



City of Phoenix

**STREET TRANSPORTATION DEPARTMENT
DESIGN AND CONSTRUCTION MANAGEMENT DIVISION**

ADMINISTRATIVE PROCEDURE (AP) NO. 155

**PROJECT DEVELOPMENT REQUIREMENTS AND
GUIDELINES**

February 2012

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The following information is available at the City of Phoenix Street Transportation Department web address: <http://phoenix.gov/STREETS/ap155.html>

City of Phoenix Administrative Procedure No. 155
City of Phoenix Standard Utility Locations
City of Phoenix Street Lighting Layout Guidelines
Typical Guard Rail Terminal Assembly
Sample Construction Plans
Sample Right-of-Way Map



Revisions

February 2012

Changed EAS to PS (Procurement Section)
Mylars are no longer required for final submittals
DWF files are required for each submittal review



1 Introduction

1.1 Implementation of Requirements and Guidelines

This new Administrative Procedure (AP) No. 155 supersedes and combines previous Street Transportation Department AP No.1, AP No. 55 and AP No. 13. This document has been prepared to include standards and guidelines pertaining to all construction plans and supporting reports and documents typically prepared for the Design and Construction Management Division of the City of Phoenix Street Transportation Department.

1.2 Identification of Responsible Persons

The Consulting Engineer contracted by the City of Phoenix Street Transportation Department to prepare construction plans, reports, and other documents required for construction of capital improvement projects shall herein be identified as the “Consultant”.

The Street Transportation Department staff representative responsible for reviewing the Consultant’s plans and coordinating the work needed to process the project through the design phase shall herein be referred to as the “Project Manager”.

The Street Transportation Department’s Civil Engineer III who supervises the Project Manager shall herein be referred to as the “Design Engineer”.

1.3 Purpose of AP No.155

The purpose of this AP is to establish City of Phoenix Street Transportation Department standards for Consultants in the preparation and submittal of Arterial, Collector and Local Street Paving projects; Local Drainage studies; Local Drainage Improvement projects; Street Modernization projects; Improvement District projects; Sidewalk Improvement projects; Community Development Block Grant (CDBG) projects; Miscellaneous Traffic Operations projects; Storm Drain projects; Water and Sanitary Sewer projects.

This AP is intended as a guide and does not presume to dictate in the matter of engineering judgment in design, nor is it intended to be restrictive as to additional information the Consultant may consider necessary in providing sound engineering judgment.

1.4 Periodic Updates

This AP may be revised or updated periodically. The latest version will be posted on the City of Phoenix website, <http://phoenix.gov/STREETS/ap155.html>. The revision page(s)



at the beginning of the AP will provide summaries and implementation dates for each revision.

1.5 Abbreviations and Acronyms

A [List of Abbreviations and Acronyms](#) used in this AP can be found in Appendix A-1.



2 Project Administration

2.1 Project Scope

After a Consultant has been selected, a representative from the Street Transportation Procurement Section (PS) staff will schedule a Scope Meeting with the Consultant, the Design Engineer, and the Project Manager. Depending on the nature and complexity of the project, other City staff may also attend. At this meeting the Design Engineer and Project Manager will outline the project scope, and the Consultant may ask questions to clarify the scope of the project. PS staff will explain the required contractual items to be provided by the Consultant. From this scope discussion, the Consultant shall prepare a detailed scope of work and fee proposal.

The Consultant shall refer to the requirements and guidelines in this AP to ensure all required elements are included in the Project Scope. The Consultant shall consider all requirements and guidelines in this AP as part of the Project Scope, unless otherwise informed in writing by the Project Manager and Design Engineer.

The Planning, Design, and Programming Division of Street Transportation Department (PDP) may have also prepared a Predesign Assessment for the project. These documents normally contain a cursory analysis of the project as well as recommendations, cost estimates, and an initial basic Project Scope. It may also identify permitting and utility issues. This document may also be used by the Consultant as a guide in developing the project design scope. If available, the Project Manager will provide a copy to the Consultant at or before the detailed Scope Meeting.

2.2 Project Information

Prior to submitting a fee proposal, the Consultant shall perform a thorough field inspection of the project area and become familiar with the site conditions to fully determine all scope requirements to provide an acceptable design for the stated Project Scope.

To develop a fee proposal, the Consultant should have, for the purpose of review and familiarization, the following list of documents and reference material:

2.2.1 Furnished by the Project Manager

1. Project Scope of Work outline and/or a Predesign Assessment.
2. Administrative Procedure No. 155.
3. Water and Sewer Quarter-Section (Q-S) maps from the Water Services Department.



4. City of Phoenix right-of-way Quarter Section and Aerial maps.
5. Maps of existing utilities.
6. Sample project plans (as needed).

2.2.2 To be Obtained by the Consultant (as needed or applicable)

1. City of Phoenix Storm Water Policies and Standards Manual:
<http://phoenix.gov/STREETS/index.html>
2. Flood Control District of Maricopa County (FCDMC) (“**DRAFT**”) Hydrology, Hydraulics and Erosion Control Technical Manuals:
<http://www.fcd.maricopa.gov/Pub/manuals/manuals.aspx>
3. City of Phoenix AutoCAD Drafting Standards:
<http://phoenix.gov/STREETS/acadstds.html>
4. City of Phoenix Water Services Department Design Standards Manual for Water and Wastewater Systems: <http://phoenix.gov/WATER/desstand.html>
5. All other necessary information for preparing the design, including record drawings, available at EAS Central Records.
6. City of Phoenix-recognized benchmark data (a minimum of two benchmarks are required on each project), available from the COP DCM Survey Section, (602) 495-2050. Benchmark information is also available online at the following web address:
http://www.surveorresourcepage.com/cop_bm/srchbm.asp

2.3 Fee Proposal

Following the Scope Meeting, the Consultant shall prepare and submit a detailed Scope of Work and Fee Proposal to the Procurement Section and the Project Manager. The Fee Proposal shall include a cover letter, a detailed scope of design work, a proposed work schedule, the total base fee broken down by tasks and staff hours needed, with direct hourly rates. Overhead and profit percentages shall be shown and calculated on the direct fee subtotals. The initial contract schedule shall be broken down by weeks and show a timeline for all submittals and City review times. Later, after actual contract Notice to Proceed has been issued, the Consultant shall prepare a new schedule with actual dates based on the actual Notice to Proceed start date and the initial timeline schedule.

The basic design fee is normally a lump sum fee amount. Any sub-Consultant work is considered an allowance and shall be listed individually, separate from the basic design



fee. A copy of each sub-Consultant's Fee Proposal shall also be included. The need for allowances will be discussed individually at the Scope Meeting.

Upon receipt of the fee proposal, the PS Contract Officer, Design Engineer and Project Manager will review it. As necessary, the City staff will negotiate the scope and fee proposal until all parties are satisfied. Then, the Consultant shall prepare the final proposal, and PS Contract Officer will prepare final contract documents and ultimately issue a written Notice to Proceed letter with the final signed contract.

2.3.1 Allowances

Allowances shall be discussed at the Scope Meeting and itemized separately from the total base fee on an as-needed basis in the proposal. Some allowances in a contract may not be used over the course of the project; or they may be redirected toward other uses over the course of the project. No payments will be made for unused allowances, nor will any changes be allowed without written approval from the Project Manager.

Examples of some allowances that may be required include: utility coordination, field survey, acquisition of right-of-way, post design services, public meetings, printing costs (outside the standard required plan submittals), cultural/environmental issues, geotechnical investigation, subsurface utility engineering services, landscape design, bridge design, etc.

2.3.1.1 Public Meetings

If necessary, during the design phase the Consultant will have an allowance for attending one or more public meetings as required by the Project Scope.

The Consultant will be expected to attend the meetings as a City representative, answer questions from the public, supply any drawings deemed pertinent to the meeting discussion, and give a presentation on an as-needed basis.

The City may retain a Public Relations (PR) firm under a separate contract to coordinate the event. The Consultant may work directly with the PR firm, depending on the nature of the project.

2.3.2 Fee Proposal Checklist

- Signed cover letter on company letterhead
- Detailed scope of work based on Scope Meeting



- Hourly rates showing overhead and profit
- Fee by major scope topic identifying staff and hours
- Allowances, including all sub-consultant proposals
- Generic schedule with day 1 as the Notice to Proceed (NTP)

2.4 Contract Documents

PS will prepare a Request for Council Action (RCA) to officially award the contract to the Consultant. After approval, PS will send a copy of the contract to the Consultant for signature. After Consultant signature, PS will route the contract through the client department, Law Department and the City Clerk for signatures. Upon final signed contract documents, PS will issue the Consultant a Notice to Proceed letter, along with a fully signed contract. This process may take up to 60 days or more.

If the contract is an amendment to an Annual Service Contract, PS can issue the Notice to Proceed without City Council action, and in this case, the Notice to Proceed can usually be issued within 30 days of approved scope of work and fee proposal.

2.5 Contract Payment Request Procedure

Each Consultant Design Contract Payment Request form shall be accompanied by a Design and Planning Progress Report, and both completed forms shall be submitted on BLUE paper. Examples of these forms are shown in Appendix A-2. Microsoft Office electronic form templates for the Payment Request and Design and Planning Progress Report may also be supplied to the Consultant by the Project Manager upon request.

All reimbursements under allowances shall include invoices or receipts, or hourly staff reports, as applicable. The Project Manager may request hourly staff reports for lump sum design contracts at any time. Examination of hours expended may be necessary based on project progress or other factors.

The Project Manager may refuse to approve a pay request if the work submitted does not meet the information shown on the project progress report. The Project Manager may also reject the pay request if it lacks specific documentation requirements, or if there are math errors. The Project Manager may also refuse the pay request if an inadequate amount of work has been completed to justify payment.

All payment requests shall be submitted on BLUE paper and delivered to:

Street Transportation Department, DCM Division
1034 East Madison Street
Phoenix, Arizona 85034



ATTN: (Project Manager's Name)

2.6 Design Change Orders

If, during the course of design, the Consultant feels the original scope has changed significantly enough to warrant a change order to the contract, the Consultant shall inform the Project Manager in writing before performing out-of-scope work. The Consultant shall submit a written explanation to the Project Manager for approval

When the Project Manager requests, or approves a Consultant's request for a design change order to the existing contract, the Consultant shall prepare a written proposal reflecting the requested scope of work change

The Project Manager may negotiate with the Consultant regarding the final fee proposal. The City will not be liable for any work performed out of scope without the permission of the Project Manager.

Each change under an Annual Services contract will be processed by PS as an amendment upon scope and fee agreement. PS will issue the amendments to the existing Annual Services contracts. After the signed amendment is received, the Consultant may bill for work performed.

Change orders under a non-Annual Services contracts usually require a Pay Ordinance to be approved by the City Council before payment can be released. If the amount of a design change order is greater than 25% of the original contract amount, Deputy City Manager's approval will also be required. The processing time for a change order of this type may be 60 days or more.



3 Project Types

3.1 Arterial Street and Storm Drain Projects

Arterial Street and Storm Drain projects generally include a combination of major street paving and storm drain improvements. Both of these design types are covered in this AP. Additional requirements and information on storm drain design is provided in the City of Phoenix Storm Water Policies and Standards Manual available online at the following web address: <http://phoenix.gov/STREETS/index.html>.

3.2 Water and Sanitary Sewer Projects

Water and sanitary sewer projects managed by Street Transportation Department, DCM Division for Water Services Department shall follow the requirements in this AP and Water Services Department requirements in their Design Standards Manual for Water and Wastewater Systems, available online at the following web address: <http://phoenix.gov/WATER/desstand.html>.

Typical types of projects managed by Street Transportation Department for Water Services Department include fire hydrant projects, Area Bounded By (ABB) water main replacement projects, sewer replacement projects, and new water or sewer mains to be built concurrent with major street improvement projects.

3.3 Neighborhood Improvement Projects

Neighborhood Improvement Projects are normally for improvements on local and collector streets in neighborhoods which are already partially or fully developed.

These projects may include, but are not limited to:

1. Local Drainage Studies
2. Local Drainage Improvements
3. Street Modernization Improvements (ST Mod)
4. Improvement Districts (ID)
5. Sidewalk Improvements (S/W)
6. Community Development Block Grant Improvements (CDBG)
7. Miscellaneous Traffic Operation Improvements



Neighborhood Improvement Projects are often done in older, established and developed areas. Buildings and structures are often found to be located in close proximity to existing public right-of-way. Local drainage is often poor and some buildings and homes have floor elevations that were set with little or no regard to drainage.

Designs submitted by the Consultant on these type projects shall be carefully analyzed to ensure no adverse conditions are created for the property owners. A major objective in the preparation of designs for Neighborhood Improvement Projects is to provide enhancements that blend into the neighborhood, with close attention paid to the drainage conditions on abutting properties. The historic and aesthetic character of the neighborhood is another issue that may need to be considered during design.

Proposed neighborhood street improvement projects may have some existing improvements that are not in compliance with current standards (e.g., the existing curb return radii may be too small, or reconstruction may be needed to provide a sidewalk ramp). Some or all of the existing paving, curb and gutter, and sidewalk may have to be replaced because of deterioration, unacceptable grade, or location. Sometimes, it may be necessary to overlay a portion of the existing pavement if deterioration is not severe enough to require replacement.

Owner-installed improvements, such as fences, walls, light posts at driveway entrances, and similar structures may be found encroaching into the public right-of-way where Neighborhood Improvement Projects are proposed. If these structures are not in the way of construction and do not create a sight distance problem, they will generally not be removed or relocated by the proposed project. If the structure does conflict with new construction, the plans will normally note that the structure will be removed and relocated by the Contractor unless otherwise directed by the Project Manager. Relocation of walls, trees and bushes at street corners shall be in accordance with Phoenix City Code Section 31-13, Obstructing Visibility at Intersections, available online at the following web address: <http://phoenix.gov//STREETS/visible.html>.

