \$5700/Mill      |
| Total Pavement            | \$5,946              | \$20,907 | \$30,418 | \$48,400           | \$20,000         |

| <b>Florence Street</b>        | Pavement Design Year |           |           | Pvmt Surface Trmt   |                   |
|-------------------------------|----------------------|-----------|-----------|---------------------|-------------------|
|                               | 5 Year               | 10 Year   | 20 Year   | 2" UTWT             | 1.5" AC IL        |
| <i>City Limits - Florence</i> |                      |           |           |                     |                   |
| AC Cost                       | \$50,600             | \$82,225  | \$98,030  | \$354,600/PCCP+Mesh | \$158,200/AC+Grid |
| AB Cost                       | N/A                  | \$105,800 | \$105,800 | \$47,280/Mill       | \$47,280/Mill     |
| Total Pavement                | \$50,600             | \$188,028 | \$203,830 | \$401,880           | \$205,480         |

| <b>French Street</b>   | Pavement Design Year |         |         | Pvmt Surface Trmt  |                 |
|------------------------|----------------------|---------|---------|--------------------|-----------------|
|                        | 5 Year               | 10 Year | 20 Year | 2" UTWT            | 1.5" AC IL      |
| <i>1st St - SR 287</i> |                      |         |         |                    |                 |
| AC Cost                | \$2,530              | \$4,048 | \$4,807 | \$17,300/PCCP+Mesh | \$7,800/AC+Grid |
| AB Cost                | N/A                  | \$4,485 | \$4,485 | \$2,300/Mill       | \$2,300/Mill    |
| Total Pavement         | \$2,530              | \$8,533 | \$9,292 | \$19,600           | \$10,100        |

| <b>Main Avenue</b>        | Pavement Design Year |          |          | Pvmt Surface Trmt  |                  |
|---------------------------|----------------------|----------|----------|--------------------|------------------|
|                           | 5 Year               | 10 Year  | 20 Year  | 2" UTWT            | 1.5" AC IL       |
| <i>Mercedes - Sacaton</i> |                      |          |          |                    |                  |
| AC Cost                   | N/A                  | \$17,204 | \$20,746 | \$74,900/PCCP+Mesh | \$33,200/AC+Grid |
| AB Cost                   | N/A                  | \$19,205 | \$19,205 | \$10,000/Mill      | \$10,000/Mill    |
| Total Pavement            | N/A                  | \$36,409 | \$39,951 | \$84,900           | \$43,200         |

Table 2: Pavement Cost Matrix – continued

| Main Avenue        | Pavement Design Year |          |                    | Pvmt Surface Trmt |
|--------------------|----------------------|----------|--------------------|-------------------|
|                    | 5 Year               | 10 Year  | 20 Year            |                   |
| Sacaton - Florence | N/A                  | \$10,879 | \$13,030           | 1.5" AC IL        |
| AC Cost            |                      |          | \$47,000/PCCP+Mesh | \$20,900/AC+Grid  |
| AB Cost            |                      | \$12,075 | \$12,075           | \$6,500/Mill      |
| Total Pavement     | N/A                  | \$22,954 | \$25,105           | \$53,500          |
|                    |                      |          |                    | \$27,400          |

| Main Street        | Pavement Design Year |          |                    | Pvmt Surface Trmt |
|--------------------|----------------------|----------|--------------------|-------------------|
|                    | 5 Year               | 10 Year  | 20 Year            |                   |
| Maricopa - Sacaton | \$3,542              | \$5,819  | \$6,946            | 1.5" AC IL        |
| AC Cost            |                      |          | \$25,100/PCCP+Mesh | \$11,200/AC+Grid  |
| AB Cost            | N/A                  | \$6,440  | \$6,440            | \$3,400/Mill      |
| Total Pavement     | \$3,542              | \$12,259 | \$13,386           | \$28,500          |
|                    |                      |          |                    | \$14,600          |

| Main Street        | Pavement Design Year |           |                     | Pvmt Surface Trmt |
|--------------------|----------------------|-----------|---------------------|-------------------|
|                    | 5 Year               | 10 Year   | 20 Year             |                   |
| Sacaton - Florence | N/A                  | \$54,648  | \$65,780            | 1.5" AC IL        |
| AC Cost            |                      |           | \$239,200/PCCP+Mesh | \$105,900/AC+Grid |
| AB Cost            | N/A                  | \$60,950  | \$60,950            | \$31,900/Mill     |
| Total Pavement     | N/A                  | \$115,598 | \$126,730           | \$271,100         |
|                    |                      |           |                     | \$137,800         |

| Maricopa Street | Pavement Design Year |          |                    | Pvmt Surface Trmt |
|-----------------|----------------------|----------|--------------------|-------------------|
|                 | 5 Year               | 10 Year  | 20 Year            |                   |
| Main - SR 287   | \$8,602              | \$14,168 | \$17,078           | 1.5" AC IL        |
| AC Cost         |                      |          | \$61,700/PCCP+Mesh | \$27,400/AC+Grid  |
| AB Cost         | N/A                  | \$15,870 | \$18,400           | \$8,300/Mill      |
| Total Pavement  | \$8,602              | \$30,038 | \$35,478           | \$70,000          |
|                 |                      |          |                    | \$35,700          |

| Marshall Street    | Pavement Design Year |          |                     | Pvmt Surface Trmt |
|--------------------|----------------------|----------|---------------------|-------------------|
|                    | 5 Year               | 10 Year  | 20 Year             |                   |
| Main St - Florence | \$16,951             | \$28,083 | \$33,775            | 1.5" AC IL        |
| AC Cost            |                      |          | \$122,400/PCCP+Mesh | \$54,200/AC+Grid  |
| AB Cost            | N/A                  | \$31,395 | \$31,395            | \$16,400/Mill     |
| Total Pavement     | \$16,951             | \$59,478 | \$65,170            | \$138,800         |
|                    |                      |          |                     | \$70,600          |

**Table 2: Pavement Cost Matrix – continued**

| Sacaton Street    | Pavement Design Year |          |          | Pvmt Surface Trmt  |
|-------------------|----------------------|----------|----------|--------------------|
|                   | 5 Year               | 10 Year  | 20 Year  |                    |
| 3rd St - Florence |                      |          |          | 1.5" AC IL         |
| AC Cost           | \$4,554              | \$7,590  | \$9,108  | \$32,600/PCCP+Mesh |
| AB Cost           | N/A                  | \$8,395  | \$9,775  | \$4,500/Mill       |
| Total Pavement    | \$4,554              | \$15,985 | \$18,883 | \$37,100           |

| Sacaton Street   | Pavement Design Year |          |          | Pvmt Surface Trmt  |
|------------------|----------------------|----------|----------|--------------------|
|                  | 5 Year               | 10 Year  | 20 Year  |                    |
| Main St - 3rd St |                      |          |          | 1.5" AC IL         |
| AC Cost          | \$13,536             | \$22,390 | \$26,945 | \$97,500/PCCP+Mesh |
| AB Cost          | N/A                  | \$24,955 | \$29,095 | \$13,000/Mill      |
| Total Pavement   | \$13,536             | \$47,345 | \$56,040 | \$110,500          |

| Washington     | Pavement Design Year |         |         | Pvmt Surface Trmt  |
|----------------|----------------------|---------|---------|--------------------|
|                | 5 Year               | 10 Year | 20 Year |                    |
| 1st - 2nd St   |                      |         |         | 1.5" AC IL         |
| AC Cost        | \$3,163              | \$4,175 | \$4,175 | \$22,400/PCCP+Mesh |
| AB Cost        | N/A                  | \$3,910 | \$3,910 | \$3,000/Mill       |
| Total Pavement | \$3,163              | \$8,085 | \$8,085 | \$25,400           |

## 2.3 Summary and Conclusion

With only a slight reduction in AC and aggregate base quantities, the cost between the 20-year and 10-year pavement design is negligible. The preferable option would be to reconstruct the pavement structural sections to the 20-year design. Two additional pavement treatment were analyzed. Both are surface treatment (pavement) only and do not address any base material reconstruction. Each of these alternates offer improved strength and durability over conventional pavement mix design, but at an increase in cost. The ultra thin white topping is estimated at almost 100% over the cost of the asphalt concrete option. However, total reconstruction of all the streets contained within this report may be cost prohibitive. Streets which have a higher rate of degradation, heavily traveled streets and streets which are primary access to the downtown businesses will need to have a higher priority for total reconstruction than other streets not so heavily used.

## 3.0 DRAINAGE RECOMMENDATIONS

### 3.1 Purpose

The purpose of this drainage update is to supplement the drainage report prepared by Carter Associates and listed as the "Master Drainage Study for the City of Casa Grande", December 1985 and a revised report under the same name in June 1987. All references and runoff values are from the drainage report.

Options will be outlined and recommendations made for a viable drainage system to help eliminate the potential for flooding the downtown streets area. There are two aspects to this system, conveyance and storage. Conveyance provides the means to collect and carry the water to some location where it can be discharged. Storage provides a place for the water to collect once it has been conveyed.

It is unlikely that there is much opportunity to create a complete storm drainage system in the downtown area that would collect storm drainage in curb inlets for conveyance in underground pipes. The grades in the area are very flat, leading to the need for large pipes to handle flow. The lack of a discharge point with a low enough elevation and adequate channel capacity also hampers the ability to utilize underground conveyance. This would be true with a conventional design.

With the need to collect and discharge storm water from both the north and south side of 2<sup>nd</sup> Street, two separate systems will need to be installed. The "North System" will collect and discharge storm water between Florence Boulevard and 2<sup>nd</sup> Street utilizing a conventional storm drain collection system with the introduction of intermediate storage points along the trunk line. The "South System" will collect and discharge storm water between 2<sup>nd</sup> Street and the Union Pacific Railroad and retain the storm water within strategically placed retention basins designed large enough to collect the storm water runoff.

From a storage standpoint, it would be beneficial to provide stormwater retention in the downtown area. Provision of such storage features as open retention basins or drain vaults under parking lots would significantly reduce the amount of runoff that currently floods streets following rainfall events. The retention features would also reduce the flow from the downtown area towards the northwest and the channel/box culverts under the Gila Bend Highway (SR 74).