Buildings shall generally not be relocated or removed to provide for street improvements unless specifically directed by the Project Manager. In most cases, improvements encroaching into the right-of-way will be left in place if they do not conflict with new improvements.

3.3.1 Local Drainage Studies

Based on citizen and City Council requests, the Street Transportation Department responds to many local drainage complaints. Sometimes, these requests require hiring a Consultant to perform detailed drainage studies.

When possible, the Consultant shall provide alternatives for mitigating the drainage problems. The Consultant shall provide conceptual designs and cost estimates sufficient to determine the order of magnitude for budgetary purposes. Where reasonable, conceptual designs may be drawn on 8-1/2 by 11 inch sheets



with sufficient details to identify the major elements of the proposed solution. It is not the intent of local drainage studies to prepare detailed designs plans.

3.3.2 Local Drainage Improvement Projects

Local drainage improvements may consist of storm drain facilities and/or paving improvements. These projects are generally designed to address specific localized drainage or flooding problems. Detailed design plans for construction are prepared by the Consultant on these type projects.

3.3.3 Street Modernization Projects

Street modernization projects are normally for improvements on local and collector streets in neighborhoods which are already partially or fully developed, and often where much of the existing development is older infrastructure.

These projects typically include paving, curb and gutter, and sidewalk improvements. It is the intent of these projects to improve the streets to current City standards for pedestrian and vehicular access. Existing improvements and encroachments are often encountered. Street improvements shall be designed to comply with current Americans with Disabilities Act (ADA) guidelines, with minimal removal or relocation of significant utilities, existing improvements and encroachments.

3.3.4 Sidewalk Improvement Projects

Sidewalk improvement projects are generally fill-in sidewalk designs intended to provide pedestrian access and/or sidewalk continuity in established neighborhoods. Existing improvements and encroachments are often encountered.

Sidewalks shall be designed in accordance with current ADA guidelines and City standards, minimizing removals or relocations of utilities, existing improvements and encroachments.

In many cases, the location of the new sidewalks will have to be adjacent to the curb and gutter. Where sufficient right-of-way exists, however, sidewalks should be detached from the curb if possible. It is generally desirable to provide a continuous and consistent sidewalk alignment rather than a meandering alignment where possible. Sidewalk alignments may be shifted to avoid relocation of existing utilities or other improvements or encroachments. Unless otherwise noted at the Scope Meeting, new sidewalks will generally be five feet wide on major and collector streets and four feet wide on local streets.



3.3.4.1 *Right-of-Way Considerations*

Right-of-way needs shall be assessed by the Consultant. Right-of-way acquisition should be kept to a minimum where possible. If additional right-of-way is absolutely necessary, the Consultant will be required to provide a Right-of-way Map, normally showing this right-of-way to be acquired by donation only. The Consultant will also be required to prepare area calculations for these takes on City-provided forms.

3.3.4.2 *Historical Issues*

Some sidewalk projects occur in City Historic Districts. There are at least 36 residential historic districts within the City of Phoenix. A location map of these historic districts, maintained by the Phoenix Historic Preservation Department, is available at the following web address: <http://phoenix.gov/HISTORIC/residents.html>.

Historic areas, including historic ditches, impacted by sidewalk work will be noted by the Project Manager during the Scope Meeting, and any special requirements will be addressed in the project scope.

In historic districts, the following issues also need to be considered and implemented wherever possible:

1. Existing grass strips between the sidewalk and curb should be retained where possible.
2. Sawcuts to remove old concrete should occur along existing historic joints or score lines in the concrete so as not to disrupt the score pattern of the existing sidewalks. New concrete curbs and sidewalks should be installed to match existing joints and score lines to preserve the historic image.
3. Removal of concrete curbs, sidewalks and driveways in historic districts shall be kept to the minimum necessary.
4. Original makers' marks (concrete stamps) with date stamps, if any, should be preserved wherever possible.
5. Avoid impacting historic vegetation or other historic features such as street markers and stamp insets in curbs and historic irrigation structures.
6. New concrete work shall include a new stamp (maker's mark) with a date to identify the new work versus the original work.



7. New sidewalk ramps shall be installed where necessary to meet current ADA guidelines.

3.3.5 Improvement District Projects

A paving Improvement District Project (ID) generally has the same design criteria as a Street Modernization project, except ID Projects require financial participation from the directly-affected property owners. This involves a district to be formed, comprised of a majority “front footage” of the property owners situated along the paving ID to agree to financially participate in the proposed improvements. The cost of improvements to the property owners will vary from project to project.

Unlike other types of projects, changes in design may not be made during the construction of an ID project, as this would change the property owner’s assessment. State statutes do not allow the design of an improvement district project to be **significantly** changed after the project has been submitted to the City Council for an Ordinance of Intention. If the project survives the protest period and the City Council passes a resolution ordering the work, the project must be constructed as designed. It is imperative that the Consultant provides a complete and thorough design.

3.3.6 Community Development Block Grant Projects

A Community Development Block Grant (CDBG) project generally follows the same design criteria as a Street Modernization or Sidewalk Improvement projects. These projects are usually initiated by a neighborhood association and normally co-sponsored by the Street Transportation and Neighborhood Services Departments. These projects are prioritized by City staff and approved by City Council. Right-of-way or easements are generally acquired by donation by the Neighborhood Services Department (NSD).

These projects may include any combinations of paving, curb and gutter, sidewalk, storm drain and irrigation improvements. Additional CDBG (federal aid) boilerplate specifications (such as Davis Bacon Wages), will be incorporated into the bid documents by the Project Manager.

3.3.7 Miscellaneous Traffic Operations Projects

Miscellaneous Traffic Operations Projects (OPS) may include driveway and sidewalk ramp reconstruction to meet ADA requirement; sidewalk replacements; traffic calming devices; traffic circles; and other similar types of projects.



Due to the wide range of projects, specific design criteria are generally discussed at the Scope Meeting. Generally, projects in this category are extremely localized in scope.

4 General Information for Project Development

4.1 AutoCAD Standards

Standard Street Transportation Department AutoCAD layer names, naming conventions, descriptions, and base sheets are available for download at the following web address: <http://phoenix.gov/STREETS/acadstds.html>.

Hatching and lettering size shall ensure clarity when plans are reduced in size by 50% (typically 11 inch by 17 inch size). Text height used shall be in conformance with current City AutoCAD Standards. Standard symbols, as identified on the latest Legend and General Notes sheet, shall be used throughout the drawings.

4.2 Record Drawings Research

The Consultant will be responsible for obtaining all existing record drawing information that pertains to the design project. The Street Transportation Department will cover the reproduction costs for obtaining these records.

The following City resources are available for record drawings research:

1. Engineering and Architectural Services Department (EAS), Central Records Section, 3rd floor of Phoenix City Hall, 200 West Washington Street (for right-of-way quarter sections, aerials and record drawings).
2. Water Services Department, 8th floor of Phoenix City Hall, 200 West Washington Street (for water and sewer quarter sections and record drawings). Consultant will be required to complete the City of Phoenix Water Services Department, *Contractor/Consultant Background Check & Access Control Form* to obtain record drawings.

Sometimes, very recent private development record drawings are not yet available in EAS Central Records Section. If needed, the Consultant may request the Project Manager to check directly with Development Services Department (DSD) to see if they can be obtained there.

4.3 Field Survey Requirements

All field surveys shall be supervised by an Arizona registered professional land surveyor. The Consultant shall submit a copy of all field survey notes in Station/Offset format, along with descriptions and elevations with the first plan submittal.



On certain projects, such as route surveys for alignment studies, and large projects in rugged, undeveloped terrain, the Consultant may propose an aerial digital terrain model (DTM) survey if it would appear to be cost effective for the project.

Benchmarks, either permanent or temporary, shall be a maximum of 1,000 feet apart and each plan sheet shall refer to the nearest benchmark. **At least two** benchmarks on a project shall be existing City-recognized benchmark monuments. Temporary construction benchmarks (TBM) shall be set by the Consultant within the existing right-of-way on existing structures such as concrete curbs or headwalls, or on driven pipes or bars that will be outside of the area to be affected by the project construction. Fire hydrants, nails driven into the pavement or power poles shall not be used as temporary benchmarks, as they will likely be lost during construction. Elevations of City-recognized benchmarks will be furnished by the Survey Section of the Street Transportation Department DCM Division. Benchmark information may also be found at the following web address: http://www.surveyorresourcepage.com/cop_bm/srchbm.asp.

Some areas of the City have experienced considerable ground subsidence. If the Consultant discovers variations from recorded City benchmarks, it shall be brought to the attention of the Street Transportation Department/DCM Division Survey Section.

All horizontal survey data shall be in accordance with NAD83. All City of Phoenix benchmarks are NGVD 1929. Other vertical data, such as NAVD 1988, will **NOT** be accepted.

Topographic features shall be obtained and measured as follows:

1. The distance to all topographic features, except valve boxes and manholes, shall be measured to the “street face” of the feature, nearest the roadway centerline.
2. The distance to all valve box covers and manhole covers shall be measured to the center of the cover.
3. Survey shall provide finished floor elevations of all structures within and 30 feet beyond the ultimate planned project right-of-way, as well as building footprints, overhangs, canopies, asphalt aprons, and other pertinent features.
4. Survey shall provide station and offset dimensions to all above-ground utility features, such as electrical transformers and switching cabinets and associated concrete pads, cable TV and telephone pedestal boxes, power poles, street lights, traffic signals, signs, valve boxes, manholes, etc.
5. Survey shall include all storm drain and sanitary sewer manhole rim and invert elevations, and all water valve “top of nut” elevations.
6. Survey shall show all topography within the ultimate planned project right-of-way and easements, and 30 feet beyond the ultimate right-of-way. For signs within this area, the description shall also include the sign overhang dimensions and clearance



height from the ground to the lowest portion of the overhanging sign. If signs are electrified, this shall also be noted, along with whether the electrical feed to the sign is overhead or underground.

7. The survey shall indicate all shrubs and the diameter and variety of all trees within 30 feet of the ultimate planned right-of-way and easements.
8. Sufficient elevations shall be obtained within and beyond the proposed project area to indicate the direction of surface flow on all intersecting side streets, frontage roads, and paved parking lots, etc.
9. The survey shall include all existing flood irrigation facilities such as ditches, structures, gates, valves, and other irrigation appurtenances within 30 feet beyond the ultimately planned right-of-way or easements.
10. All existing driveways and alleys shall be located within 30 feet of the ultimate planned project right-of-way. Sufficient elevations shall be obtained in alleys to establish a profile within 30 feet of the ultimate right-of-way.
11. The survey shall locate, describe and tie-in all existing survey monuments within the project area. At times, this may mean that the Consultant will need to chip out small areas of pavement in order to confirm existence of record survey monument information. The Consultant shall not assume that the City will provide survey crews to locate monuments. The Consultant may contact the City Survey Section at (602) 495-2050 for assistance in verifying existing survey monument status and locations.
12. All survey monuments for street intersections, angle points and horizontal curves necessary for the project design shall either be found or temporarily set by the surveyor such that these points can be set permanently at the time of construction. These control points shall be shown on the construction plans.

4.4 Utilities

4.4.1 General

The Consultant shall show all found and not-found utility lines and features on the project base map. Data will be obtained from surveys, site visits, and utility maps. Utility features noted on record drawing plans or maps, but not found in the field survey shall be shown on the plans and noted as “Not Found” or “NF”. Utility types and sizes shall be shown in accordance with symbols shown on the Legend and General Notes sheet. On each sheet, utilities shall be dimensioned from the monument line. The Consultant shall call out all conflicting private utility relocations on the plans as “**TO BE RELOCATED BY OTHERS**”. All utility lines 12 inches or smaller in diameter shall be shown on plans as a single line. All utility lines greater than 12 inches in diameter shall be shown on the plans to the proper dimensional scale.





4.4.2 Subsurface Utility Engineering (SUE)

Subsurface Utility Engineering (SUE) is composed of four levels of locating existing underground utility lines. The four levels are as follows:

1. Level D - Existing records such as utility maps and record drawings supplied by the utility companies or the City are used to generally establish utility locations on the plans. Generally the Project Manager will provide the Consultant with available maps from the private utility companies. Other utilities may be found through record drawing research by the Consultant.
2. Level C – Records obtained from a Level D investigation shall be used by the Consultant during the field survey. The Consultant shall obtain all visible above-ground utility features (such as valve boxes, manhole covers, cable TV and telephone pedestals, electrical transformers and switching cabinets, etc.) in the field survey in an attempt to correlate underground utility features obtained from Level D maps with surveyed above-ground features found.
3. Level B – Non-invasive, subsurface geophysical instruments are used to more accurately find, trace and locate all underground utilities. All found underground utility lines are marked and surveyed for more accurate inventory and placement of underground utility lines on the plans.
4. Level A – After underground utilities have been inventoried and located horizontally by Level B, potential conflicts between these existing utilities and proposed underground construction associated with the proposed project are “potholed” with minimally-invasive equipment to precisely locate the horizontal and vertical location and size of the utility lines at specific desired locations.

Each individual project scope will indicate the level of utility location effort desired for the project. All projects will use Levels D, C and A as required. Many projects with more extensive proposed underground construction and more extensive existing underground utilities (where more accurate determination of potential conflicts is extremely important) will also require Level B subsurface utility locating service.

4.4.3 Utility Pothole Request Procedures

The Consultant shall identify potential underground utility conflicts at the 70% plan submittal stage and submit utility pothole requests to the Project Manager. Pothole requests are made on City of Phoenix [Subsurface Utility Engineering \(SUE\) Request/Authorization Form](#). This form is available in Excel format from the Project Manager and can be found in Appendix A-5. Information on this form includes the hole number, plan sheet number, station, offset, utility type and size. Pothole requests shall be grouped by type and/or utility company on separate



request forms; for example, all gas line requests on one form and all telephone requests on another form.

Pothole request forms shall be accompanied by copies of plan sheets with corresponding pothole request numbers and locations shown to correlate with the request forms. All nearby benchmark information shall also be provided on these plan sheets. The requests will be processed through EAS Utility Coordination Section by the Project Manager. The following shall be submitted:

1. One (1) copy for the Project Manager's records.
2. One (1) copy for EACH utility owner.
3. Three (3) copies for the EAS Utility Coordination Section.

Plan sheets submitted with requests for pothole data must also include appropriate benchmark and street stationing references. This is required to locate potholes in the field and to provide elevation data referenced to the project datum. All pothole results, including survey elevation and location will be provided to the Consultant by the Project Manager.

4.4.3.1 Water and Sewer Pothole Requests

Water lines 12 inches and less in diameter will not be potholed and the Consultant shall not request these. A contingency bid item to accommodate the potential relocation of conflicting 12 inch and smaller waterlines shall be provided, and these relocations shall be called out on the design plans.

Generally, relocation of water lines larger than 12 inches in diameter should be avoided whenever possible. After extensive research of record drawings and field survey of existing facilities such as water valve nut elevations, pothole requests for water lines larger than 12 inches in diameter may be considered.

Unless otherwise known, all water service lines shall be assumed as non-copper pipe. A contingency bid item to cover full replacement of all these service lines from main to meter shall be provided, and these replacements shall be called out on the design plans.

Sewer lines shall not be requested for potholes. The Consultant shall survey and provide all sewer manhole rim and invert elevations on the design plans. Elevations of existing sewer lines between manholes shall be interpolated for determination of sewer line elevation at potential conflict points with proposed underground construction.



4.4.4 Missing Valves/Manhole Procedure

If water valves or sewer manholes are indicated as existing on City records but are not found during the Consultant's topographic survey, the Consultant shall provide a list of valves and manholes "not found" for the Project Manager. The list shall indicate the Water Services Department's Quarter-Section Map numbers and the map reference numbers for each missing valve or manhole.

The Project Manager will request the Water Services Department to locate and uncover these valves or manholes so that information pertaining to them may be included in the design plans.

The Consultant's surveyors shall make a diligent search for all water valves and manholes during the initial topographic survey effort. The City will not issue a design contract change order for additional survey work after the Water Services Department has located and uncovered the valves and manholes. The initial survey locating of water valves and manholes and subsequent re-survey after initially non-found items have been uncovered shall be considered part of the basic survey fee.

Any water valves or manholes still not found after uncovering attempts have been made shall be labeled "**NOT FOUND**" or "**NF**" on the design plans.

In addition to locating the water valve boxes on the plan view, the elevations of the top of the operating valve nuts shall be shown in the profile section of the plans using the symbol for water valves. If water valve box risers are filled with dirt or debris such that the valve nut is not accessible, the Consultant shall notify the Project Manager of these specific locations, including Quarter Section map number and valve number, and the Project Manager will make arrangements with Water Services Department to have these valve box risers cleaned to expose the operating nut. After notification that the risers have been cleaned, the Consultant shall re-survey these valves to obtain the operating nut elevations for placement on the design plans. This shall be considered as part of the basic survey fee.

The elevations of all existing sanitary sewer and storm drain manhole rims and inverts shall be shown on the plan views or in the profiles.

4.4.5 Flood Irrigation Facilities

All flood irrigation facilities, whether SRP or private, shall be shown on the plans in proper dimensional scale. Rim and invert elevations shall be obtained and shown on the plans at all standpipes and irrigation structures. Poor conditions on any portions of open ditches, pipelines or structures shall be noted to the Project Manager for further investigation and instructions.



Some ditches may be classified as historic. Categorizing these ditches early in the design process is imperative and assistance from the City Historic Preservation Officer is available.

4.5 Geotechnical Investigation

4.5.1 Soil Borings

For all projects that will include major structures in the right-of-way, such as bridges or box culverts; or underground facility design, including storm drain, water, and sewer, a geotechnical investigation shall be performed.

Soil borings shall be provided for all proposed major structures; and at least every 660 feet along proposed underground pipelines. Additional borings shall be taken to clearly define limits of hard rock if encountered. Depth of borings shall extend to at least 2 feet below the bottom of proposed underground facilities.

In addition to borings, pH testing shall be performed at all soil boring locations and field resistivity testing shall be performed through the length of the project. In areas where resistance readings are less than 2000 ohms, additional readings shall be taken to clearly define the limits of the low resistance area.

Logs of the borings and the pH and resistivity results shall be shown on separate boring log plan sheets. The proposed location of the proposed underground utility pipe shall be shown at its appropriate depth on each boring log.

Boring log data shall also include the following information:

1. The name of the company that produced the soil report.
2. The date the test boring was made.
3. The type of equipment used to drill the hole and take the samples.
4. The size of the auger used.
5. A description of caving that occurred during the excavations, if any.
6. Horizons of each type of soil encountered.
7. Description of the soil.
8. Classification by AASHTO Designation M145 or the Unified Soil Classification System.
9. Plasticity Index, Moisture Content, Standard Proctor Density, R-value.



10. Percent passing No. 200 sieve.
11. Whether water was encountered, and at what depth.
12. Existing pavement type and thickness, if encountered in the boring.
13. A soil boring location map.

Each sheet on which soil boring logs are shown shall also carry the following notation:

“The boring logs shown on this sheet are included for the Contractor’s convenience only. It is not intended to imply that the character of material is the same as that shown in the logs at any point other than where the boring was made. The Contractor shall satisfy himself regarding the character and amount of rock, gravel, sand, silt, clay, and water to be encountered in the work to be performed”.

If soil borings are required for a project, the Consultant shall submit a plan to the Project Manager indicating proposed locations and depths of all borings, along with a proposed schedule for performing the work, prior to starting this work.

Two hard copies and one electronic pdf copy of the final soils report shall be provided to the Project Manager. Electronic pdf copies of this report may be distributed to potential bidding Contractors during construction bid advertisement to assist them in fully understanding the soil conditions they can expect to encounter on the project.

4.5.2 Seismic Refraction Surveys

In addition to soil borings, most projects that will have significant underground work will also require seismic refraction surveys to obtain a better understanding of subsurface soil conditions that will likely be encountered on the project. The number of lines necessary will be dependent on the specific project.

The seismic refraction survey shall estimate the compression wave velocities and shear wave velocities and compare them with known conditions. Information obtained in the survey report shall include a map of each seismic line and its relationship to the existing soil boring locations. There shall also be an interpolated graph of the compression waves and shear waves showing depth vs. distance of the wave based on the actual measured field data.

The obtained velocities shall then be compared to standard data obtained from the Caterpillar (Tractor) Performance Handbook to estimate the machine



horsepower that may be expected as necessary to excavate the material. This information can also be used by the Consultant to better refine the estimated construction cost.

Two hard copies and one electronic pdf copy of the final seismic refraction survey report shall be provided to the Project Manager. Electronic pdf copies of this report will be distributed to potential bidding Contractors during construction bid advertisement to assist them in fully understanding the soil conditions they can expect to encounter on the project.

4.5.3 Pavement Structural Sections

For each paving project, the City of Phoenix Street Transportation Department, Materials Section will review the Consultant's geotechnical report and provide the recommended pavement structural section(s) for the new pavement.

4.6 Specifications and Details

The Street Transportation Department mainly utilizes the latest editions of standard specifications and details from Maricopa Association of Governments (MAG) and the City of Phoenix Supplement to MAG. Also, when necessary, ADOT Standard specifications and details are referenced. In addition, the Street Transportation Department has an extensive boilerplate specification template with many commonly-used special provisions that the Consultant shall follow as appropriate.

Unless otherwise noted, the Project Manager will prepare the final contract specifications. The Consultant will be given a copy of the latest City Boilerplate specification template for review. The Consultant will be required to provide any additional special provisions in the Boilerplate format that may not already be covered in MAG, City Supplement to MAG or the Boilerplate special provisions. Any special provisions prepared by the Consultant shall be printed and sealed by the Consultant. In addition, the special provisions shall be provided to the Project Manager in electronic format compatible with the Boilerplate template such that the Project Manager can easily insert them into the final contract specifications. For most projects, the City Design Engineer will seal the final contract specification package.

A draft of the Consultant's special provisions shall be submitted with the 90% design submittal. Final, sealed special provisions shall be included with the 100% design submittal.

4.7 Quantities and Cost Estimates

At the 40% and 70% design plan stage, the Consultant shall prepare a preliminary construction cost estimate using standard City bid items. The Project Manager will provide the Consultant with an electronic list of all available standard bid item numbers/descriptions. At the 100% design plan stage, the Consultant shall prepare a



final construction cost estimate in City bid item format, both in electronic Microsoft Excel format and printed and sealed hard copy format (example shown in Appendix A-6).

From the final construction cost estimate prepared by the Consultant, the Project Manager will prepare the final bid proposal pages for the contract specifications, along with the final Engineer's Estimate for use in the bid documents.

The Consultant shall carefully review all specifications and the Boilerplate template to understand the City's normal measurement and payment methods for all bid items used on the project. The Consultant shall clarify with the Project Manager, any questions about the proper bid item to use, or the proper measurement/payment to use for any specific item to be used on the project.

To assist the Consultant in preparing construction cost estimates, the Project Manager may be able to provide the Consultant with average unit bid prices obtained from the City's electronic bid item history database. In addition, the Consultant can download recent project bid tabulations from the following City web address: <http://phoenix.gov/bidtabs/index.html>.

4.8 Storm Drainage Reports

As applicable to the project, the Consultant shall prepare and submit storm drainage reports as specified in the City of Phoenix Storm Water Policies and Standards Manual, available at the following web address: <http://phoenix.gov/STREETS/index.html>.

The Consultant shall provide the Project Manager with a minimum of four (4) hard copies of the Drainage Report, plus one full color pdf copy of the report. The Project Manager will place the pdf copy on the Street Transportation Department/DCM computer server, and distribute hard copies to the DCM Drainage Library, EAS Central Records and the Street Transportation Department/Floodplain Management Section.

4.8.1 Designs in Federal Emergency Management Agency (FEMA) Floodplain Areas

In addition to the design requirements established in the City of Phoenix Storm Water Policies and Standards Manual, whenever preparing designs in FEMA floodplain areas, the Consultant shall also include an allowance in the contract for preparing a Conditional Letter of Map Revision (CLOMR) prior to construction, and a Letter of Map Revision (LOMR) after construction is complete, for submittal to FEMA through the Street Transportation Department, Floodplain Management Section. In addition to preparing all documents necessary for these reports, the Consultant shall also include provisions in the allowance to perform post-construction "as-built" survey of the facility after construction is complete, for final "as-built" run of the hydraulic model and LOMR confirmation to FEMA.



4.8.2 Storm Drainage Memos

Some smaller projects (commonly, Sidewalk Improvement projects, Street Modernization projects, and Local Drainage projects) may not require a full drainage report as specified in the Storm Water Policies and Standards Manual. In some cases, only a minor Drainage Memo is needed. When this is appropriate for the specific project, the Consultant shall prepare a drainage memo that generally describes the existing drainage conditions and the final drainage conditions after the proposed improvements. This brief memo be sealed by an Arizona registered professional civil engineer.

A simple site plan shall be included with the Drainage Memo to help explain the existing and proposed drainage conditions.

The following is a typical outline of some topics that may need to be addressed in a Drainage Memo:

- 1.0 Introduction (Location, FEMA Classification, etc)
- 2.0 Existing Conditions
- 3.0 Proposed Drainage Conditions or Mitigation
- 4.0 Potential Impacts to On-Site Drainage
- 5.0 Potential Impacts to Off-Site Drainage



5 Detailed Project Plan Preparation

5.1 General Plan Information

All final plan sheets prepared by the Consultant shall be sealed and signed by an appropriate Arizona registered professional engineer (Civil, Structural, Electrical, etc.), and be provided on 22 inch x 34 inch unbound set of **bond paper**. The consultant will also submit a final disk with all AutoCAD drawings, a complete set of PDF files scaled at 11x17, a complete set of PDF files scaled at 22x34. These PDF files will be scaleable (created from AutoCAD) and include a final signed cover sheet (supplied by the PM).

Also on disk will be PDF final, full color final versions of all report and submittals required by the contract. Those will include such documents as drainage reports, drainage memos, structural selection reports, soils reports, legal descriptions, calculations, right-of-way strip maps, environmental reports, etc.

Note: final Mylar drawings are still required for the final right-of-way map.

The following confidentiality statement shall be placed on EACH Plan Sheet (including the cover sheet), preferably in the lower right side of the sheet if possible:

“Per City of Phoenix Ordinance G-4396, these plans are for official use only and may not be shared with others except as required to fulfill the obligations of your contract with the City of Phoenix.”

Special non-standard details shall be prepared and shown to scale on separate detail sheets as needed, with appropriate construction notes and quantities as needed.

Removal and installation notes with quantities shall be numerically referenced and listed on the right-hand side of each sheet. Notes shall be consistent with the most recent published CAD standards. Major item quantities shall be called out on each sheet and summarized on a separate quantity summary sheet. Work to be done by others shall not be called out on the right-hand side of the sheet, but called out simply with arrows and labeled **“BY OTHERS”**.