### 3.2 Existing Conditions and Deficiencies

The lack of an adequate storm drain system and flat grades of surface streets has resulted in the degradation of existing pavement. Without adequate positive drainage, any new pavement will be destroyed in a similar manner.

The drainage outlet for the entire downtown streets area occurs at a channel at the northwest corner of Wilson Street and 1<sup>st</sup> Street. This channel leads to a dual 6'x3' box culvert under SR 84 to Schwartz Road. According to the 1985 Master Drainage Report, this box culvert and channel are extremely undersized for a major storm drain runoff. When a major storm event takes place, the box and channel are filled to their capacity and create a "backup" of water southwest of the box culvert.

In order to define the drainage patterns within the downtown area, a survey was made of curb and street centerline elevations at all intersections between Florence Boulevard and Main Street, east to Casa Grande Avenue. From this, approximate sub-drainage basins were determined for the downtown area. Field observations supplementing the survey noted storm water runoff entering the downtown area from the neighborhood south of Florence Boulevard and east of Casa Grande Avenue. These drainage limits are shown in Figure 2.

Three sub-drainage basins were defined. Sub-basin A is bordered on the north by Florence Boulevard, to the east by Morrison Avenue and to the south by 2<sup>nd</sup> Street and 1<sup>st</sup> Street (See Figure 2). This basin drains to the 2<sup>nd</sup> Street/Florence Boulevard intersection with the north curb line on 2<sup>nd</sup> Street acting as the conveyance of stormwater collected north of 2<sup>nd</sup> Street. Sub-basin B is located south of 2<sup>nd</sup> Street, north of the SPRR tracks, west of Casa Grande Avenue and east of Florence Street. Stormwater in this area flows towards the Main Street/Marshall Street intersection. Sub-basin C is bounded on the north by 2<sup>nd</sup> Street, on the south by the SPRR, on the east by Florence Street and on the west by Wilson Street. Stormwater in this area is directed towards 1<sup>st</sup> Street where it is carried in the gutters towards Wilson Street.

It should be noted that these basins differ slightly from those described in the Master Drainage Study. However, they generally are located in areas M-2 and M-3 from that study.

Both sub-basin A and sub-basin C directly flow towards the existing box culverts, west of the intersection of SR 84 and French Street. Sub-basin B will also contribute to this flow when surcharging occurs between the Main Street/Marshall Street and Main Street/Florence Street intersections. According to the Master Drainage Study, the maximum capacity of this existing box culvert is 180 cfs while the accumulated flow from the contributing areas emptying into the box culvert is 346 cfs. An important part of improving drainage in the downtown area will be to retain stormwater wherever possible to reduce the flow reaching this culvert.

Localized areas where water appears to collect, within sub-basins B and C have been identified at the following locations:

- Main Street/Marshall Street intersection
- Main Street between Florence Street and Sacaton Street
- 1<sup>st</sup> Street between Florence Street and Sacaton Street

These locations will be addressed by either reprofiling the curb and gutter sections or a tapered mill and pavement replacement to help facilitate positive drainage grade along the flow line.

At two locations, the existing curb has a stair-step configuration. These curbs are located at:

- Main Street between Florence Street and Sacaton Street
- 1<sup>st</sup> Street between Florence Street and Sacaton Street

This could be a result of high pad elevations for the parcel lots or an attempt to increase gutter capacity or a combination of both. In all cases, the existing curb will be removed and replaced with 6 to 7-inch high curbs. Existing and new sidewalk ramps will be constructed to meet current ADA requirements.

Localized areas where water appears to collect, with sub-basin A, have been identified at the following locations:

- Florence Street and 2nd Street
- Marshall Street and 2nd Street

These locations will be addressed by reprofiling the curb and gutter sections, pavement replacement and new storm drain system to help facilitate positive drainage grade along the flow line.

As a result from the undersized outlet, as well as the flat grades, the storm water on downtown streets is "backed up", increasing the potential for flooding. Options for proposed drainage improvements will be addressed in the Drainage Improvements Matrix described in table 4.



EXISTING 2.6' X 3' X 180' CONCRETE BOX CULVERT

EXISTING DRAINAGE STRUCTURE & CHECK VALVE

SR 84

WILSON ST.

FRENCH ST.

PINAL AVE. (SR 387)

FLORINCE BLVD. (SR 287)

MERCEDES ST.

KATHERINE AVE.

UNION PACIFIC RAILROAD

MARICOPA

SACATON

WASHINGTON

2ND STREET

LAIN AVENUE

MAIN STREET

1ST STREET

FLORINCE ST.

E. 2ND STREET

MARSHALL

N. 2ND STREET

PICACHO ST.

N. DRYLAKE ST.

TOLTEC ST.

4TH STREET

5TH STREET

HERMOSILLA ST.

CASA GRANDE AVE.

CAMERON AVE.

MORRISON AVE.

BROWN AVE.

1st St.

2nd St.

3rd St.

4th St.

5th St.

6th St.

City of Casa Grande  
Downtown Streets  
Improvement Project

Figure 2  
Existing Drainage Conditions

Approximate Limits of  
Drainage Sub Basins

Existing Flow Direction



### 3.3 Drainage Recommendations

As was previously mentioned, the ability to provide for an underground drainage system to convey storm water from the project area to the channel at French Street and SR 84 is hampered by both the flatness of the downtown area, the lack of depth for the outfall and the cost associated with providing underground facilities. Due to this restriction, a storm drain system with a minimum trunk line size as well as a minimal cover will need to be installed.

First, areas where gutter grades are either flat or where elevations show low points should be replaced to ensure positive flow. In conjunction with this, the cross-slope of the roadways at these points should be improved to maintain a 2 percent slope towards the gutter. There are three locations where these improvements will be required:

- Main Street between Florence Street and Sacaton Street
- 1<sup>st</sup> Street between Florence Street and Sacaton Street
- 2<sup>nd</sup> Street and Florence Street

#### 3.3.1 South Drainage System

In order to regrade the first two intersections, it will be necessary to create a new high point at Washington Street. This will reduce the size of sub-basin C and increase the size of sub-basin B slightly.

The intersection of Main Street and Marshall Street is the low point in sub-basin B. Stormwater collects at this point until it reaches sufficient depth (about 0.6 feet) to break over the Main Street/Florence Street intersection and flow to the west. In order to correct this, the elevation on the Main Street/Dry Lake Street intersection should be dropped to allow water to flow towards that intersection. A key recommendation for both reducing flooding east of Florence Street and south of 2<sup>nd</sup> Street, as well as to significantly reduce the flow to the channel and box culvert at French Street and SR 84, is to construct a stormwater retention facility on the vacant property located along Dry Lake Street between Main Street and 1<sup>st</sup> Street and in the southwest corner of the Hermasillo Street/1<sup>st</sup> Street intersection.

For the Dry Lake Street retention basin, if flows are taken towards the Main Street/Dry Lake Street intersection, they could be conveyed to this facility via curb inlets or scuppers located on Main Street, Dry Lake Street and 1<sup>st</sup> Street. Preliminary calculations (see appendix) show that sub-basin B along with that portion of sub-basin C that would be re-routed due to grade changes at Main Street/Washington Street and 1<sup>st</sup> Street/Washington Street would require a 100-year, 1-hour retention volume of about 259,000 cubic feet (see appendix). It appears that the vacant lots have a surface area of about 90,000 square feet (Dry Lake Street) and 15,000 square feet (Hermasillo Street). If this entire area were used for retention, the basins at these locations would need to be about 2.5 feet deep. It is possible that these basins, particularly the Dry Lake Street basin, could have some ancillary use, such as a park or perhaps for sports fields.

It should be noted that, during the design process, the retention volume should be refined to incorporate a Cw (weighted coefficient of runoff) that is closer to the actual value based on land use. A Cw of 0.68 was assumed in sub-basin B for calculation purposes.

In sub-basin C, a retention facility is proposed along Maricopa Street between Main Street and 1<sup>st</sup> Street. A single-family residence and a storage yard now occupy this area. Based on the contributing area draining to this facility, a retention facility with a capacity of 52,100 cubic feet would be required

(see appendix). This could be accommodating in the available area (approximately 300 feet x 150 feet) with about 1-foot depth. It would also be feasible to use ½ of this property for a parking lot and the remainder for retention with a depth of about 2.5 feet.

Stormwater would be conveyed to this facility through curb inlets or scuppers on Main Street, Maricopa Street and 1<sup>st</sup> Street.

By providing these retention facilities, the size of the basins draining towards the French Street/SR 84 channel and box culvert would be reduced by about 51.4 acres, a reduction of about 39 percent, greatly reducing the flow and the chance for flooding related to the capacity of the channel and box culvert.

### 3.3.2 North Drainage System

With the proposed storm drain system, it is key to reduce the amount of runoff entering the system, especially at peak storm events. An effective way to perform this is to place storage basins/chambers along the trunk line. This “bleed off” system will allow the basins/chambers to fill before the system reaches capacity. A series of three chamber locations is proposed for the downtown streets location. The first two along the flow path will serve as collection and metered distribution points for the downstream system. The last location, which is just immediately upstream from the concrete box culvert, will meter the flow to the outfall location. The design is to help reduce runoff flows during short storm durations and help reduce velocities.

One system, the “Infiltrator Chamber”, provides interlocking chambers which collect storm water runoff and disperse the water among other chambers connected together and surrounded by compacted rock to help dissipate the water among the entire system. The added benefit of chamber system is the ability of the chambers to be installed under a parking lot. The chambers are designed to handle an H-20 loading when proper construction techniques are utilized. These systems have been installed and are functional in Phoenix and Flagstaff. The chambers are placed below grade on a bed of crushed stone and backfilled with additional crushed stone, filter fabric, geogrid material and compacted granular backfill. Each chamber has the capacity of 24 cubic feet. Three locations for the bed sites are: the northwest corner of 2<sup>nd</sup> Street/Drylake Street; the northwest corner of 2<sup>nd</sup> Street/Sacaton Street and prior to the box culvert at French Street/SR 84 intersection (see Table 3). Each location would have the capacity to store 52,800 cubic feet of storm water runoff. The actual size and amount of chambers needed would be finalized after a localized design-level analysis is developed.