Plans shall generally be prepared in accordance with the latest City of Phoenix Supplement to MAG Standard Specifications and Details unless otherwise directed by the Project Manager. As bridge structures are not specifically covered in MAG or City Supplement to MAG Standard Specifications and Details, they shall generally be covered by ADOT Standard Specifications and Details, and special details and provisions prepared by the Consultant.



5.1.1 Plan Submittals

Required plan submittals will be outlined by the City's Project Manager and Design Engineer at the Scope Meeting. Each plan submittal will include, at a minimum, the following:

1. One full size, unbound reproducible set of the design plans.
2. One half size, unbound reproducible set of the design plans.
3. Scope-specified number of bound copies of full size and half size plans.
4. One CD containing complete current version, or as specified on the website, AutoCAD files, ~~and~~ scaleable pdf files of the design plans at each plan submittal stage (one at 11x17 and one at 36x22), and a DWF file compatible with AutoDesk Design Review 2010.
5. Previous redline review plans and any comment summary sheets supplied to the Consultant by the Project Manager.

Submittals without previous City redline reviews will not be accepted.

All submittals shall be Quality Assurance/Quality Control checked by the Consultant before each submittal. Submittals that do not address the redlines or comments made by the Project Manager at a previous submittal, or are below the expected standard of the percentage submittal will be returned to the Consultant without City review. Re-submittals shall be at the expense of the Consultant.

Basic plan submittal checklists can be found in Appendix A-3 ([Initial Plan Review Checklist](#), [Preliminary Plan Review Checklist](#), [PS&E Plan Review Checklist](#), [Final Plan Review Checklist](#)). These checklists only serve as a general guideline for what may be expected for review at each design stage.

5.1.2 Cover Sheet

The Cover Sheet, included in the City's AutoCAD Standards, shall contain the following information:

1. The Consultant's professional engineer seal, placed in the upper right hand corner.
2. The project number, project description, appropriate Quarter Section number(s) (or City-wide, if appropriate) and the percent submittal of the plan set, for the project area marked along the right margin outside the border line.



3. The appropriate signature lines:

Plans that do not include Water Services Department-funded work are signed by the Deputy Street Transportation Director and the Assistant Street Transportation Director.

Plans that do include Water Services Department-funded work are signed by the Deputy Street Transportation Director, Assistant Street Transportation Director, Water Services Department, and Maricopa County Environmental Services Department. These plans also include an as-built signature block as required by the Water Services Department.

4. A project vicinity map.
5. An Index of all sheets in the set.
6. The names of the Mayor, City Manager, and City Council.
7. Identification of a minimum of two City-recognized benchmarks.
8. The year the project will bid, placed under the City logo.
9. If multiple projects with individual project numbers are to be packaged into one bid set, there shall be a Cover Sheet for each project number, plus a master Cover Sheet listing each project number and description in the set.

5.1.3 Title Blocks

All plan sheets, except for the Cover Sheet, shall have a title block in the lower right-hand corner of the sheet. This title block, included in the City's AutoCAD Standard sheets, shall have the following information clearly displayed:

1. Name of Engineering Consulting Firm preparing the plans.
2. The title "**City of Phoenix Street Transportation Department Design and Construction Management Division**".
3. The type of plan depicted on each sheet (for example, "**PAVING**" or "**STORM DRAIN**").
4. The Project Description (e.g. Hearn Rd: 68th Street to 71st Street). Project street name descriptions shall generally be labeled from south to north or from west to east. The Consultant shall normally use the same project description provided in the contract.



5. The Project Number (e.g. ST87100123).
6. The individual sheet number and the total number of sheets in the plan set.

5.1.4 Key Map

The Key Map may be on the Cover Sheet or the second or third sheet of the plans as space allows. The sheet containing the key map shall include the following:

1. Project limits and corresponding stationing.
2. All street names, including all cross streets.
3. The portion of each street covered by each plan or profile sheet.
4. A key map legend as needed to denote paving plan, paving profile, storm drain plan/profile, waterline, etc.
5. A north arrow.
6. Sufficiently sized to be readable when printed at half-size.

5.1.5 Legend and Notes Sheet

The standard Legend and Notes sheet shall be the second sheet in the set. The Consultant shall use the symbols found on this sheet consistently throughout the entire plan set. The Consultant may add special notes as necessary for the specific project. The note additions should be identified under a separate header, "**SPECIAL NOTES**".

5.1.6 Quantity Summary Sheet

Each large paving project shall contain a Roadway Quantity Summary Sheet. This sheet consists of a table showing a summary of each bid item number, description of each item, unit pertaining to the item, item quantity listed for each sheet number, and grand total for each item in the project. Large stand-alone storm drain projects shall include a Storm Drain Quantity Summary Sheet. If a storm drain project is included in the same plan set with a paving project, no separate Storm Drain Quantity Summary Sheet is required.

5.1.7 Typical Sections

Typical sections shall be shown looking up-station. The station limits that pertain to each typical section shall be shown. All improvements and proposed grading to match existing shall be shown.



Proposed pavement structural sections shall also be shown. In addition, a paving legend shall also be shown. This legend shall denote various pavement sections including, existing pavement to remain, new main roadway pavement, new asphalt concrete pavement driveway connections, etc.

5.1.8 General Plan and Profile Sheets

In general, most plan/profile layouts shall be shown on standard half plan/half profile sheets. In the case where steep grades or wide plan views prohibit plotting on these sheets, separate full plan and full profile sheets may be used.

The plan scales shall be 1 inch = 20 feet horizontal, 1 inch = 2 feet vertical unless otherwise specified by the Project Manager. Typically, no more than 500 linear feet of plan will be allowed on each sheet.

In general, projects shall be oriented with the north arrow straight up or 90 degrees to the right.

All existing topography and associated notations shall be shown with station and offset from the monument line.

All existing utilities shall be dimensioned on each sheet with respect to the monument line. All utilities perpendicular to the proposed improvement shall also be shown on the profile sheet. Utilities requiring adjustment to clear conflicts shall be shown and noted on the profile along with their potholed elevations.

Utilities larger than 12-inches in diameter shall be drawn to scale in the plan view. Utilities 12-inches or smaller in diameter shall be drawn as a single line in the plan view.

Plan views shall show the limits of existing and new right-of-way, as well as construction easement areas.

Sheet number references for match lines and other related plan sheets such as references to storm drain plan sheets, connector pipe profile sheets, etc. shall be noted on each individual plan sheet.

Profile slopes shall be shown in feet per foot dimensions to four significant figures.

Grade breaks shall be stationed with elevations shown. Station and elevations shall also be shown at sheet match lines and at the beginning and end points of the project.



Centerline stationing shall be shown on plan and profile. Stationing shall generally run from west to east, or south to north; or for pipelines, from the low point or outfall and increase to the high point or point of inflow. For pipeline projects being designed and built with paving projects, stationing for all projects shall correlate with the paving project.

Title blocks shall be located in the lower right-hand corner of plan sheets, and shall include the appropriate type of work shown on the sheet (e.g. PAVING, STORM DRAIN, etc.), along with the project description and project number.



5.2 Paving Plan and Profile Sheets

5.2.1 Sheet Sequence for Paving Plans

In general, the sequence of plan sheets for paving projects shall be as follows:

1. Cover Sheet
2. Legend and Notes Sheet
3. Plan Sheet Key Map (place on Cover Sheet if possible)
4. Roadway Quantity Summary Sheet
5. Typical Sections, Pavement Structural Sections, Pavement Legend, etc.
6. Paving Plan/Profile sheets
7. Catch Basin/Connector Pipe Profile Sheets (as appropriate)
8. Alternate Pipe Material Chart (as appropriate)
9. Private Irrigation Plan and Profile Sheets (as appropriate)
10. SRVWUA Plan and Profile Sheets (as appropriate)
11. Special Detail Sheets (as appropriate)
12. Bridge and Structural Detail Plans (as appropriate)
13. Landscaping/Irrigation Plan Sheets (as appropriate)
14. Traffic Signal Plan Sheets (as appropriate)
15. Street Lighting Plan Sheets (as appropriate)

5.2.2 Plan Sheet Orientation and Layout

Construction centerline stationing, at intervals of 100 feet, shall be shown on both the plan and profile views and shall run from left to right.

Centerline stationing shall generally begin at Station 10+00 or higher to avoid “negative” stationing.



Portions of the same street or intersection shall not be shown beyond match lines on separate sheets. Match line information shall provide stationing and matching sheet number.

Plan sheet orientation shall avoid match lines within street intersections. Street intersections shall be shown fully on one plan sheet.

5.2.3 Horizontal Geometrics

Final major street geometrics will generally be provided to the Consultant in a separate AutoCAD layer after the Consultant provides the topographic field survey/utility base sheet information to the City in AutoCAD format.

All roadway monument line intersections shall show all turned angles between the intersecting lines on the plans.

All existing survey monuments, section and quarter corners, points of curvature (P.C.), points of tangency (P.T.), points of intersection (P.I.) on curvilinear sections, beginning and end points of tapers and all side street intersections shall be labeled and stationed.

On new curved sections, construction centerline stationing shall be shown along the centerline of the curve, and not the tangent lines. Curve data (radius, delta, tangent and curve lengths) shall be shown on same sheet as the curve.

On streets that are not centered on the monument line, the stationing shall be along the construction centerline, which shall also be the proposed crown line, unless superelevation or other project conditions dictate otherwise. On such streets, the right-of-way will be measured from the monument line, as will all existing topographic offset measurements.

Intersecting major streets shall be improved to the limits designated in the contract. Tapers to match existing pavement shall be as designated in the geometrics. Care shall be taken to ensure smooth grades in both directions at the intersection of major streets, collector streets, and other potentially signalized intersections. Face of curb return radii at major-major and major-collector street intersections shall generally be 35 feet or as approved by PDP.

Work at intersecting residential streets shall generally end at the terminus of the curb return. If a residential street is unpaved and right-of-way is available, the pavement (without curb and gutter) shall generally be extended 30 feet beyond the returns to prevent gravel accumulation at the intersection. Tapers shall generally extend a maximum of 100 feet beyond the curb and gutter. Face of curb return radii for residential streets shall be 20 feet or as approved by PDP.



Curb returns at all intersecting streets (including along frontage roads) shall include sidewalk ramps.

Sidewalk ramps are required at all newly constructed curb returns. At intersections where existing curb returns with no sidewalk ramps are adjacent to newly constructed curb returns, sidewalk ramps shall be installed at the existing returns. In “T” intersections, mid-block ramps are required across the street from ramps in curb returns.

On intersecting side streets, the plans shall show dimensions from monument line to right-of-way and to edge of pavement, face of existing vertical curbs, or back of existing roll curbs.

The relationship between existing driveways and the proposed street improvements in developed areas requires close attention by the Consultant. The location of existing driveways must be shown in plan view. Where the roadway is being widened, the plans shall show replacement driveways similar to existing driveways in size and location.

If a parcel of land is undeveloped but is fenced and has a gate, a driveway entrance shall be provided at the gate location. Boundaries of the traveled way of existing dirt or gravel road surfaces shall be indicated in the plan view.

On projects that will salvage all or part of a strip pavement, the location and elevation of the roadway crown and left and right edges of the existing paving shall be shown on the plans with respect to the monument line at minimum 50-foot intervals and at any intermediate significant changes in grade or alignment. On projects that will fully remove existing strip pavement, the horizontal location of the pavement edges shall be shown in plan view, and the existing crown line elevation shall be shown on the profile view of the plans.

All roadway designs, including intersections, shall be designed in accordance with AASHTO sight distance criteria. In addition, City visibility obstruction guidelines can be found at the following web address: <http://phoenix.gov/STREETS/visible.html>.

Existing found monuments shall be called out on the plans (e.g. **FOUND COP BRASS CAP IN HANDHOLE**”).

The Construction Notes shall indicate that the Contractor is to place a survey marker per MAG Standard Detail Drawing 120, Type A or B, as appropriate, to replace existing monuments that will be disturbed by construction, or temporary markers set by the Consultant’s surveyor.

The location of permanent or temporary benchmarks shall be shown on each plan sheet (e.g. **BM: IRON BAR IN CONCRETE AT INTERSECTION OF 15th AVENUE AND BASELINE ROAD, ELEVATION = 1133.26 FEET**”). The nearest



permanent or temporary benchmark shall be provided on each sheet indicating the location and elevation of the benchmark.

5.2.4 Topography and Notation

Plans shall show all subdivision names, block numbers, lot numbers, property splits, lot dimensions, addresses, names of major business, schools, fire stations, and other public facilities. Much of this information is available on City of Phoenix Quarter Section maps.

All proposed right-of-way and easement limits shall be shown on the plans with heavy lines. Existing right-of-way that will be superseded by new right-of-way shall not be shown. Existing right-of-way that will remain shall be shown with slightly lighter lines.

All underground utilities, appurtenances and their distance from the monument line shall be shown, labeled as to size, type of material, and type of utility.

All existing storm drain and sanitary sewer manhole rim and invert elevations, and all water valve “top of operating nut” elevations shall be shown on the plans.

Utilities that are abandoned or to be abandoned shall be indicated as well as those to be removed. Any utilities to be constructed prior to the bidding of the project shall also be shown and so indicated. Underground lines shall be noted if they are buried cable, conduit or duct banks. Multiple duct banks shall also indicate the number of ducts.

In some areas of the City, privately owned irrigation ditches, pipes and turnout structures that distribute flood irrigation water also lie in the right-of-way and shall be shown on the plans. Information concerning size, type, and location of private irrigation facilities in the right-of-way must be determined by the Consultant through investigation, as record drawings often are not available. All pipe and ditch inverts, top of ditch elevations, structure sizes, structure top and invert elevations and headgate locations shall be shown on the plans.

If existing underground utility lines and service lines are expected to be at a depth that might interfere with the proposed street paving work, or cause a conflict with the proposed underground construction, the Consultant shall submit utility pothole requests to the Project Manager. Pothole requests shall be submitted on standard forms provided by the Project Manager. The City will obtain the pothole information and will forward the results to the Consultant for incorporation into the plans.

Utility line relocations that are needed to make the proposed construction possible are an essential part of the complete design recommendation to be provided in the preliminary plan submittal. Notes concerning the relocation of



public utility lines not owned by the City must indicate that the owner shall do the relocation. Any relocation or reconstruction of City-owned utility lines and services or private irrigation systems shall be part of the Consultant's design plan. It is important that the Consultant's design clearly calls out all utilities to be relocated or reconstructed.

All existing underground fuel storage tanks shall be shown on the plans. When the right-of-way is in an area where such tanks may exist, a special effort shall be made to check for the possibility of their existence.

All existing Portland cement concrete pavements shall be shown on the plans. Many streets in older parts of the City may have buried concrete pavement. If such slabs are suspected and no record drawings can be found to verify their existence, the Consultant shall bring this to the attention of the City for a determination on the possibility of performing confirmation core borings.

All topography to at least 30 feet beyond the proposed right-of-way or easements shall be shown with station and offset from monument line. Standard symbols shall be used where applicable.

All information for canopies, overhead and ground signs, and building overhangs within 30 feet of the proposed right-of-way shall also be shown on the plans. The outline of the street-side face and corners of each building on property abutting the right-of-way shall also be shown on the plan view if any part of the building lies within 30 feet of the proposed right-of-way line.

The floor elevation of each building within 30 feet of the proposed right-of-way shall be shown in the profile by a dashed line representing the floor, and the finished floor elevation written above the line.

All drywells within 30 feet of the proposed right-of-way shall be noted on the plans, along with the rim elevation of the dry well grate.

All signs within, and 30 feet beyond the right-of-way shall be shown on the plans. Distance from the monument line and stationing shall be given to the street side of sign support poles, as well as the distance to the sign overhang and the height of clearance. If signs are electrified, it shall also be noted, along with whether the electrical source is overhead or underground.

All trees and shrubs within 30 feet of the proposed right-of-way and easements shall be shown on the plans by station and offset (to street side) from the monument line. The tree trunk diameter shall be measured one foot above the existing ground, and the variety of the tree or shrub shall be specified in the topographic notation on the plans.



The City will determine the disposition of all trees and shrubs. If slight changes in alignment could be made to save valuable trees or the sidewalk could be realigned by acquisition of additional right-of-way, it should be brought to the attention of the City as early as possible.

All street light and utility poles shall be shown. Existing power poles with street lights shall also show the appropriate street light symbol on the pole. Additionally, all existing traffic signal poles and their appurtenances shall be shown. Distances shall be measured from monument line to the street side of pole and pole material type (wood, metal, etc.) noted in topography notes, with station location. Appropriate Construction Notes shall be indicated on the plans as to the responsible party for street light pole relocations.

All subdivision entrance structures and any associated lighting and power connections shall be shown. When these interfere with new construction they shall generally be noted for relocation or reconstruction. If the new right-of-way acquisition needed for the project creates conflict with the structure, relocation costs may be paid to the homeowner's association (HOA) in which case, it will be the HOA's responsibility to relocate or reconstruct it prior to project construction.

Record drawings research and sufficient elevations shall be obtained by the Consultant to indicate the direction of surface flow on all intersecting side streets, frontage roads, and paved parking lots. The direction of flow shall be shown by small arrows in the plan view.

The Consultant shall show elevations and cross-section data (Monument Line, Gutter Flow Line, Top of Curb, Right-of-way, and Grade Breaks) on side streets and beyond the ends of planned construction for a distance of 300 feet to provide information pertaining to drainage and existing conditions that may influence design. Where appropriate, some or possibly all of this information may be needed on the plan sheets if tapers are needed, or drainage grading or inlet construction is required.

Hatching or shading and size of lettering shall be chosen to ensure clarity when plans are reduced in size by 50%. To maintain clarity, hatching or shading may need to be deleted in areas occupied by notes. Pavement hatching shall generally be limited to existing paving to remain only. This hatching shall also be used for existing paving beyond the property line.

Where certain items such as water valves and sanitary sewer or storm drain manholes, are supposed to exist according to plan records, but cannot be found in the field, they shall be labeled "**NOT FOUND**" or "**NF**" on the plans. Refer to Section 4.4.4 of this AP regarding methods for attempting to locate and expose these hidden features.



All known existing sprinkler irrigation systems shall be noted on the plans. Where new construction requires alterations, these sprinkler systems must be restored by the Contractor and shall be noted on the plans.

Where new paving is proposed, the Consultant shall show replacement of all water meter services in the pavement from water main to meter service. Lacking specific service pipe type information, the Consultant shall assume the entire service line must be replaced with new copper service pipe.

The Consultant shall show all existing safety curbs within 30 feet of the proposed right-of-way line. Relocation of existing safety curbs, and the addition of new safety curbs, where required, shall be shown and called out on the plans.

The Consultant shall show all features such as mailboxes, signs, light posts, walls, fences, gates, retaining walls, railroad ties, stone dividers, etc. If the Consultant expects that a man-made or natural feature outside the area of influence of the project design will interfere or become an important element during construction, this feature shall also be included in the topographic data.

All berms and/or ditches within 30 feet of proposed right-of-way shall be shown in plan view. Toe and crest of berms and top and bottom of ditches shall be shown on the plans with spot elevations at minimum 50-foot intervals showing top of berm and ditch flow line. Flow lines of existing irrigation or drainage ditches shall be shown in the profiles of the irrigation plans.

All existing landscape irrigation lines and appurtenances within 30 feet of the proposed right-of-way shall be shown on the plans.

All driveways and alleys shall be located and profiled. The surface material on each driveway shall be identified in the topographic notes and/or the plan view (e.g. "DIRT", "GRAVEL", "DECOMPOSED GRANITE", "ASPHALT", or "CONCRETE"). If it will be necessary to reconstruct or re-grade a driveway, the reconstructed driveway connection will normally match existing materials and thickness.

Edges of existing driveways shall be depicted on the plan view from the roadway connection to a point at least 10 feet beyond the proposed right-of-way line. At driveways that may require significant alterations beyond the property lines, sufficient elevations beyond the property line shall be taken by the Consultant, and driveway profiles shall be prepared by the Consultant to ensure compliance with City Detail P1164.

5.2.5 Profiles and Grades

Separate profiles shall be shown for left curb and gutter, construction centerline (crown), and right curb and gutter. Elevations and stations at all grade breaks,



curb returns, intersections, and sheet match lines shall be shown. Street profile grades shall be shown as percentages to four decimal places. All grade breaks shall be identified by symbol and profile note.

The proposed construction centerline profile shall show the profile of the existing surface at the construction centerline. The proposed curb and gutter profiles shall show the existing surface line at the location of the new curb lines. If the proposed curb and gutter is adjacent to the existing curb of a frontage road, the existing surface line shall be omitted, and the frontage road gutter flowline and top of curb shall be shown and properly labeled.

Average ground elevations at the proposed right-of-way line shall be shown in the profile at least every 50 feet and at all driveways, intersecting sidewalks, and along parking lots. The elevation shall be shown using the symbol noted in the drafting standards.

Arterial street pavement cross slopes on profiles shall range between 1% absolute minimum and 3% absolute maximum. These extremes shall only be used when necessary. Desirable cross slope should be established near 2%. Minimum cross slope shall not be used in combination with a minimum longitudinal slope.

The minimum desirable longitudinal curb grade shall be 0.20%. The absolute minimum shall be 0.15%. The maximum desirable shall be 3% with 6% as absolute maximum. Percent of grades shall be shown to four significant figures. Vertical curves are not required unless the algebraic change in grades exceeds 1% for arterial streets, 2% for collector streets and 3% for local streets. Large grade changes shall be checked for safe stopping sight distance, intersection sight distance and headlight sight distance per AASHTO standards.

Algebraic grade breaks through major-major, major-collector, and any other signalized or potentially-signalized intersections shall not exceed 2.5% desirable or 3.0% absolute maximum.

Where possible, grades should be set to reduce high crowns where they exist. Crown grades should be set at least 0.5 foot below upstream floor elevations when possible. This could assist the flow of floodwaters and prevent backup into private properties. Care should be used when lowering streets; however, as deep excavation could expose or provide inadequate cover over existing utilities, or significantly change historic drainage patterns which would not be desirable.

Any streets with horizontal curves sufficient to require superelevation shall be designed in accordance with AASHTO guidelines. The Consultant is advised to discuss this subject with the City prior to design of superelevation. Generally, within the City of Phoenix, the AASHTO e-max = 0.04 Table is used for superelevation.



The Consultant is responsible for designing the street such that private property drainage is not adversely affected. Sufficient elevations shall be taken and shown on the plans to ensure that the new curb grades will not adversely affect private property drainage. This survey information, its recording on the plans, and its use in setting proper street grades is extremely important. No unwarranted ponding on paved areas on private property will be permitted. If, in the opinion of the City, this information is not sufficient to properly check the proposed grade, the plans will be returned to the Consultant to provide the required information.

Where adjacent paved private property drains to the street, the proposed curb grades shall be set to allow that drainage to continue. Where this is not possible, catch basins or concrete scuppers may be required within or beyond the right-of-way. If this is required, permanent right-of-way or drainage easement shall be obtained as needed for the appurtenance. Where existing curbs on frontage roads exist, the top of the new curb should be set closely to the top of the existing curb to facilitate landscaping and irrigation.

To maximize catch basin efficiency, catch basins in sumps are recommended, particularly at side street intersections. The Consultant shall design pavement and curb grades such that the maximum depth of sump shall be no more than 0.40 feet deep for 6-inch curb and 0.30 feet deep for 4-inch curb.

Sufficient elevation information shall be obtained to ensure good driveway matches to private property. Spot elevations on existing driveways shall be shown on plans where needed to show that the driveway match will comply with City of Phoenix Detail P1164 requirements. The Consultant shall provide detailed driveway profiles where necessary to clearly indicate to a Contractor how the driveway match shall be made to meet Detail P1164 requirements.

Any driveway reconstruction that may need to occur beyond the right-of-way shall have temporary construction easement dimensions shown on the plans to cover the additional area required. These temporary easements may be obtained by temporary rights of entry signed by the individual property owners.

The Consultant shall be cautious if intending to depress backs of driveway entrances to minimize matching distance beyond the right-of-way, as this could open a pathway for street drainage to enter onto private property. The Consultant should avoid any design that would allow street drainage to easily enter private property.

If a driveway grade must be changed to meet the requirements of Detail P1164, and there is a fence with a gate for this driveway, the Consultant shall determine if the gate/fence must be adjusted to function with the new driveway grade properly. If adjustment is necessary, the Consultant shall provide the necessary design and notations on the plans.



As may be requested by the Project Manager, the Consultant shall provide driveway profile worksheets to show how the proposed profile will meet the requirements of Detail P1164. In some cases, the Project Manager may request these profiles be included in the design plans to clearly show a contractor how they are to be built.

Where significant cuts or fills will be required to match proposed work to existing adjacent property, the cut or fill lines shall be shown on the plans. These general cuts and fills shall also be shown on the roadway typical sections.

The maximum slope of the cut or fill slope behind a sidewalk or shoulder area shall generally be 4:1. Cut slopes steeper than 4:1 may need to be set further back from the roadway or sidewalk to accommodate erosion, depending on the height of cut; or retaining walls may be necessary or desired. Fill slopes steeper than 4:1 may require vehicular protection such as guard rail or barrier wall, depending on the height of fill. For these conditions, the Consultant shall discuss alternatives with the Project Manager.

If guard rail is required to prevent vehicles from traversing down a steep fill slope, proper end treatments will be necessary. The Consultant shall use an energy-absorbing impact head, “extruding” type guard rail end treatment that ejects the guard rail toward the roadway side, such as the FLEAT-350. It is important that the extruding impact head eject the guard rail toward the roadway side, and away from potential pedestrian areas behind the guard rail. An example of a typical FLEAT-350 end treatment installation is available at the City of Phoenix web address <http://phoenix.gov/STREETS/ap155.html>

Whenever possible, existing trees, fences or other structures shall be protected from significant cuts or fills. Where these cannot be avoided, the Consultant shall provide whatever design or plan notations may be necessary to remove, relocate or reconstruct conflicting items.



5.3 Storm Drain Plan and Profile Sheets

Storm drain design and construction plans shall generally conform to requirements listed in the City of Phoenix Storm Water Policies and Standards Manual, which can be found at the following web address: <http://phoenix.gov/STREETS/index.html>.

5.3.1 Sheet Sequence for Storm Drain Plans

Plan sheet sequence for Storm Drain plans shall generally conform with requirements established in the City of Phoenix Storm Water Policies and Standards Manual (<http://phoenix.gov/STREETS/index.html>), Section 6.14.2.

5.3.2 Plan Sheet Orientation and Layout

Plan sheets shall generally be oriented and laid out in the same fashion as paving plans, described in Section 5.2.2.

5.3.3 Horizontal Alignment

In general, the location of the storm drain shall be set in the standard location, 4 feet west or 4 feet south of the monument line, whenever possible. If this location is not feasible or desirable because of other conflicting existing utilities or other reasons, the Consultant shall recommend an alternate location.