The existing pocket park/green belt at the northeast corner of Casa Grande Avenue and 2<sup>nd</sup> Street could provide a site for a below or above grade retention system. Placing a retention basin at this location would reduce the amount of storm runoff along 2<sup>nd</sup> Street.

To complete the system, a series of catch basins would be installed at the curb returns of intersections along 2<sup>nd</sup> Street. No catch basins would be installed along the intercepting streets.

The proposed drainage improvements are shown in Figure 3. Preliminary costs are shown in Table 3.

As another way to help reduce the potential for over-flooding the proposed system, any new development should be governed by the City of Casa Grande to have property-retained runoff unless they are in those areas where the sub-basin retention facilities are constructed. This requirement would further reduce the flows to the French Street/SR 84 channel and box culvert.

### 3.4 Summary and Conclusion

The ultimate goal for the redevelopment of the downtown area of Casa Grande is to bring the north side and south side of 2<sup>nd</sup> Street together to form a uniform downtown and opportunity for continued economic growth. 2<sup>nd</sup> Street is currently acting as a barrier between the two “sections” of downtown Casa Grande. With the recommendation to reconfigure 2<sup>nd</sup> Street to a two-lane roadway with on-street parking, the need for storm water removal from 2<sup>nd</sup> Street is even more imperative.

The preferred option of storm water removal would be to construct two different storm drain systems to convey water from the north and south side of 2<sup>nd</sup> Street. The north side, lacking any large open areas for potential locations of retention basins, would benefit from a below grade drainage system. The south side has better potential for a less expensive alternative of at-grade storm water retention. As outlined in the preceding text, this south drainage system would collect water south of 2<sup>nd</sup> Street and north of the Union Pacific Railroad. With slight regrading of 1<sup>st</sup> and Main Streets, several retention basins can be placed to collect and retain storm water. The retention basins can also serve as recreational parks for the public.

To maintain storm water flows and runoff, any future development should retain storm water on site, leaving the existing system capable to manage the storm water events.

Table 3 and Figure 3 outline the costs and placement of the recommended drainage alternative.

**Table 3 – Drainage Improvements Matrix**

| <b>South Drainage System</b>   |  |  |
|--|--|--|
| Location   | Improvement                                | Cost   |
| West of Dry Lake Street,<br>Between Main Street and 1st<br>Street          | Construct Retention Basin                  | Excavation -8,620 CY @ \$6.00/CY = \$51,720<br>Curb Inlets - 6 @ \$2,500/Ea = \$15,000<br>Drywells - 4 @ \$2,500/Ea = \$10,000<br>Contingency = +25%<br>Total = \$95,900   |
| SW Corner, Hermasillo<br>Street/1st Street                                 | Construct Retention Basin                  | Excavation – 970 CY @ \$6.00/CY = \$5,820<br>Curb Inlets - 3 @ \$2,500/Ea = \$7,500<br>Drywells - 1 @ \$2,500/Ea = \$2,500<br>Contingency = +25%<br>Total = \$19,800   |
| East Side of Maricopa<br>Street, Between Main Street<br>and 1st Street     | Construct Retention Basin                  | Excavation - 1,910 CY @ \$6.00/CY = \$11,460<br>Curb Inlets - 3 @ \$2,500/Ea = \$7,500<br>Drywells - 2 @ \$2,500/Ea = \$5,000<br>Contingency = +25%<br>Total = \$30,000  |
| <b>North Drainage System</b>   |  |  |
| Location   | Improvement                                | Cost   |
| Pocket Park<br>NW Corner, 2 <sup>nd</sup> Street/ Casa<br>Grande Avenue    | Regrade for Retention<br>Basin             | Excavation: 2,000 CY @ \$6/CY = \$12,000<br>Curb Inlets: 2 @ \$2,500/Ea = \$5,000<br>Drywells: 2 @ \$2,500/Ea = \$5,000<br>Contingency = +25%<br>Total = \$27,500  |
| Toltec Street to French<br>Street, north side of 2 <sup>nd</sup><br>Street | Construct Storm Drain<br>Trunk Line        | 24" RCP: 3,200 LF @ \$50/LF = \$160,000<br>Catch Basins: 16 @ \$3,000/Ea = \$48,000<br>Contingency = +25%<br>Total = \$260,000   |
| NW Corner, 2 <sup>nd</sup> Street/<br>Drylake Street                       | Construct Detention<br>Chamber (100'x100') | Excavation: 3,500 CY @ \$6.00/CY = \$21,000<br>Chambers: 2200 @ \$50/Ea = \$110,000<br>Rock Backfill: 2500 CY @ \$25/CY = \$62,500<br>Filter Fabric: 2800 SY @ \$2/SY = \$5,600<br>Contingency = +25%<br>Total = \$250,000 |
| NW Corner, 2 <sup>nd</sup> Street/<br>Sacaton Street                       | Construct Detention<br>Chamber (100'x100') | Excavation: 3,500 CY @ \$6.00/CY = \$21,000<br>Chambers: 2200 @ \$50/Ea = \$110,000<br>Rock Backfill: 2500 CY @ \$25/CY = \$62,500<br>Filter Fabric: 2800 SY @ \$2/SY = \$5,600<br>Contingency = +25%<br>Total = \$250,000 |
| French St/SR 84<br>Prior to Concrete Box<br>Culvert                        | Construct Detention<br>Chamber (100'x100') | Excavation: 3,500 CY @ \$6.00/CY = \$21,000<br>Chambers: 2200 @ \$50/Ea = \$110,000<br>Rock Backfill: 2500 CY @ \$25/CY = \$62,500<br>Filter Fabric: 2800 SY @ \$2/SY = \$5,600<br>Contingency = +25%<br>Total = \$250,000 |

## **4.0 UTILITY REPLACEMENT RECOMMENDATIONS**

### **4.1 Existing Facilities, Deficiencies and Opportunities**

Water, sewer, power, natural gas, irrigation and cable television utilities exist within the project area. As with most urban construction projects, coordination with utility companies is vital to the successful and timely completion of the project.

The City of Casa Grande has recommended that each utility company be contacted early in the project development phase to allow adequate time to respond to potential replacement or new facilities placement within the project limits. This proactive approach will assist in minimizing future pavement cuts, which result in premature pavement failure.

The utility companies, which have facilities within the project area have been contacted in regards to future improvement plans and need for facility replacement. While most of the utility companies are reactive to the needs of the customer and do not have control when a service would be required, future improvements are forecasted for facility placement. However, all the companies contacted expressed their desire to partner with the City of Casa Grande and the design consultant to minimize or eliminate any possible conflicts. Table 4 identifies the utility owners and their involvement.

The existing sewer lines, owned by the City, are in various stages of condition. Carollo Engineers prepared a Sewer System Evaluation, July, 1998 in which it described the sewer lines condition as depicted on Figure 4. Most of the sewer lines within the downtown area are in the worst stages of condition and warrant replacement as soon as possible.

### **4.2 Conclusion**

Any new, rehabilitated or replaced pipes should be incorporated into the construction phases of this project to minimize construction impact to adjacent businesses and the traveling public. Sewer line replacement and rehabilitation will also have a weighted priority in order to accomplish the reconstruction expediently.

Table 4 – Utility Owner Involvement Matrix

| Utility Owner          | Facility Type | Involvement               | Location   | Remarks   |
|------------------------|---------------|---------------------------|--|---|
| Arizona Public Service | Electric      | Will Coordinate As needed | Various Aerial Locations   | Will coordinate with design team and contractor for replacement and upgrade of existing electrical lines            |
| Arizona Water Company  | Water         | Will Coordinate As needed | Various  | Will coordinate with design team and contractor for replacement and upgrade of existing water lines                 |
| Kender Morgan Electric | Petroleum     | None                      | Gas lines between Southern Pacific railroad and Main Avenue  | No planned improvement or replacement in area   |
| Southwest Gas          | Natural Gas   | Will Coordinate As needed | Various  | No planned improvement in area - may need to replace undersized mains   |
| US West                | Telephone     | Will Coordinate As needed | Various  | No planned improvement or replacement in area When necessary, Will coordinate with APS for joint use utility trench |
| Cox Communications     | Cable TV      | None                      | Various Aerial Locations   | No planned improvement or to install new facilities underground   |
| San Carlos Irrigation  | Irrigation    | None                      | Various  | No planned improvement or replacement in area   |
| City of Casa Grande    | Sewer         | Will Coordinate As needed | 1st St<br>8" replacement - 330' @ \$100/lf = \$33,000<br>1st St<br>8" rehabilitation - 400' @ \$80/lf = \$32,000<br>1st St<br>10" replacement - 650' @ \$100/lf = 65,000<br>1st St<br>12" rehabilitation - 400' @ \$80/lf = \$32,000<br>Main Street Alley<br>8" replacement - 1400' @ \$100/lf = \$140,000<br>Main Street Alley<br>8" rehabilitation - 300' @ \$80/lf = \$24,000<br>Main Street<br>8" replacement - 350' @ \$100/lf = \$35,000<br>Sacaton St<br>12" replacement - 400' @ 100/lf = \$40,000<br>Marshall St<br>8" replacement - 150' @ \$100/lf = 15,000<br>Total Cost = \$416,000 |   |

## 5.0 STREET DESIGN RECOMMENDATIONS

### 5.1 Purpose

As part of the improvement of utilities, reconstruction of pavement and construction of drainage improvements, it will be beneficial to consider certain street design features that would:

- Encourage pedestrian circulation;
- Enhance amenities;
- Improve parking;
- Control traffic;
- Reduce stormwater runoff; and
- Minimize operating costs.

The elements that may be considered include:

**Pedestrian features:** Sidewalks, crosswalks, shade structures.

**Amenities:** Benches, specialty pavements, pedestrian and street lighting, signing, and landscaping.

**Parking:** Angle-in parking, loading zones, disabled parking, off-street parking.

**Traffic control:** Curb bulbs, textural devices, turn lanes, signing, and signals.

Most of these elements have already been incorporated into improvements to Florence Street, parts of Marshall Street, 2<sup>nd</sup> Street, 3<sup>rd</sup> Street, 4<sup>th</sup> Street and 5<sup>th</sup> Street. The character of the street improvements to these streets should be utilized as a guideline for new improvements so as to enhance and maintain the theme of downtown Casa Grande.

As was previously mentioned, Entranco has prepared a Traffic Analysis for the Downtown Area, recommending a downtown bypass route. The route would follow Main Street and Sacaton Street and encourage higher volumes of traffic to use that route. This will enable the City to reduce the amount of travel lanes on 2<sup>nd</sup> Street from four (4) to two (2). The remaining pavement will be striped for angled parking on the north side and parallel parking on the south side of 2<sup>nd</sup> Street. The modification will also include the curb returns (curb bulbs) to extend into 2<sup>nd</sup> Street, protecting both the pedestrians and vehicles. Modifications to the Main Street/Casa Grande Avenue and 2<sup>nd</sup> Street/Sacaton Street intersections would also be made as part of this bypass route construction.

In the following sections, the specifics of each element are discussed. The final section includes a matrix that outlines the street improvement needs of the various streets in the study area and a cost estimate matrix for each street where the needs for improvements were noted.

### 5.2 Pedestrian Features

In order to have a vital, self sustaining downtown area, it is imperative that the environment is inviting to the pedestrian. Getting people out of their vehicles to walk and enjoy an area is key in increasing activity in an area.

The most important element to good pedestrian circulation is providing adequate sidewalks. In a downtown environment, where shops will front onto the sidewalk, a sidewalk with a width of at least 10 feet is necessary. This provides room for access to the fronting businesses while maintaining good two-way pedestrian access. Where businesses do not directly access the street, a sidewalk with a width of at least six feet should be provided. A six-foot sidewalk allows good two-way access for pedestrians. Of course, wider sidewalks should be considered wherever room exists and additional pedestrian traffic is anticipated.

Another important element for enhancing pedestrian circulation is crosswalks. Typically, crosswalks are provided at intersections but careful examination of where pedestrians travel is needed to determine if crosswalks are needed in other locations, such as at mid-block. Associated with crosswalks is the need to ensure ADA accessibility. Most ramps that were installed several years ago do not meet the current standards and any new construction should include upgrading of ramps. Crosswalks can be as simple as painted lines or can be delineated with specialty pavements. While crosswalks are typically ten feet wide, the volume of pedestrians should dictate the crosswalk's width. Sometimes, midblock crosswalks are made wider to facilitate movement of pedestrians between parking areas and attractors. While midblock crosswalks support the concept to provide traffic calming, there is a possibility for a reduction in on-street parking.

Here in Arizona, it is very important to consider the environment pedestrians will be in. Providing shade, even interspersed shade is important to encouraging pedestrian circulation. There are two ways to provide shade. First, awnings can be provided along the buildings facing the sidewalk. The second way is to provide street trees. Street trees could be installed within the City's right-of-way and provide better year-round and all day shade since their canopy provides 360 degree coverage. Arcades or promenades, constructed of materials suitable for the desert southwest, can also provide shade at transit stops, mid-block crossings or along streets to provide shade for pedestrians. Awnings, particularly on buildings with a southern exposure, are not as effective at providing shade. The awnings would also be outside the City's street right-of-way, leaving the expenditures to install and maintain the awnings to the property owner.

Placement of amenities such as benches should be considered during the design process. Benches can be incorporated on street corners in conjunction with curb bulbs, as is currently done along Florence Street, 3<sup>rd</sup> Street and 4<sup>th</sup> Street.

### **5.3 Amenities**

Provision of amenities will help improve the attractiveness of the street and will also encourage pedestrian activity by creating an inviting environment.

One amenity that should be considered is benches. Benches can be provided on street corners or in areas where adequate right-of-way exists to allow pedestrian circulation. Benches should be combined with shade structures wherever possible. One technique is to create a pad for the bench behind the sidewalk and then provide shade trees on either side of the bench. Benches should also be provided in conjunction with transit stops, if any exist.

Specialty pavements do not add to the pedestrian/motorist experience, per se, but they do add an artistic element. Specialty pavement can be incorporated into sidewalks and crosswalks and can also be used for roadway pavement, where they are particularly useful as textural warning or speed control devices. Patterns or logos can easily be incorporated into the specialty pavements.

Lighting is important for several reasons. First, lighting enhances security especially for pedestrians. Second, lighting allows use of the downtown area at all hours, enhancing its appeal. Third, roadway lighting improves vehicular safety.

Street lighting can be used for both lighting of the roadway and lighting of the pedestrian facilities provided that this is taken into account during design. However, in some cases, such as where pedestrians areas are located away from the roadway or where trees or other structures obscure light from standard street light fixtures, specific pedestrian level lighting should be considered. Pedestrian lighting can also be used to accent landscaping or other streetscape treatments.

Signing can also be used to enhance the pedestrian environment. Signs that direct pedestrians to points of interest, specific shops or businesses or parking areas are useful. This type of signing, in comparison to roadway signing, can be artistic and can include a logo unique to downtown. Signing should be placed in locations where it does not impair pedestrian circulation or create hazards.

An important element of the downtown area should be landscaping. Landscaping can be located between the curb and the sidewalk, between the sidewalk and the right-of-way line, in landscape easements, or in planters interspersed throughout the downtown area. Although plant materials should be drought-tolerant, irrigation must be provided to sustain the plantings. Irrigation systems should be incorporated into the overall utility system design for the streets.

#### **5.4 Parking**

Parking is necessary to encourage use of the downtown area. The Traffic Analysis Report for the Downtown Redevelopment Area describes the current parking supply exceeds the parking demand throughout the day. Although there is a limited number of parking available directly in front of any business, ample parking is located in a surface parking lot or on a street 'right around the corner'. The Traffic Analysis recommends, as part of the 2<sup>nd</sup> Street reconfiguration, that 60-degree angle parking be placed along one side of the street and parallel parking on the other side. This parking addition will add additional capacity for the downtown area.

It is also important to consider creation of short-term loading zones where businesses do not have alley or back of store access. This type of parking is also useful where deliveries might occur or where very short-term parking may be required.

The parking should include a reasonable number of parking stalls for the disabled community. During the design process, the ADA guidelines should be consulted regarding the required number of disabled stalls. Provisions to allow for loading and unloading of disabled persons as well as access from the street to the nearest sidewalk should be made.

Parking can also be provided in off-street lots. As was discussed in the drainage section, there are a number of undeveloped parcels in the downtown area that could serve as both an off-street parking lot and as a stormwater retention area, through either surface ponds or underground vaults or pipes.

#### **5.5 Traffic Control**

Since one goal of the improvements should be to encourage motorists to leave their cars and enjoy downtown on their feet, de-emphasis of through traffic should be a goal of the Downtown Street Project. This can be accomplished using traffic calming techniques. Traffic calming in a downtown environment has the purpose of first discouraging non-downtown destination traffic and secondly to slow traffic.

The most common way to accomplish this is to narrow the driving area and introduce side friction such as on-street parking and curb bulbs. Curb bulbs are locations, usually but not always at intersections, where the curb is brought laterally towards the center of the roadway. This creates a noticeable "pinch" in the roadway, slowing traffic approaching this point. Curb bulbs also are beneficial to pedestrians, shortening the distance they need to travel between the two sides of the street. Curb bulbs can incorporate landscaping and can be used to create mini-plazas at street corners or mid-block, if they are installed in conjunction with crosswalks.

Textural devices can also be used in a downtown environment to alert motorists that pedestrian or parking activity is ahead. Brick pavers or colored, stamped concrete are the preferable method although raised pavement markers can also be used.

As was mentioned previously, mid-block pedestrian crossings can also be an effective way to limit traffic speed. If pedestrian activity is high, vehicles are required to stop, thereby lowering their overall travel speed. Mid-block crossings should be limited to two-lane roadways to protect pedestrians.

Field review did not indicate the current need for midblock pedestrian crossings. As additional businesses locate in downtown Casa Grande, the need for midblock pedestrian crossings should be evaluated.

From a capacity standpoint, it may be necessary to construct left- and right-turn lanes at intersections or potentially at entrances to off-street parking lots. Turn lanes allow the turning traffic to separate from through traffic, improving traffic operations at intersections.

Traffic control at intersections and the need to include turn lanes should be considered on a case-by-case basis as design proceeds. However, it appears that the existing traffic control present at most intersections is adequate.

Street signs are needed to inform, warn and control motor vehicles. The type of signs that will be required include speed limit signs, stop signs, pedestrian crosswalk warning signs, street name signs and parking signs. All should be placed in locations where they are readily visible to approaching motorists but where they will not hamper pedestrian circulation. In addition, the effect of landscaping (when planted and when mature) should factored into their placement.

Consideration should also be given to upgrading the railroad crossings at Florence Street and Sacaton Street. The crossing should be improved to a rubberized or concrete type, and double gates with a median should be installed to enhance vehicle protection.

Finally, installation of traffic signals may be required at some locations due to vehicular volumes, pedestrian volumes or a combination of the two. Where pedestrian volumes are high at mid-block locations, pedestrian actuated traffic signals or "Pelican" signal crossings may be considered.

## **5.6 Needs Assessment of Downtown Streets**

In order to determine the improvement needs for the various downtown streets included in the study area, a field review was made. Table 5 was developed that lists the improvements required on these streets.