5.3.4 Topography and Notation

Storm drain topography and plan notation requirements shall generally conform to requirements listed in the City of Phoenix Storm Water Policies and Standards Manual (<http://phoenix.gov/STREETS/index.html>), Sections 6.12 and 6.14.

5.3.5 Profiles and Grades

Storm drain profile and grade requirements shall generally conform to requirements listed in the City of Phoenix Storm Water Policies and Standards Manual (<http://phoenix.gov/STREETS/index.html>), Sections 6.12 and 6.14.

In addition, mainline storm drain profiles shall also show and note all necessary pipe collars (24 inch or larger), and pipe supports for existing utility lines that will remain above the proposed storm drain line. Pipe supports are generally only used for existing crossing sanitary sewer lines that will remain above proposed storm drain lines.



5.4 Catch Basins and Connector Pipes

Storm drain catch basin and connector pipe design shall generally conform to requirements listed in the City of Phoenix Storm Water Policies and Standards Manual (<http://phoenix.gov/STREETS/index.html>), Section 6.

In addition, catch basin and connector pipe design and plans shall include the following requirements:

1. Sheets shall have the appropriate title block completed in the lower right hand corner and space for seal in the upper right hand corner.
2. Catch basins and their connecting lines shall generally be depicted looking up-station.
3. Any existing utilities that will require relocation shall be noted in the cross-sections.
4. Any required pipe collars shall be shown and noted in the cross-sections.

5.5 Flood Irrigation Plan and Profile Sheets

5.5.1 Relocation or Upgrade of Salt River Project (SRP) Irrigation Facilities

Frequently, especially on major arterial street improvement projects, SRP's lateral delivery ditches and tailwater ditches need to be replaced with pipes. Oftentimes their existing system pipes and delivery structures need to be upgraded and/or relocated to allow for the construction of the City improvements. Generally, SRP requires that their own staff prepare their facility design plans. SRP will usually allow the City's Contractor to construct the SRP pipe facility as part of the City's street improvement, but will require their own forces to relocate their delivery structures. Occasionally, major irrigation work will require extensive dry-up time, and may need to be scheduled during annual SRP Canal Dry-Up periods. Early and continuous communication with SRP Irrigation staff is critical during design, as required dry-up periods may dictate the schedule for the project.

If an irrigation canal has a piped crossing which is owned by SRP, the City will inform the Consultant if SRP will be providing a design for their irrigation facility. Except for bridge design work, SRP generally provides designs for their own facility improvements or relocations. Some projects may require a land exchange between the City, SRP, and/or the Bureau of Reclamation (BOR). The Project Manager will inform the Consultant at the Scope Meeting or as soon as it is known. If it seems like this may be a possibility, but it is not known for sure at the time of scoping, the Project Manager may recommend an allowance in the contract to cover additional Consultant work that may be required, such as



preparation of detailed right-of-way maps and legal descriptions for SRP irrigation easements.

The following basic process will apply to handling projects that require work on SRP facilities:

1. The Consultant shall provide Notes on the plans indicating the SRP facilities that will need to be piped or relocated. This information shall be part of the Consultant's preliminary plan submittal.
2. The City will send a set of the preliminary plans to SRP for review and comment.
3. SRP will contact the City by letter indicating the SRP design work needed as part of the street improvement and they will request authority to proceed with design. An agreement will then be established between the City and SRP, such that SRP can invoice the City for its design costs.
4. The City will authorize SRP to proceed with its design and to invoice the City.
5. SRP's preliminary plans will be reviewed by the Project Manager and the Consultant, and comments will be submitted to SRP.
6. SRP will send their final plans to the Project Manager and the Project Manager will forward them to the Consultant.
7. The Consultant shall incorporate SRP's design plans into their design plans, and show the proposed SRP facility on the Consultant's design plans, including notes referencing the SRP plan sheets. SRP will provide mylars of their final design plans.
8. If SRP intends to construct any part of its facilities, the Consultant shall note these items on the plans.
9. If a particular existing irrigation ditch is deemed "historical" by the City Historic Preservation Office, a modified course of action may be required.

Occasionally, other existing flood irrigation facilities owned by the Roosevelt Irrigation District (RID) will be encountered. The process for relocating RID irrigation facilities is somewhat similar to SRP. Prior rights issues will need to be determined as early as possible in the project design process. Similar to SRP, the RID will require that either they design their own facilities and the City pay them for that design, and the Consultant will incorporate their design plans into the project plans; or they may allow the City's Consultant to design their facility, and the City would pay for RID's reviews. As with SRP, early and continuous communication with RID is critical.



5.5.2 Relocation or Upgrade of Private Irrigation Facilities

There are many privately owned and operated flood irrigation systems throughout the City. Many are located in neighborhoods, but these systems can also be found along many arterial and collector streets as well. If existing private irrigation ditches and/or pipes are in the right-of-way and must be relocated or replaced to allow for construction of proposed street improvements, the proposed private irrigation facilities shall be shown on a separate plan and profile sheets, unless otherwise approved by the City.

Relocated private irrigation ditches and pipes should be placed on private property whenever possible, however, existing conditions on private property or existing right-of-way may make it necessary, more desirable, or less costly to construct the ditches or pipes in the right-of-way. Any design proposing to relocate existing irrigation facilities from the right-of-way to private property shall be approved by the owners of the land on which the facilities are to be located before the design is commenced.

It is the Consultant's responsibility to secure water delivery information from SRP (SRVWUA-Salt River Valley Water Users Association) or other water delivering agency or company as a guide in preparing the private irrigation facility plans.

The Consultant is responsible for the design of all relocated or replaced irrigation facilities to ensure equal or better service as existed prior to the proposed project. If the design for the relocation or replacement of irrigation facilities involves significant changes in the way water is delivered (e.g., replacing open ditches with underground pipe, and replacing gated ditch deliveries with deliveries from irrigation valves), the Consultant shall submit a report with a summary of the proposed design plan and appropriate calculations. This report shall also include a narrative indicating that the property owners will receive irrigation water deliveries comparable to the existing system deliveries. The report shall provide assurance on the adequacy of the design, and shall include the Hydraulic Grade Line (HGL) profile for both the existing and proposed delivery systems. The proposed plans and accompanying report shall be submitted with the preliminary plans.

Relocating irrigation facilities from the right-of-way to developed or undeveloped private property can present problems which may be unacceptable to the property owner. If the Consultant believes that private ditches, pipe, stand pipes, alfalfa valves, etc. must be relocated from the public right-of-way to private property, the Consultant shall contact the property owner served by the existing irrigation system and coordinate the design of the proposed relocation.

The Consultant shall identify each affected private property prior to submitting a design to the City. The City will usually accept private irrigation designs that relocate private irrigation facilities within the right-of-way, such as behind the



sidewalk, if there is no other acceptable location. Private irrigation pipe may cross the right-of-way and, for short distances, lie under the pavement if necessary; but in general, if the pipe must remain within the right-of-way it should be located outside the paved roadway area.

Sometimes, it may appear that private irrigation facilities are abandoned or have not been used for a long time. If there have been no deliveries of water for a long time, it may be possible to obtain sign-offs of water rights from the property owners to eliminate the need to reconstruct these facilities. If it appears this may be the case, the Consultant shall discuss this with the Project Manager.

5.5.3 Plan Sheet Orientation and Layout

Sheets shall have the same orientation as the paving plan sheets.

5.5.4 Horizontal Alignment

Whenever possible, private irrigation pipe ditches and structures shall be placed on private property, using a temporary construction easement to cover the necessary work area as needed. If placement of pipe on private property results in significant conflicts, such as existing trees or major landscaping, planters, walls, or buildings the private irrigation lines may be placed within the right-of-way, such as behind the sidewalk, under sidewalk, or in the roadway for short lengths to avoid the major conflicts.

In locating private or SRP irrigation pipe, consideration must be given to allow sufficient space for other features, such as utility poles, street lights, utility boxes, fire hydrants, etc., normally placed near the outer edges of roadway right-of-way.

5.5.5 Topography and Notation

At a minimum, irrigation plans shall show all existing utilities and topography within a minimum of 30 feet of the irrigation pipe.

Removal items shall be called out on the paving sheets, not on the irrigation sheets. When SRP does their own construction, removals to be done by SRP forces shall be called out on the paving sheets and it shall be noted that they will be removed by SRP forces.

Construction items for new irrigation work shall be called out on the irrigation sheets. If SRP will be doing their own construction, those appropriate items shall be listed and noted on the plans to be done by SRP.



5.5.6 Profiles and Grades

Profiles shown for irrigation pipes shall show the proposed surface grades over the centerline of the pipe as well as the invert and top of pipe profile. Top elevations and invert elevations shall also be shown for all irrigation structures. Grades of pipe shall be established which will provide sufficient cover over the pipe and will also work efficiently hydraulically. The size, type, and slope of pipe shall be shown in the profile.

5.6 Bridge and Other Major Structural Plans

5.6.1 General

Bridges and other major structures are typically not covered in detail in MAG Standard Specifications or Details or in the City of Phoenix Supplement to MAG Standard Specifications or Details. Most major structural work such as bridges, box culverts, or special vaults shall basically be covered under ADOT Standard Specifications and Details, with any necessary special provisions or details provided by the Consultant.

5.6.2 Sheet Sequence for Bridge and Other Major Structural Plans

Typically, sheets for bridges or other major structural plans being prepared in conjunction with another project (such as a paving project) will be placed after the paving and/or storm drain sheets.

Additional sheets often needed for bridges may include the following:

1. Detour Plan and Profile (sometimes required for the construction of a new bridge).
2. Plan and Profile for underground pipeline relocations, such as water or sewer, that may be necessary to accommodate new bridge construction.
3. Bridge location plan showing the bridge in plan and elevation, along with major bridge structure quantities.
4. Soil boring logs in the vicinity of the proposed bridge structure.
5. Abutment details.
6. Pier details.
7. Deck details.
8. Miscellaneous details.
9. Handrail details.

5.6.3 Bridge Design Guidelines

Unless otherwise specified by the Project Manager, all bridges shall be designed in accordance with the latest AASHTO Standard Specifications for Highway



Bridges for an HS25 Live Load. Currently, the Service Load Design method is still being used; however, the Street Transportation Department may transition to the Load and Resistance Factor Design (LRFD) method in the future. The Consultant shall verify the required method with the Project Manager at the time of Project Scoping.

If expansion joints are required in the bridge structure, the Street Transportation Department prefers “strip seal” type joints. “Compression seal” type joints should be avoided.

In addition, bridge skew angles should be minimized to the extent that it is feasibly possible.

The Consultant shall refer to the City of Phoenix Storm Water Policies and Standards Manual (<http://phoenix.gov/STREETS/index.html>) for all other bridge design criteria.

5.7 Water and Sanitary Sewer Plans

All water and sanitary sewer designs funded by the Water Services Department shall be done in accordance with the City of Phoenix Water Services Department Design Standards Manual for Water and Wastewater Systems. This manual is available at the following web address: <http://phoenix.gov/WATER/desstand.html>.

Water and sewer projects funded by Water Services Department shall be prepared separately from any other projects that they may bid with, making them able to stand alone. These separately funded projects shall have their own Cover Sheet, Legend and Notes Sheet, etc. These projects will often bid with other projects, such as paving projects, but they must be prepared with the ability to stand alone.

5.8 Traffic Signal Plans

Generally, traffic signal plans will be designed by Street Transportation Department staff. The Consultant will normally be required to submit AutoCAD base map files for the requested intersections with the 70% plan submittal.

5.9 Street Lighting Plans

The Consultant may be required to prepare street light layout plans. The Consultant shall prepare the street light layout plans in accordance with the “City of Phoenix Street Lighting Layout Guidelines”. If required, the Project Manager will provide a copy of this guideline to the Consultant.

Street light layout plans are normally submitted with the 70% design plans, and are usually prepared as a separate AutoCAD layer that can be turned on or off as needed. Normally, this layer will only be turned on for the specific plan submittal for review by



City staff; then turned off and not used in the final design. This layout plan is simply the Consultant's recommendation on where to place street lights to comply with the guidelines and to best fit other features of the project and field conditions for review by City staff. City staff will make the final decisions on street light placement for the project, and will coordinate the actual final design of the street lights with the power company.

5.10 Landscaping Plans

The Street Transportation Department staff can prepare landscape designs in-house; however, there may be times when the Consultant is requested to perform this work. If the Consultant is requested to perform this task, the Project Manager and the City Landscape Architect will provide specific instructions and example plans to the Consultant.



6 Right-of-Way Types and Document Preparation

Generally, the Consultant shall be required to prepare right-of-way plans and area calculations for projects that will require new right-of-way or easements. The Consultant shall include an allowance item for preparation of ROW plans and area calculation sheets.

6.1 Types of Ownership, Right-of-way and Easements

6.1.1 Fee Simple Title

This type of right provides total ownership (Fee Simple Title) of land for the City. This is the preferred type of ownership obtained for most major projects in street right-of-way. This type of ownership is permanent, and may be obtained by purchase, condemnation or donation. It is required for the main portion of the roadway, sidewalk, SRP box locations, street returns, City utilities, and Salt River Valley Water Users Association (SRVWUA) irrigation facilities. It may also be required for drainage projects that extend beyond the ROW limits.

Occasionally, if the property owner and the City mutually agree, a permanent easement may be substituted for this permanent ROW. Such a case would be if the land were owned by the U.S.A. and could not grant permanent ROW.