Rating of 1  
 Rating of 2  
 Rating of 3  
 Rating of 4  
 Rating of 5

Condition  
 Good  
 Very Poor

City of Casa Grande  
 Downtown Streets  
 Figure 4  
 Sewer Line Condition

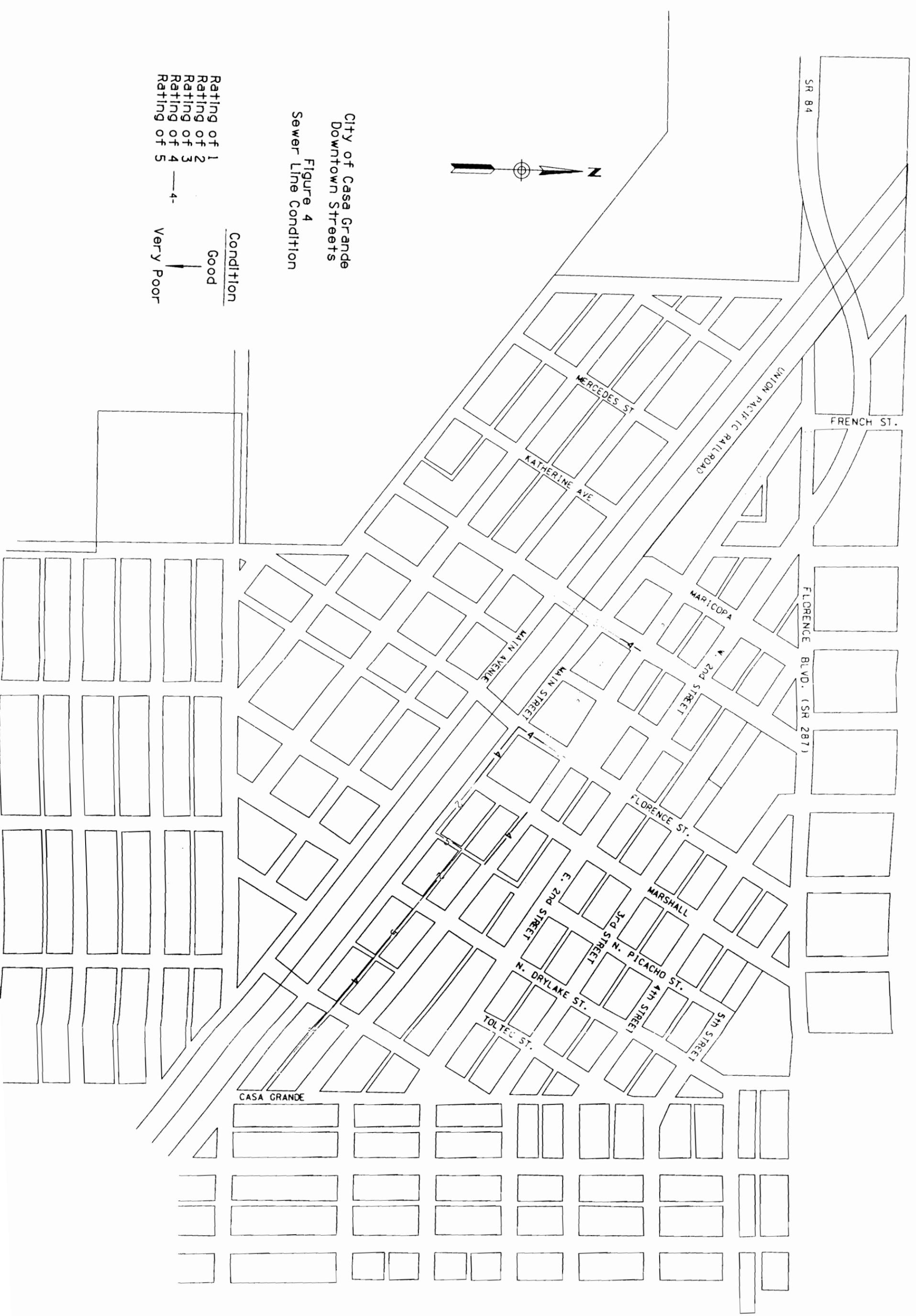
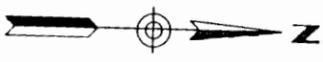


Table 5 - Street Improvements Need Matrix

| Street Name | Limits                                 | Curb/Sidewalk   | Landscaping                               | Lighting             | Parking   | Curb Ramps   | Other  |
|-------------|--|---|---|----------------------|---|--|--|
| Main Avenue | Mercedes Street to Sacaton             | New Curb/Sidewalk N & S Sides                         | New LS N & S Sides                        | Yes                  | No  | Yes - Mercedes St., Katherine St. & Sacaton St.        | Underground Overhead Telephone   |
|             | Sacaton St to Florence St              | New Curb/Sidewalk N & S Sides                         | New LS N & S Sides                        | Yes                  | Parallel - S Side                                       | Yes - Florence St.                                     | Underground Overhead Telephone   |
| Main Street | Jimmie Kerr Blvd. to Hermasillo St.    | New Sidewalk N Sides, New Curb/Sidewalk S Side        | New LS N & S Sides                        | Yes                  | Parallel - N & S Sides                                  | Yes - Hermasillo St.                                   | Underground Overhead Power, Consider Realignment of Jimmie Kerr Intersection |
|             | Hermasillo St. to Dry Lake Street      | New Sidewalk N Sides, New Curb/Sidewalk S Side        | New LS N & S Sides                        | Yes                  | Parallel - N & S Sides                                  | Yes - Dry Lake St.                                     | Underground Overhead Power   |
|             | Dry Lake Street to Marshall Street     | New Sidewalk N Sides, New Curb/Sidewalk S Side        | New LS N & S Sides                        | Yes                  | Parallel - N Side                                       | Yes - Marshall St.                                     | Underground Overhead Power   |
|             | Marshall Street to Florence Street     | New Sidewalk N Sides, New Curb/Sidewalk S Side        | New LS N & S Sides                        | Yes                  | Angle - N Side, None on S Side                          | Yes, Florence St.                                      | Curb bulbs at Marshall St & Florence Street                                  |
|             | Florence Street to Sacaton Street      | New Curb/Sidewalk N & S Sides                         | New LS N & S Sides                        | Existing to Remain   | Angle - N Side, None on S Side                          | Yes, Washington Street & Sacaton St.                   | Curb Bulbs at Washington St. & Sacaton St.                                   |
|             | Sacaton Street to Maricopa Street      | New Curb - S Side, New Curb/Sidewalk N Side           | New LS N Side                             | Yes                  | None  | None   | Very narrow area for improvement   |
|             | Casa Grande to Hermasillo Street       | Existing Sidewalk S Side, New Sidewalk N Side         | New LS N & S Sides                        | No, Residential Area | Parallel  | Yes, Casa Grande & Hermasillo Street                   | Existing Curbs Both Sides  |
| 1st Street  | Hermasillo St. to Dry Lake Street      | Some Existing Sidewalks, S Side, New Sidewalks N Side | New LS N & S Sides                        | No, Residential Area | Parallel  | Yes, Dry Lake Street                                   | Existing Curbs Both Sides  |
|             | Dry Lake Street to Marshall Street     | New Sidewalks N & S Sides                             | New LS N & S Sides                        | Yes                  | Parallel  | Yes, Marshall Street                                   | Underground Overhead Power, Curb Bulbs at Dry Lake St. & Marshall St.        |
|             | Marshall St to Florence St             | Existing Sidewalk N & S Sides                         | New LS N & S Sides                        | Yes                  | Parallel  | Existing at Florence Street                            | Existing Curbs Bulbs at Florence Street                                      |
|             | Florence Street to Sacaton Street      | Replace Existing Curb/Sidewalk N & S Sides            | New LS N & S Sides                        | Yes                  | Parallel  | Yes, Washington Street and Sacaton Street              | Curb Bulbs at Sacaton Street   |
|             | Sacaton St to Maricopa St              | New Sidewalks N & S Sides                             | New LS N & S Sides                        | Yes                  | Parallel  | Yes, Maricopa Street                                   | Underground Overhead Power   |
|             | Maricopa Street to Pinal St            | New Sidewalks N & S Sides                             | New LS N & S Sides                        | Yes                  | Parallel  | Yes, Pinal Street                                      | Underground Overhead Power   |
|             | Pinal Street to Wilson Street          | New Sidewalks N & S Sides                             | New LS N & S Sides                        | Yes                  | Parallel  | None   | Underground Overhead Power   |
| 2nd Street  | Casa Grande Ave to Florence Boulevard  | New Curb and Sidewalk at Curb Bulb Locations          | New LS N & S Sides at Curb Bulb Locations | Existing to remain   | Existing Parallel on South side New Angle on North side | New for Curb Bulbs                                     | New Curb Bulbs Both Sides Utilize Existing Pavement Brick Paver Crosswalks   |
|             | Picacho Street to W of Florence Street | Existing Curb/Sidewalks N & S Sides                   | Existing LS N & S Sides                   | Existing to Remain   | Existing Angle  | Existing at Picacho Street, Marshall & Florence Street | None   |
| 3rd Street  | Picacho Street to Florence Boulevard   | Existing Curb/Sidewalks N & S Sides                   | Existing LS N & S Sides                   | Existing to Remain   | Existing Angle  | Existing at Picacho Street, Marshall & Florence Street | None   |
| 4th Street  | Picacho Street to Florence Boulevard   | Existing Curb/Sidewalks N & S Sides                   | Existing LS N & S Sides                   | Existing to Remain   | Existing Angle  | Existing at Picacho Street, Marshall & Florence Street | None   |

Table 5: Street Improvements Need Matrix, Continued

| Street Name       | Limits                                | Curb/Sidewalk                                      | Landscaping   | Lighting           | Parking        | Curb Ramps  | Other  |
|-------------------|---------------------------------------|--|---|--------------------|----------------|---|--|
| 5th Street        | Marshall Street to Florence Boulevard | Existing Curb/Sidewalks N & S Sides                | Existing LS N & S Sides                                 | Existing to Remain | None           | Existing at Marshall Street                       | None   |
|                   | Main Street to 1st Street             | Existing Curb/Sidewalks E & W Sides                | New LS E & W Sides                                      | Yes                | Existing Angle | Yes, Main Street                                  | Underground Overhead Power, Curb Bulbs at Main Street & 1st Street |
| Marshall Street   | 1st Street to 2nd Street              | Existing Curb/Sidewalks E & W Sides                | Some Existing LS E & W Sides                            | Yes                | Existing Angle | Yes, 1st Street                                   | Underground Overhead Power   |
|                   | 2nd Street to Florence Boulevard      | Existing Curb/Sidewalks E & W Sides                | Existing LS E & W Sides                                 | Existing to Remain | Existing Angle | Existing at 3rd Street, 4th Street and 5th Street | None   |
| Washington Street | Main Street to 1st Street             | New Curb E Side, New Curb/Sidewalk W Side          | New LS E Side   | Yes                | None           | Yes, Main Street and 1st Street                   | Consider One-Way Operation NB                                      |
|                   | 1st Street to 2nd Street              | New Curb E Side, New Curb/Sidewalk W Side          | New LS E Side   | Yes                | None           | Yes, 2nd Street                                   | Consider One-Way Operation NB                                      |
| Sacaton Street    | Railroad to Main Street               | New Curb/Sidewalk E & W Sides                      | None  | Yes                | None           | Yes, Main Street                                  | Underground Overhead Power, Consider RR Crossing Upgrade           |
|                   | Main Street to 1st Street             | Existing Curb/Sidewalk E & W Sides                 | New LS E & W Sides                                      | Yes                | Parallel       | Yes, 1st Street                                   | Underground Overhead Power, Curb Bulbs at 1st Street               |
|                   | 1st Street to 2nd Street              | Existing Curb/Sidewalk E & W Sides                 | New LS E & W Sides                                      | Yes                | Parallel       | Existing, 2nd Street                              | Underground Overhead Power   |
|                   | 2nd Street to Florence Boulevard      | Existing Curb/Sidewalk E & W Sides                 | New LS E & W Sides- Some Existing N of 3rd, E & W Sides | Yes                | Parallel       | Yes, 3rd Street                                   | Underground Overhead Power   |
| Maricopa Street   | Main Street to 1st Street             | New Sidewalk E & W Sides                           | New LS E & W Sides                                      | Yes                | No             | Yes, 1st Street                                   | Underground Overhead Power   |
|                   | 1st Street to 2nd Street              | New Sidewalk E & W Sides                           | New LS E & W Sides                                      | Yes                | Parallel       | Yes, 2nd Street                                   | Underground Overhead Power   |
|                   | 2nd Street to Florence Boulevard      | Existing Curb/Sidewalk W Side, New Sidewalk E Side | New LS E & W Sides                                      | Yes                | Parallel       | Yes, 3rd Street                                   | None   |
| Pinal Avenue      | 1st Street to 2nd Street              | Existing Curb/Sidewalk W Side, New Sidewalk E Side | Existing LS W Side, New LS E Side                       | Yes                | None           | Yes 1st Street & 2nd Street                       | Underground Overhead Power   |
| French Street     | Wilson Street to Gila Bend Hwy.       | New Sidewalk E & W Sides                           | None  | Yes                | None           | Yes, Wilson Street                                | Underground Overhead Power   |

## 5.7 Traffic Signals

As a result from the Traffic Analysis for the Redevelopment Area, dated May 8, 2000, prepared by Entranco, a bypass route of the downtown area is recommended. Main Street and Sacaton Street are identified as the preferred alternate. Signalizing the intersections of 2<sup>nd</sup> Street and Sacaton Street as well as Main Street and Casa Grande Avenue will be required. Casa Grande Avenue will also require realignment approaching Main Street/Jimmie Kerr Boulevard.

Additional traffic signals will be necessary at both intersection improvements of 2<sup>nd</sup> Street/Pinal Avenue and Pinal Avenue/Florence Boulevard/ Gila Bend Highway (SR 84). Both intersections are identified as part of Phase V – Long term Downtown Bypass alignment.

## 5.8 Street Improvement Costs

Table 6 lists the preliminary costs associated with installation of curb and gutter, sidewalks, lighting, street trees, landscaping and curb ramps for those segments where such improvements have not already been constructed.

Curb and gutter costs are assumed to include construction of curb bulbs at intersections as identified in Table 5. For sidewalks, a standard width of six-feet was assumed. Lighting costs are for a standard luminaire on one side of the roadway, spaced at 150 feet, with HPS fixture and includes cost for conduit and conductors. Street trees are for 24" box spaced at 50 feet. Landscaping costs is for a continuous 5-foot wide strip along the roadway and includes irrigation. Curb ramps are included for all intersections.

Table 6 – Street Improvement Costs

| Street Name     | Limits                                | Length | Curb (LF) | Sidewalk (SF) | Lighting (Ea.) | Street Trees (Ea.) | Landscaping (SF) | Signal Intersection (Lump Sum) | Curb Ramps (Ea.) | Segment Cost | Total Cost |
|-----------------|---------------------------------------|--------|-----------|---------------|----------------|--------------------|------------------|--------------------------------|------------------|--------------|------------|
| Main Avenue     | Mercedes Street to Sacaton            | 915    | 1830      | 10980         | 6              | 37                 | 9150             | 0                              | 8                | \$125,100    | \$210,000  |
|                 | Sacaton Street to Florence Street     | 610    | 1220      | 7320          | 4              | 24                 | 6100             | 0                              | 8                | \$84,900     |            |
|                 | Jimmie Kerr Blvd. to Hermasillo St.   | 670    | 670       | 8040          | 4              | 27                 | 6700             | 1                              | 4                | \$363,200 *  |            |
|                 | Hermasillo St. to Dry Lake Street     | 680    | 680       | 8160          | 4              | 27                 | 6800             | 0                              | 4                | \$82,800     |            |
|                 | Dry Lake Street to Marshall Street    | 650    | 650       | 7800          | 4              | 26                 | 6500             | 0                              | 4                | \$79,900     |            |
| Main Street     | Marshall Street to Florence Street    | 330    | 330       | 3960          | 2              | 13                 | 3300             | 0                              | 4                | \$41,700     | \$670,900  |
|                 | Florence Street to Sacaton Street     | 610    | 1220      | 7320          | 0              | 24                 | 6100             | 0                              | 6                | \$71,100     |            |
|                 | Sacaton Street to Maricopa Street     | 340    | 680       | 2040          | 2              | 14                 | 1700             | 0                              | 0                | \$32,200     |            |
|                 | Casa Grande to Hermasillo Street      | 470    | 0         | 2820          | 0              | 19                 | 4700             | 0                              | 6                | \$37,200     |            |
|                 | Hermasillo St. to Dry Lake Street     | 680    | 0         | 6120          | 0              | 27                 | 6800             | 0                              | 4                | \$56,700     |            |
| 1st Street      | Dry Lake Street to Marshall Street    | 650    | 0         | 7800          | 4              | 26                 | 6500             | 0                              | 4                | \$73,000     | \$430,300  |
|                 | Marshall Street to Florence Street    | 330    | 0         | 0             | 2              | 13                 | 3300             | 0                              | 0                | \$23,100     |            |
|                 | Florence Street to Sacaton Street     | 610    | 1220      | 7320          | 4              | 24                 | 6100             | 0                              | 8                | \$84,900     |            |
|                 | Sacaton Street to Maricopa Street     | 340    | 0         | 4080          | 2              | 14                 | 3400             | 0                              | 4                | \$39,400     |            |
|                 | Maricopa Street to Pinal Street       | 500    | 0         | 6000          | 3              | 20                 | 5000             | 0                              | 4                | \$56,500     |            |
| Florence Street | Pinal Street to Wilson Street         | 530    | 0         | 6360          | 4              | 21                 | 5300             | 0                              | 0                | \$59,500     | \$245,300  |
|                 | 4th Street to Florence Boulevard      | 200    | 400       | 2000          | 2              | 2                  | 2000             | 1                              | 2                | \$245,300    |            |
|                 | Casa Grande Ave to Florence Boulevard | 3300   | 2200      | 11000         | 0              | 0                  | 4500             | 0                              | 44               | \$102,100    |            |
|                 | Maricopa Street to Pinal Ave          | 200    | 400       | 2000          | 4              | 4                  | 2000             | 1                              | 4                | \$252,200 *  |            |
|                 | Main Street to 1st Street             | 295    | 0         | 0             | 2              | 12                 | 2950             | 0                              | 0                | \$21,500     |            |
| Marshall Street | 1st Street to 2nd Street              | 350    | 0         | 0             | 2              | 0                  | 3500             | 0                              | 0                | \$17,200     | \$38,700   |
|                 | Main Street to 1st Street             | 275    | 550       | 1650          | 2              | 6                  | 1375             | 0                              | 0                | \$24,600     |            |
|                 | 1st Street to 2nd Street              | 335    | 670       | 2010          | 2              | 7                  | 1675             | 0                              | 0                | \$28,400     |            |
|                 | Railroad to Main Street               | 100    | 200       | 1200          | 0              | 0                  | 0                | 0                              | 0                | \$5,900      |            |
|                 | Main Street to 1st Street             | 270    | 0         | 0             | 2              | 11                 | 2700             | 0                              | 0                | \$20,200     |            |
| Sacaton Street  | 1st Street to 2nd Street              | 325    | 0         | 0             | 2              | 13                 | 3250             | 1                              | 0                | \$304,200 *  | \$376,700  |
|                 | 2nd Street to Florence Boulevard      | 610    | 0         | 0             | 4              | 24                 | 6100             | 0                              | 4                | \$46,400     |            |
|                 | Main Street to 1st Street             | 260    | 0         | 3120          | 2              | 10                 | 2600             | 0                              | 0                | \$29,200     |            |
|                 | 1st Street to 2nd Street              | 315    | 0         | 3780          | 2              | 13                 | 3150             | 0                              | 4                | \$37,200     |            |
|                 | 2nd Street to Florence Boulevard      | 390    | 0         | 1950          | 3              | 16                 | 3900             | 0                              | 4                | \$38,500     |            |
| Maricopa Street | 1st Street to 2nd Street              | 305    | 305       | 1525          | 2              | 6                  | 3050             | 1                              | 4                | \$251,300 *  | \$104,900  |
|                 | Pinal Avenue                          | 305    | 305       | 1525          | 2              | 6                  | 3050             | 1                              | 4                | \$251,300 *  |            |
|                 | Main Street to 1st Street             | 200    | 400       | 2000          | 2              | 4                  | 1000             | 0                              | 6                | \$19,600     |            |
| Pinal Avenue    | Main Street to 1st Street             | 200    | 400       | 2000          | 2              | 4                  | 1000             | 0                              | 6                | \$19,600     | \$270,600  |
| French Street   | Wilson Street to Gila Bend Hwy.       | 300    | 0         | 3600          | 2              | 0                  | 0                | 0                              | 4                | \$20,300     |            |