6.1.2 Permanent Easements

Permanent easements of various kinds may also be obtained for special purposes such as slopes (typically fill slopes only for maintenance purposes) and drainage. They may also be obtained in certain unique or special cases for other items such as sidewalks, landscaping, public utilities, and other special uses. Permanent easements may also be obtained for the purposes mentioned above in Section 6.1.1. This type of ROW may be obtained by purchase, condemnation, or donation.

Permanent easements for drainage purposes may be purchased, condemned or donated. Generally, if the drainage improvement benefits only a single property, the drainage easement is donated. If the drainage improvements benefit several properties, beyond the easement area, the easement may be purchased. If the property to be obtained is owned by the U.S.A., only a permanent easement may be obtained. Drainage easement specifics are defined in the City Storm Water Policies and Standards Manual.

6.1.3 Temporary Construction Easements (TCE)

Temporary construction easements are required for temporary work outside the right-of-way, such as minor grading to match existing property elevations,



reconstructing a driveway beyond the right-of-way to match existing grades, installation of street improvements such as sidewalks, detours, reconstruction of structures or reconstructing private flood irrigation facilities. In addition, a TCE is required for areas beyond the right-of-way for significant cut slopes rather than a permanent slope easement which would be recommended to protect a fill slope. This type of easement is to be obtained by purchase, condemnation, or donation. Easements for private irrigation may not be condemned.

In areas where the construction is mainly for the benefit of the property owner, such as a temporary slope easement for driveway reconstruction or gently matching grade and restoring the area between new roadway or sidewalk work and existing private property, or other work on private property, a Temporary Right of Entry may be obtained in lieu of paying for a temporary construction easement.

6.1.4 Temporary Right-of-Entry

When grading existing driveways to match the current construction project, a Temporary Right-of-Entry may be used rather than a temporary construction easement. These conditions are usually for neighborhood projects such as sidewalks or ADA retrofits. Obtaining a Temporary Right-of-Entry from the property owner eliminates the need for detailed map preparation, title work, a legal description, payment processing to the property owner, etc. The right to enter the property is granted by the property owner at no cost to the City. The Consultant is required to complete an area calculation sheet for each parcel needing a Temporary Right-of-Entry. If the property owner refuses to sign a [Temporary Right-of-Entry Form](#) (see Appendix A-4), the improvements along that portion of the project may be eliminated from the design (and construction).

6.2 Right-of-Way Documents

In most cases, the Consultant is only requested to prepare the project right-of-way map showing all right-of-way and easements that will be necessary for the project, and the corresponding area calculations for each take from each property lot shown on the City Quarter Section maps. City Quarter Section maps shall be the basis for all right-of-way maps prepared by Consultants. Consultants shall use City Quarter section maps as their base for right-of-way map preparation, and shall not re-draw the information, but rather use it verbatim, as supplied by the City. Quarter Section maps can be obtained in electronic format from EAS Central Records. The desired portion of the base map information shall be transferred onto the Right-of-way base map sheet available in AutoCAD format on the Street Transportation Department website.

Typically, Consultants will not be responsible for preparing the legal descriptions for the proposed right-of-way takes, or for doing title searches to determine property ownership. This work is usually performed by City staff in the Real Estate Division.



Reasonable effort shall be made by the Consultant to verify the existing ROW locations. Such effort includes checking subdivision maps, survey using City-approved benchmarks, the Maricopa County parcel database, and the maps available from EAS on the 3rd Floor of City Hall.

As right-of-way acquisition can be a critical path item in the schedule for getting the project to construction, the determination of needed right-of-way, and the preparation of the map and the corresponding area calculations is important to achieve as early in the design process as possible. It can take as much as one year or more to obtain right-of-way for a project, especially if there are many takes from different property owners, or there is government land such as State Land or federal land involved. The Consultant shall work closely with the Project Manager to develop right-of-way needs and documents as early in the project design as possible. On large projects such as major arterial street improvements, right-of-way needs are usually not fully defined until about the 70% design stage. Smaller projects, however, may be able to determine needs at an earlier stage.

6.2.1 Project Right-of-Way Map

The Right-of-Way Map shall be prepared on the standard AutoCAD base map available on the Street Transportation website. The base map information shall be extracted directly from City of Phoenix Quarter Section maps. Typically, right-of-way maps shall be prepared on 22 inch by 34 inch plan sheets and the map information will be plotted to a scale of 1 inch = 100 feet; however, certain critical areas may require a larger scale to show necessary detail and dimensions. On linear projects along streets, the Consultant shall prepare a strip of an area of the Quarter Section map to show approximately 200 feet of existing map information on each side of the street where right-of-way will be needed. The provided base map has a legend established for most of the different types of right-of-way that will be needed, and the Consultant shall use these legend symbols as needed to depict the various types of right-of-way to be acquired for the project. The PM will specify which map or maps are required at the scope meeting. The Right-of-way Map will be used internally by the Real Estate Division.

The following are requirements for the Right-of-Way Map:

1. Shall be prepared on 22 inch by 34 inch plan sheets at a scale of 1 inch = 100 feet.
2. Must show all parcels within the project. Parcels with acquisitions shall be shaded according to type of acquisition (see [Right-of-Way Area Calculation Form](#), Appendix A-4).
3. Existing and proposed ROW lines must be clearly depicted and identified as such with notes.



4. All parcels shall be clearly marked with the Assessor Parcel Number (APN) and the street address. Each subdivision boundary shall be shown where appropriate.
5. Centerline stationing of the project shall be shown.
6. COP quarter section(s) shall be identified.
7. All existing easements and easement types shall be shown.
8. All dimensions needed to fully describe each right-of-way take in a legal description. Dimensional information shall be tied to monument lines and existing lot lines. If needed, bearings and distances shall be provided.
9. Dimensions of new right-of-way triangles and radii of curves shall be shown.
10. Submit two (2) copies of a draft Right-of-way Map. Submit the final Right-of-way Map in ink on mylar.

6.2.2 Right-of-Way Area Calculations

Along with the right-of-way map, the Consultant shall also prepare area calculations for each right-of-way take area for each defined lot on the base map. These area calculations are only estimates, based on the existing dimension information provided on the Quarter Section map. The Consultant will not be expected to do further research or to survey any properties to calculate more exact areas. These calculations, along with a diagram of each individual take, must be provided on the standard Right-of-way Area Calculation form provided to the Consultant by the Project Manager. Each calculation must show the total area of each lot as it existed prior to the take; the area of the proposed take; and the area of the lot remaining after the take. The PM can provide the Consultant with an electronic version of the standard form that must be completed for each parcel.



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APPENDIX A-1

List of Abbreviations and Acronyms



List of Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ABC	Aggregate Base Course
ADA	Americans with Disabilities Act
ADOT	Arizona Department of Transportation
AP	Administrative Procedure
APN	Assessor Parcel Number
BOR	Bureau of Reclamation
CD	Compact Disc
CDBG	Community Development Block Grant
CIP	Capital Improvement Program
COP	City of Phoenix
CLOMR	Conditional Letter of Map Revision
COE	Corps of Engineers
DCM	Design & Construction Management, Street Transportation Department
DG	Decomposed Granite
DSD	Development Services Department (City of Phoenix)
DTM	Digital Terrain Model
EAS	Engineering & Architectural Services Department (City of Phoenix)
EGL	Energy Grade Line
EPA	Environmental Protection Agency
FCDMC	Flood Control District of Maricopa County
FEMA	Federal Emergency Management Agency
FF	Finished Floor Elevation
G&A	Grade and Alignment
HGL	Hydraulic Grade Line
HOA	Home Owners Association
ID	Improvement District
LOMR	Letter of Map Revision
LPD	Local Paving and Drainage
MAG	Maricopa Association of Governments
MCDOT	Maricopa County Department of Transportation
NF	Not Found in Field
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NPI	Non-pay Item
NSD	Neighborhood Services Department (City of Phoenix)
NTP	Notice to Proceed
OPS	Operations
PDF	Portable Document Format
PDP	Planning, Design and Programming Division, Street Transportation Department

PM	Project Manager
PR	Public Relations
PS&E	Plans, Specifications and Estimate
QA/QC	Quality Assurance / Quality Control
Q-S	Quarter Section
RCA	Request for Council Action
REN	Real Estate Number
RID	Roosevelt Irrigation District
ROW	Right-of-way
S/W	Sidewalk
SRP	Salt River Project
SRVWUA	Salt River Valley Water User's Association
STD	Street Transportation Department (City of Phoenix)
ST Mod	Street Modernization Improvements
SUE	Subsurface Utility Engineering
TBM	Temporary Benchmark
TCE	Temporary Construction Easement
WSD	Water Services Department (City of Phoenix)
WSP	Warranted Signal Program

APPENDIX A-2

Design Contract Payment Request



**CITY OF PHOENIX
STREET TRANSPORTATION DEPARTMENT
DESIGN CONTRACT PAYMENT REQUEST**

TO: STREET TRANSPORTATION, DCM, 1034 EAST MADISON STREET, PHOENIX, ARIZONA 85034

ZONE A PROJECT MANAGER B. Smith DATE 12/15/05

PROJECT DESCRIPTION: _____ PAYMENT REQUEST NO. 2

 Cave Creek Road Storm Drain: Union Hills to Bell Road

CITY PROJECT NO. ST83130000 CONTRACT NO. 105001 DATE OF CONTRACT 1015/05

FIRM'S NAME Engineering, Inc.

FIRM'S ADDRESS 1234 16th Street, Phoenix, AZ TELE. NO. 602-555-5555

A. Engineer's Fee per contract. \$ 75,000.00

1. Contract Amount (Basic Fee)
2. Add Allowances and/or Change Orders

<u> Right of Way Allowance </u>	\$	<u> 5,000.00 </u>
<u> Electrical Allowance </u>		<u> 2,200.00 </u>
<u> Printing Allowance </u>		<u> 1,000.00 </u>
<u> Public Meeting Allowance </u>		<u> 3,000.00 </u>
<u> Change Order #1 </u>		<u> 3,000.00 </u>

3. Total Allowances/Change Orders \$ 14,200.00

4. Total Contract Amount (including additions) \$ 89,200.00

B. Engineering fee earned to date. = \$ 11,250.00

1. *Value of work completed 15% % x \$75,000.00
(Basic Fee)
 (Include change orders that increase basic fee)

2. Add Payment for Allowance and / or Change Orders that increase Allowances
 (Attach invoice)

<u> Right of Way Allowance </u>	\$	<u> 2,000.00 </u>
<u> Electrical Allowance </u>		<u> 1,000.00 </u>
<u> Printing Allowance </u>		<u> 0 </u>
<u> Public Meeting Allowance </u>		<u> 0 </u>
<u> Change Order #1 </u>		<u> 0 </u>

3. Total Allowances \$ 3,000.00

4. Total Payment Request 14,250.00

5. Less Prior Payments 5,000.00

6. TOTAL PAYMENT DUE \$ 9,250.00

NOTE *All Progress Payments are subject to limitations specified in contract.
 A Design and Progress Payment must accompany this payment request.

Submitted by Ivanna B. Dunn 12/15/05 _____
Date

Checked by _____
 PROJECT MANAGER Date

Approved by _____

CITY OF PHOENIX, ARIZONA
STREET TRANSPORTATION DEPARTMENT
DESIGN AND PLANNING PROGRESS REPORT

1. PROJECT DESCRIPTION Cave Creek Road Storm Drain: Union Hills to Bell Road				2. PROJECT NO ST83130000	3. REPORT NO. 2
4. DESIGN BY: Engineering, Inc.				5. CONTRACT NO. 105001	6. REPORT DATE 12/15/05
7. PROCEED NOTICE 10/15/05	8. TIME ALLOWED 270 days	9. WORK STARTED	10. EST. COMPL. DATE 3rd Quarter 05/06	11. TIME ELAPSED 20 %	12. WORK COMPLETED 15 %

13. FIELD WORK & SURVEY: 50 % COMPLETE. COMMENTS:

Field work is complete. Survey Maps are in progress.

14. DESIGN: 5 % COMPLETE. COMMENTS:

Initial Drainage investigation is in progress. ROW maps are in progress.

15. PLANS: 0 % COMPLETE. COMMENTS:

16. SPECIFICATIONS: 0 % COMPLETE. COMMENTS:

17. GENERAL COMMENTS & REMARKS

SUBMIT THIS REPORT WITH PAYMENT REQUEST ATTACH ADDITIONAL INFORMATION OR DOCUMENTATION IF NECESSARY FOR ITEMS 13 - 17	18. SUBMITTED BY: <i>Ivanna B. Dunn</i>	19. DATE <i>12/15/05</i>
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APPENDIX A-3

Plan Submittal Checklists



INITIAL PLAN REVIEW CHECKLIST*

(Typically for 25%, 30% OR 40% Design Submittal)

- * This checklist is not intended to be all inclusive, but does provide many basic items that should typically be checked and evaluated at this stage of design plan development. Some items on this checklist may not be applicable to 25% DESIGN stage plans, and if so, those items shall be marked “N/A” for “Not Applicable” at this stage.