\* Includes Intersection Realignment

| Item                   | Estimated Cost | Unit            |
|------------------------|----------------|-----------------|
| Curb & Gutter          | \$ 8.50        | LF              |
| Sidewalk               | \$ 2.50        | SF              |
| Lighting               | \$ 2,500.00    | Ea.             |
| Street Trees           | \$ 400.00      | Ea.             |
| Landscaping/Irrigation | \$ 2.50        | SF              |
| Curb Ramps             | \$ 550.00      | Ea.             |
| Traffic Signal/Imprmt  | \$ 225,000.00  | Ea Intersection |
| Contingency            | +25%           |                 |

## 6.0 PRIORITY AND IMPLEMENTATION PLAN

The goal of this report has been to assemble a comprehensive list of improvements needed to the Downtown City of Casa Grande streets. In conjunction with this, costs for the needed improvements have been identified. As the last step, the list of streets needing improvement have been reviewed along with their respective improvement costs and a priority and implementation plan has been developed.

Five phases are recommended for the construction of the streets listed within this report. Phase I will be the highest priority with Phases II, III, IV and V being the next priorities. The priorities are based on the total infrastructure needs of the downtown area.

Drainage is the focal point and most important issue of this project. Improvements to the South Drainage System are recommended for inclusion in the first phase of the improvement project. Provision of a way to reduce the amount of standing water on downtown streets will allow the City of Casa Grande to have the pavement within the downtown area meet their intended design life. The improvement to the South Drainage System is not dependent upon the North Drainage system to function.

Since 1<sup>st</sup> Street runs the entire length of the project area, it is a logical candidate for improvement in the first phase of construction. Improvements to 1<sup>st</sup> Street will also allow the streetscape concept created on 2<sup>nd</sup> Street and north to be carried into the area south of 2<sup>nd</sup> Street, helping to revitalize this area. It also will help north/south routes by providing improvements at each intersection. Since those improvements will extend at least 50 feet north and south of the intersections, this will improve intersection drainage and the appearance of the intersecting streets to some degree.

1<sup>st</sup> Street and Main Street have poor sanitary sewer line condition, requiring replacement and regarded as a first phase construction priority.

The projects included in Phase I were also chosen in an attempt to balance the costs associated with each implementation phase. While not exactly balanced, the costs are spread out fairly well between the first four phases. Phase V will be the last step in the scope of downtown improvements with the alignment of the Long Term Downtown Bypass.

Implementation of Phase II would improve Main Street and Florence Street, including replacement of pavement and provision of street improvements including curbs, sidewalk and streetscape elements. During this phase, the reconstruction of the intersections at 2<sup>nd</sup> Street/Sacaton St and Casa Grande Avenue/Main Street are recommended to begin to complete the downtown bypass route. Florence Street will be reconfigured to align opposite of Walnut Avenue at Florence Boulevard. This intersection will also have a traffic signal.

2<sup>nd</sup> Street is the only street to be improved during Phase III. Drainage improvements and streetscaping as well as a proposed one-inch asphalt concrete overlay are proposed for construction during this phase. In order for 2<sup>nd</sup> Street to become a successful low traffic volume street, the construction of the downtown bypass route will need to be constructed prior to the improvements to 2<sup>nd</sup> Street.

In Phase IV, the majority of the streets would be improved, including pavement rehabilitation and streetscaping. Certain segments of Doan Street, 5<sup>th</sup> Street and 2<sup>nd</sup> Street will be removed as part of Phase IV construction phase to allow better traffic operation.

Phase V identifies the extension of Pinal Avenue and realignment of 2<sup>nd</sup> Street for the Long Term Downtown Bypass alignment. This improvement includes the reconfiguration of the Florence Blvd/Pinal Avenue/Gila Bend Highway (SR 84) intersection, re-phasing the traffic signal, new intersection for Pinal Avenue and 2<sup>nd</sup> Street with a traffic signal.

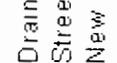
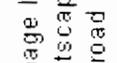
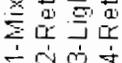
Table 7 lists the recommended prioritization and phasing of the street projects along with the preliminary costs associated with each phase. The Project Phasing and Recommended Improvements and Redevelopment Opportunity Clusters are shown schematically on Figures 5 and 6.

Figure No. 7 shows a schedule projecting a time line for design, right-of-way acquisition, utility relocation/repair, and construction of each phase.

# Casa Grande Downtown Area Plan

## Figure 6 Recommended Improvements and Redevelopment Opportunity Clusters

### LEGEND

-  Drainage Improvements
-  Streetscape Improvements
-  New road alignment
-  Major Intersection Improvements
-  Traffic Calming
-  Key Redevelopment Sites
-  1-Mixed-use/Parking
-  2-Retail/Office
-  3-Light-industrial/retail
-  4-Retail/Entertainment

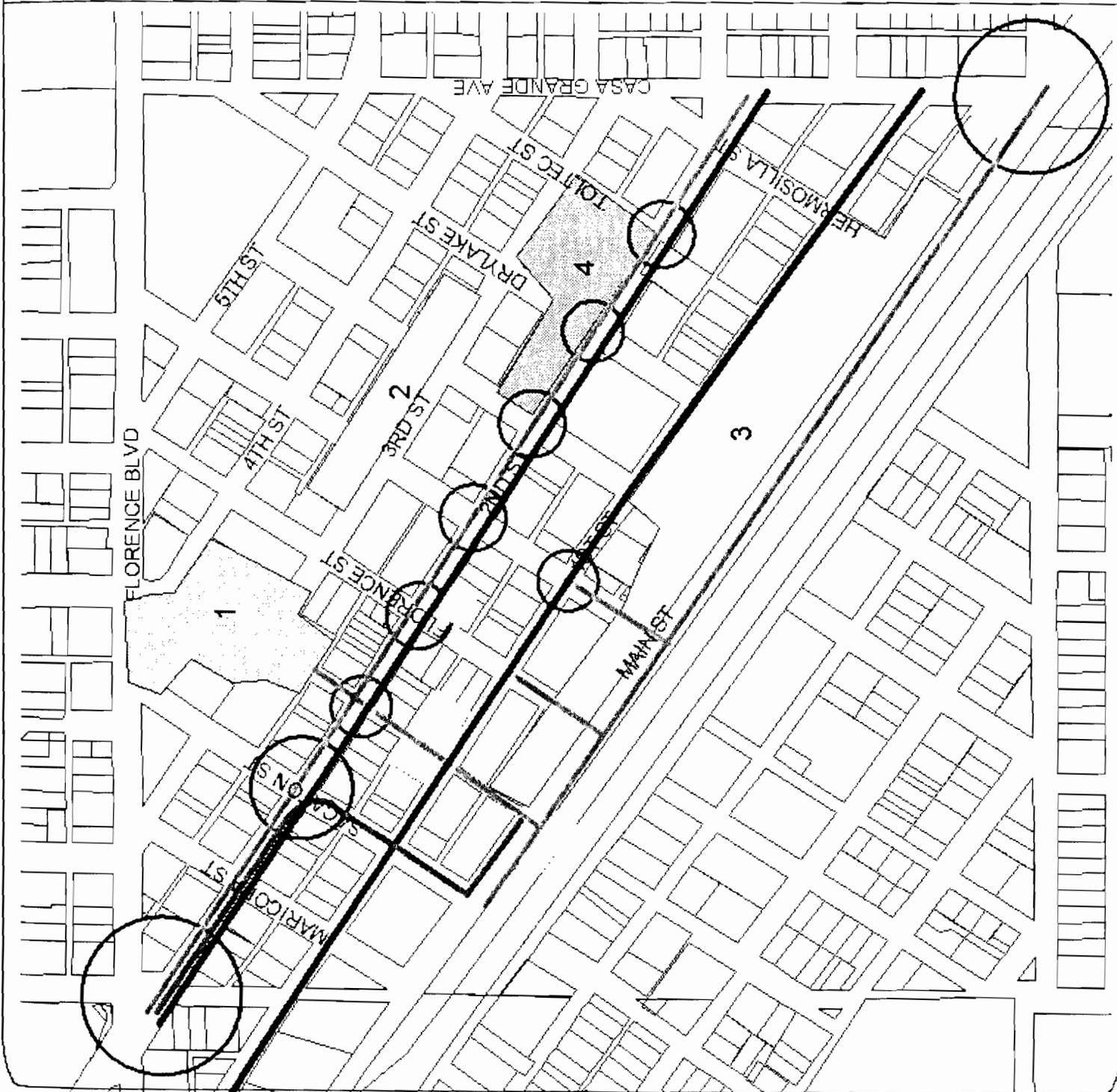
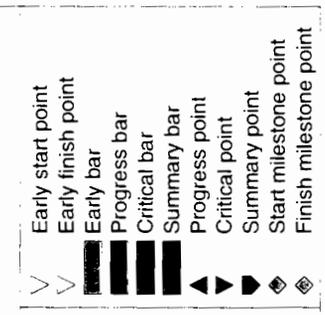
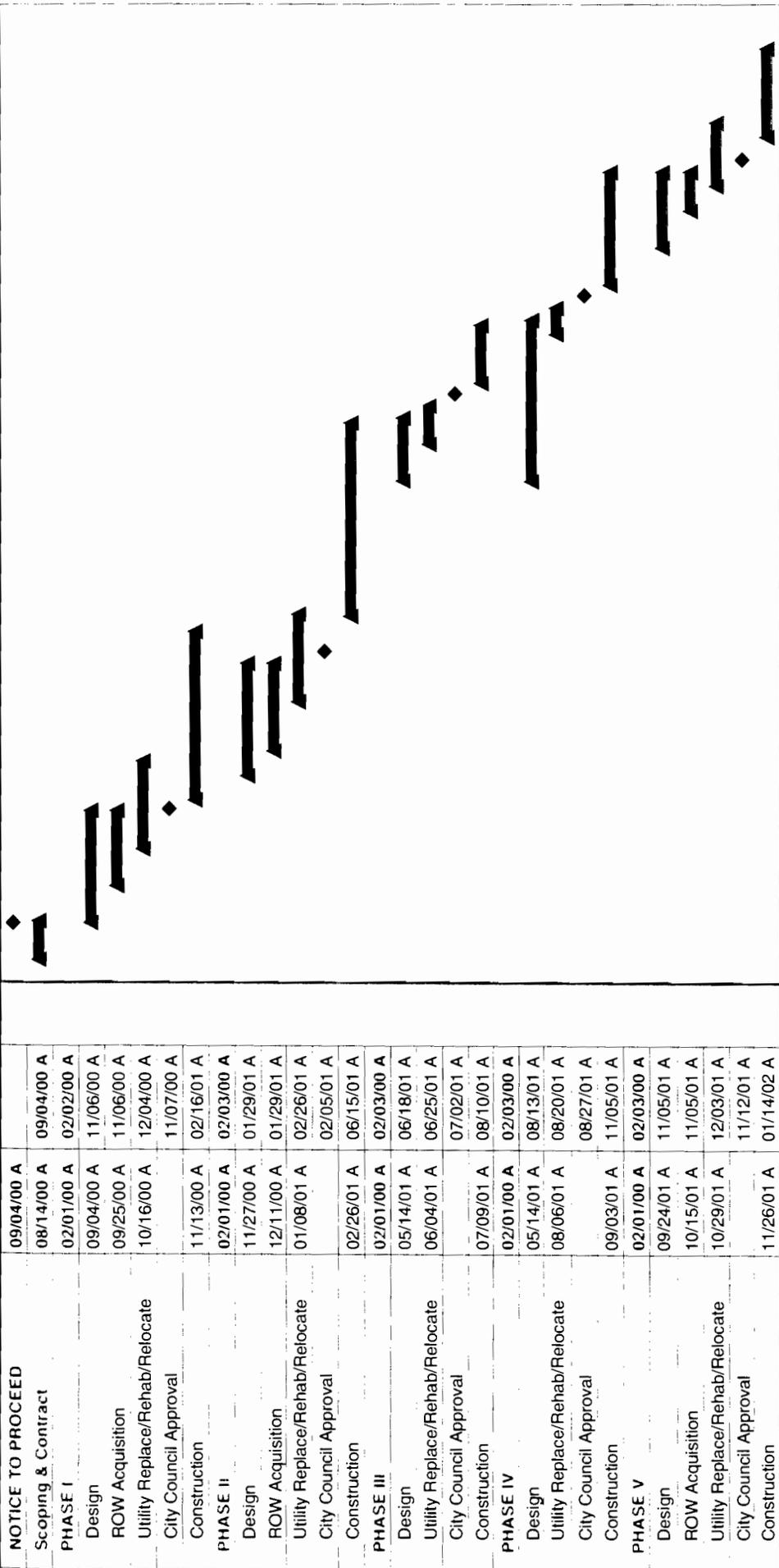


Table 7 – Prioritization and Project Phasing with Cost per Construction Phase

| Construction Phase | Street Name     | Limits                                | Pavement Cost | Drainage Cost | Street Improvement Cost | Sewer Replacement Rehab Cost | Pavement Removal | Total Cost  | Total Phase Cost | R/W Needed |
|--------------------|-----------------|---------------------------------------|---------------|---------------|-------------------------|------------------------------|------------------|-------------|------------------|------------|
| I                  | Retention Basin | West Dry Lake St - Main St and 1st St | n/a           | \$95,900      | n/a                     | n/a                          | n/a              | \$95,900    | \$930,000        | 75,400 SF  |
|                    | Retention Basin | SW corner, Hermasillo and 1st St      | n/a           | \$19,800      | n/a                     | n/a                          | n/a              | \$19,800    |                  | 23,800 SF  |
|                    | Retention Basin | East of Maricopa - Main St and 1st St | n/a           | \$30,000      | n/a                     | n/a                          | n/a              | \$30,000    |                  | 30,900 SF  |
| I                  | 1st Street      | Wilson St to Casa Grande Ave (SR 84)  | \$192,000     | n/a           | \$430,300               | \$162,000                    | n/a              | \$784,300   | \$1,566,600      | n/a        |
|                    | Florence Street | Florence Blvd (SR 287) to Elm Street  | \$203,830     | n/a           | n/a                     | n/a                          | \$3,000          | \$203,830   |                  | n/a        |
| II                 | Florence Street | Realign north segment of Florence St  | \$7,000       | n/a           | \$5,000                 | n/a                          | \$3,000          | \$12,000    |                  | n/a        |
| II                 | Main Street     | Sacaton St to Casa Grande Ave         | \$126,730     | n/a           | \$638,700               | \$199,000                    |                  | \$964,430   |                  | 26,500 SF  |
|                    | Sacaton St      | Railroad to 2nd Street                | \$56,040      | n/a           | \$330,300               | n/a                          |                  | \$386,340   |                  | 3,100 SF   |
| III                | 2nd Street      | Casa Grande Avenue to Florence Blvd   | \$25,500      | \$1,037,500   | \$102,100               | n/a                          |                  | \$1,165,100 | \$1,165,100      | 30,000 SF  |
| IV                 | Main Avenue     | Florence St. to Mercedes St.          | \$65,056      | n/a           | \$210,000               | n/a                          |                  | \$275,056   | \$869,622        | n/a        |
|                    | 3rd Street      | Picacho St to West of Florence St     | \$27,762      | n/a           | n/a                     | n/a                          |                  | \$27,762    |                  | n/a        |
|                    | 4th Street      | Florence St. to Picacho St            | \$30,418      | n/a           | n/a                     | n/a                          |                  | \$30,418    |                  | n/a        |
| IV                 | 5th Street      | Marshall St to Florence Blvd          | \$9,292       | n/a           | n/a                     | n/a                          | \$5,000          | \$9,292     |                  | n/a        |
|                    | French St       | 1st St to SR 84                       | \$9,292       | n/a           | \$20,300                | n/a                          |                  | \$29,592    |                  | n/a        |
| IV                 | Pinal Ave       | 1st St to 2nd St                      | n/a           | n/a           | \$26,300                | n/a                          |                  | \$26,300    |                  | n/a        |
| IV                 | Maricopa St     | Main St to 2nd St                     | \$35,478      | n/a           | \$104,900               | n/a                          |                  | \$140,378   |                  | n/a        |
| IV                 | Marshall St     | Main St to Florence Blvd              | \$65,170      | n/a           | \$38,700                | \$15,000                     |                  | \$118,870   |                  | n/a        |
|                    | Sacaton St      | 2nd Street to Florence Blvd           | \$18,883      | n/a           | \$46,400                | \$40,000                     |                  | \$105,283   |                  | n/a        |
| IV                 | Main Street     | Maricopa Street to Sacaton Street     | \$13,386      | n/a           | \$32,200                | n/a                          |                  | \$45,586    |                  | n/a        |
| IV                 | Washington St   | 1st Street to 2nd Street              | \$8,085       | n/a           | \$53,000                | n/a                          |                  | \$61,085    |                  | 37,800 SF  |
| V                  | Pinal Avenue    | Widening/Extension                    |               | \$25,000      | \$270,600               | n/a                          | n/a              |             | 0                | 17,800 SF  |
| V                  | 2nd Street      | Realignment                           |               | \$10,000      | \$252,200               | n/a                          |                  |             |                  |            |



**City of Casa Grande**  
**Downtown Streets Improvement Project**  
**Phase Timeline Schedule**  
**Figure 7**

## 7.0 CONCLUSION

The review of the existing street system conducted for this report shows a number of deficiencies. Pavement failures, caused by pavement age, inadequate pavement depths, and standing storm water are prevalent, especially south of 2<sup>nd</sup> Street and west of Florence Street.

The lack of adequate slope and insufficient outfall size contribute to the pavement failures. In addition, lack of storm water storage off of the roadways also contributes to pavement failure, as water stands along curbs and in streets.

Many of the streets lack curbs, sidewalks, lighting, and landscaping. This creates a negative contrast between the streets north of 2<sup>nd</sup> Street and east of Florence Street where curbs, sidewalks, and streetscape enhancements have been installed. As part of the rehabilitation of the downtown streets, it would be beneficial to carry this theme to the streets south of 1<sup>st</sup> Street and west of Florence Street.

This report examined the various improvement needs and associated costs required to provide a uniform appearance and level of service on all downtown streets. The various street improvements have been prioritized and phases recommended. In conjunction with the street improvements, several drainage relief projects have been developed. The projects will:

- Replace or rehabilitate failing or failed pavements;
- Provide uniform curbs, gutters, and sidewalks along all streets;
- Provide street lighting and streetscape elements along all streets; and
- Relieve the flooding problem currently occurring in the downtown area.

The next step in the process is to further refine and define the individual projects recommended herein. The eventual goal is to produce construction documents for these improvements so the projects can be bid and built, thereby dramatically improving the downtown area.

A financial plan should be developed to allow the City of Casa Grande the greatest flexibility and efficiency to use local funding sources as leverage against other funding sources to fulfill necessary local match programs. The financial strategies plan should focus on the ability of the City of Casa Grande to obtain local funds to combine with state and federal funding sources, such as:

- TEA-21C Transportation Enhancement funds
- Community Development Block Grant funds
- Main Street Grant programs
- State Park Heritage and Historic Preservation grant programs