- Requested number of printed full size and half size plans provided.
- AutoCAD and scaleable pdf files of plans provided.
- Plans are drawn on standard 22 inch by 34 inch border plan sheets.
- Proper specified scale has been used, where applicable, for all plan sheets.
- North Arrow (in proper orientation) and specified drawing Scale is shown on each appropriate plan sheet.
- Cover Sheet and all Title Blocks are completed with required project information.
- Key map has been provided, preferably shown on the Cover Sheet if space permits. Large or complex projects may require a separate Key Map sheet.
- Minimum consistent lettering size meets requirements for readability when plans are reduced by half (minimum 14pt at full scale).
- Fully turned deflection angles (expressed in degrees-minutes-seconds) are shown at all intersections.
- All existing found survey monuments are shown on plans, with type of monument found and station location and elevation called out.
- All temporary benchmarks set by field survey are shown on plans, with proper symbol, station and offset location and elevation.
- Project survey information ties to, and refers to at least two City of Phoenix recognized benchmarks.
- Each plan sheet shows the nearest benchmark—either City-recognized benchmark or temporary benchmark set by field survey, whichever is closest to work shown on the sheet.
- Project benchmarks (existing or temporarily set) are no more than 1,000 feet apart.
- All temporary benchmarks set by field survey are located in areas that will be out of the way of disturbance by ultimate planned project construction (such as, a chiseled “X” on top of a curb to remain).
- All horizontal survey is in accordance with NAD83 and all vertical datum is based on NGVD 1929.
- Accurate centerline stationing is shown on all plan sheets, with “tick” marks at each even 50-foot and 100-foot station, and callouts for each 100-ft station.

- All major topographical features within 30 feet of proposed right of way are shown on the plans, and corresponding topo notes with station and offset dimension are shown. All offset dimensions are measured to street face side, except utility lines, manholes and valves are measured to the center. Notes for overhead signs include overhang dimensions and vertical clearance dimension above existing ground.
- All topographical feature symbols on plans match the symbols on the standard General Legend and Notes sheet.
- The extents of partial building footprints within 30 feet of proposed right of way are shown in plan, and finished floor elevations of those buildings are shown and called out in the profile.
- The extents of any existing Portland cement concrete pavement (on surface or underlay) are shown on the plans.
- All existing manhole rim and invert elevations and water valve nut elevations are called out on the plans.
- All underground utility lines are shown on the plans and called out as to type and size, using symbols as shown on the General Legend and Notes sheet. Utility lines that are 12 inches in diameter or smaller are shown as a single line, and lines that are larger than 12 inches in diameter are shown as double lines, spaced apart to match the proper scale of the utility line.
- All existing utilities, existing or proposed curb and gutter, sidewalks and ultimate project right of way lines and easements (proposed or existing) are dimensioned in a neat, consistent and organized manner on each plan sheet.
- Geometric dimensions and alignment of proposed facility matches project scope requirements.
- All tapers and angle points are noted where they occur on plans by station, elevation and dimensional offset.
- Horizontal angle deflections in roadways greater than 1 degree generally use horizontal circular curves.
- Where present, horizontal curve data information, sufficient to stake in the field, is shown on the plans.
- Longitudinal grade of new storm drain or sewer line pipes meet requirements established in corresponding City of Phoenix Storm Water Policies and Standards Manual or Water Services Department Design Standards Manual for Water and Wastewater Systems.
- Longitudinal grade of roadway is at least 0.2000%, with an absolute minimum grade of 0.1500%. Maximum longitudinal grade is 6.0000%, unless otherwise approved by Project Manager.
- All longitudinal grade breaks are called out, with station, offset and elevation.
- Where roadway longitudinal grade breaks are greater than 1%, a vertical curve is provided.

- Roadway pavement cross slopes generally range between 1.0% minimum and 3.0% maximum, with most cross slopes in the desirable 2.0% +/- range. General cross slopes less than 1.5% have been avoided wherever possible, except where necessary through side street intersections.
- Changes in roadway cross slope passing through side street intersections generally do not change by more than 1.0% +/-.
- Combinations of minimum longitudinal slope and minimum cross slope on roadways have been avoided to facilitate positive drainage.
- Algebraic differences in longitudinal grades through intersections (intersection breakovers) are generally 2.5% or less, and do not exceed 3.0% maximum at existing, proposed or potentially signalized intersections.
- Significant roadway cuts or fills have been reviewed carefully for impacts to utilities, drainage, and access to adjacent properties, as well as minimizing work beyond standard right of way limits where possible.
- New roadway top of curb is generally set below elevation at right of way where possible, to avoid blocking private property drainage toward the street, and to prevent street drainage from flowing into private property.
- Roadway grades are set such that maximum sump depths are at least 0.1 foot below top of curb elevation (0.4 maximum depth for typical vertical curb), and set such that drainage in excess of this maximum sump depth will break over the pavement grade and continue flowing in its historical direction.
- When storm drain systems are existing or proposed with the project, existing side street valley gutters and aprons have been eliminated, and side streets crowned and storm drain catch basins added (preferably in sump for maximum drainage efficiency), wherever possible or practical.
- New roadway crown grades are generally set no higher than existing, and at least 0.5 foot lower than upstream finished floor elevations whenever possible to avoid blocking drainage and potentially increasing localized ponding or flooding on private property.
- All roadway profile lines are shown and labeled—typically monument line and/or construction centerline or crown line; left and right curb and gutter or edge of pavement; and tick marks shown at proper elevation along the ultimate right of way line at least every 50 feet, and where significant grade changes occur.
- Stations, elevations and sheet number references are shown on the plans at all match lines and at the beginning and end points where the project matches existing.
- Spot station, offset and elevations are shown in plan view for all critical points on roadway median islands (typically at median nose, points of curvature or reverse curvature, points of tangency and grade breaks), rather than depicting profile lines in the profile view.

- Intersecting side street and project match end point spot elevations for at least 100 feet beyond curb returns or proposed match points are shown in plan view, along with appropriate drainage arrows to indicate direction of flow adjacent to project.
- Intersection grading worksheets have been provided for all major, collector and any other potentially-signalized intersections.
- For storm drainage projects, the Storm Drain Design Checklist in the City of Phoenix Storm Water Policies and Standards Manual has also been checked for appropriate items at this initial stage of development.
- For water or sewer line projects, all required standards as stated in the City of Phoenix Water Services Department Design Standards Manual for Water and Wastewater Systems have been met, and an initial water or sewer plan checklist from this Manual has been completed and included with this plan submittal. (Note: Some existing topography and elevation data requirements listed on this checklist may be reduced to meet the needs of the specific water or sewer project).

PRELIMINARY PLAN REVIEW CHECKLIST*

(Typically for 60% or 70% Design Submittal)

- * This checklist is not intended to be all inclusive, but does provide many basic items that should typically be checked and evaluated at this stage of design plan development. Some items on this checklist may not be applicable to the project, and if so, those items shall be marked “N/A” for “Not Applicable”.

- Previous plan review comment sets have been returned with this submittal.
- All previous plan review comments have been addressed.
- Requested number of printed full size and half size plans are provided.
- AutoCAD and scaleable pdf files of plans are provided.
- For paving projects, typical sections for each significant change in roadway section are provided.
- For water or sewer line projects, all required standards as stated in the City of Phoenix Water Services Department Design Standards Manual for Water and Wastewater Systems have been met, and an appropriate water or sewer plan checklist from this Manual has been completed and included with this plan submittal.
- If storm drain mainline design is involved, a preliminary redline horizontal/vertical mainline alignment layout plan has been prepared, submitted for review and approved prior to official Preliminary Plan submittal.
- For storm drainage related projects, a complete detailed hydrology and hydraulic report for the storm drainage system, including drainage area map and all computations for storm drain main, catch basins and connector pipes, etc. has been provided in accordance with the City Storm Water Policies and Standards Manual. Also, the Storm Drain Design Checklist in the City of Phoenix Storm Water Policies and Standards Manual has been completed and submitted with the Hydrology and Hydraulic Report.
- For storm drain mainline designs, all known existing underground utility crossings are shown in the storm drain profile.
- For storm drain mainline designs, all asbestos cement pipe (ACP) waterline undercrossings (12-inch or smaller) are called out for ductile iron pipe (DIP) replacements at the crossings; and all non-DIP sanitary sewer line undercrossings are called out for permanent pipe supports or DIP replacements at the crossings per MAG Detail 403.
- For projects with storm drain catch basin designs, all catch basin connector pipe profiles are shown, including all known existing underground utilities in each profile.
- For storm drain mainline designs, a Storm Drain Design Summary Sheet, overall Hydraulic and Energy Grade Line Profile Sheet, and an Alternate Pipe Material chart have been completed and included in the plans.

- All potential underground utility conflicts with proposed design are noted on the plans and shown in corresponding locations on profiles.
- All removal and installation notes are shown on plans, and all quantity take-offs are shown on each appropriate plan sheet and on a Summary Sheet. Bid item descriptions, item numbers and unit measurements shall be in accordance with standard City bid item catalog lists.
- Appropriate geotechnical information (for pavement design, storm drain design, bridge, drainage channel, etc.) is shown on the plans on separate sheets. Appropriate information usually includes a soil boring location map, soil boring logs, gradation and plasticity information, field resistivity and soil pH information, and seismic refraction survey results.
- Any structural plans and corresponding special details needed (such as for bridges, culverts, headwalls and wingwalls, special drainage structures, utility vaults, etc) are shown on the plans.
- Project is essentially complete and “build-able”, with all elements and construction notes essential for construction included on plans.
- Any desired underground utility potholes have been requested (with each utility type and/or utility company—electric, telephone, cable TV, gas, etc., requested on separate forms) on standard City of Phoenix Engineering and Architectural Services Department S.U.E. (Utility Pothole) Request forms, and corresponding plan exhibits have been provided showing all desired pothole locations for each utility type and/or utility company.
- If landscaping design is to be done by City, appropriate AutoCAD base sheets have been provided to City.
- If traffic signal design is to be done by City, appropriate AutoCAD base sheets have been provided to City.
- If streetlight work is to be included, preliminary plans include a “redline” streetlight layout that follows the City Streetlight Layout Guideline.
- A detailed Preliminary (60% or 70%) Construction Cost Estimate using standard City bid item numbers, description formats and unit measurements has been provided.
- If right of way is required for the project, a right-of-way map indicating all new right of way or easement acquisitions necessary to construct the project, including all dimensions necessary to clearly describe the takes, and corresponding right of way area calculations on standard City forms has been provided.
- Any revised intersection grading worksheets required have been provided for all major, collector and any other potentially-signalized intersections.

PS&E (PLAN, SPECS & ESTIMATE) PLAN REVIEW CHECKLIST*

(Typically for 90% Design Submittal)

- * This checklist is not intended to be all inclusive, but does provide many basic items that should typically be checked and evaluated at this stage of design plan development. Some items on this checklist may not be applicable to the project, and if so, those items shall be marked “N/A” for “Not Applicable”.

- Previous plan review comment sets have been returned with this submittal.
- All previous plan review comments have been addressed.
- Requested number of printed full size and half size plans are provided.
- AutoCAD and scaleable pdf files of plans are provided.
- All utility pothole information received has been plotted on plans in the appropriate locations and noted as “potholed” information.
- All utility conflicts confirmed by utility pothole information have been addressed in the design by adjusting the design to avoid the conflict whenever possible; or if that is not possible, then by noting the existing conflicting utility to be relocated.
- All quantity take-off revisions are shown on each appropriate plan sheet and on the Summary Sheet. Bid item descriptions, item numbers and unit measurements are in accordance with standard Street Transportation bid item catalog lists.
- A detailed PS&E (90%) Construction Cost Estimate using standard City bid item numbers, description formats and unit measurements has been provided.
- Any Special Provisions that may be needed (not already covered in MAG or City Supplement to MAG Standard Specifications, or in the City Boilerplate Specification template) are provided.

FINAL PLAN REVIEW CHECKLIST*
(100% Design Submittal)

* This checklist is not intended to be all inclusive, but does provide many basic items that should typically be checked and evaluated at this stage of design plan development. Some items on this checklist may not be applicable to the project, and if so, those items shall be marked "N/A" for "Not Applicable".

- Previous plan review comment sets have been returned with this submittal.
- All previous plan review comments have been addressed.
- All final plan sheets include the standard City note referring to City Ordinance G-4396.
- Requested number of printed full size and half size plans are provided, along with the required electronic documents, sealed and signed by registered professional engineer.
- AutoCAD and scaleable pdf files of plans are provided.
- Any required outside Agency signatures on Cover Sheet (such as plan approval signature by Maricopa County Environmental Services Department for Water or Sewer line work) has been provided.
- A detailed Final (100%) Construction Cost Estimate using standard City bid item numbers and description format has been provided.
- Final Special Provisions that may be needed (not already covered in MAG or City Supplement to MAG Standard Specifications, or in the City Boilerplate Specification template) are provided.
- Copy of final, original survey notes (in Station/Offset format to match plan stationing) has been provided.

APPENDIX A-4

Right-of-way Information



RIGHT-OF-WAY AREA CALCULATIONS

Project No.: _____


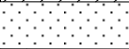
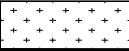

Description: _____

From: _____ To: _____

County Assessor APN No.: _____

Lot No. from Quarter Section Map: _____

Street Address: _____

Type of Acquisition	Symbol	Area of Exist. Parcel		Area to be Acquired		Area Remaining	
		Sq. Ft.	Acres	Sq. Ft.	Acres	Sq. Ft.	Acres
Existing Parcel							
Fee R/W							
Slope Easement							
Drainage Easement							
Temp. Construction Easement							

Computations: (Note if calculations are determined from electronic COP DXF QS Maps using AutoCAD software; otherwise, show calculations below)

Existing Parcel:

Fee R/W:

Slope Easement:

Drainage Easement:

Temp. Construction Easement:

Sketch of Parcel (or provide Mylar exhibit)

Date: _____

Sheet ___ of ___
Revised: 9-26-2005

SAMPLE AREA CALCULATION FORM FOR INDIVIDUAL PARCEL

RIGHT-OF-WAY AREA CALCULATIONS



Project No.: PT00140131

Description: Bus Bay on Thunderbird Road East of 32nd Street

From: _____ To: _____

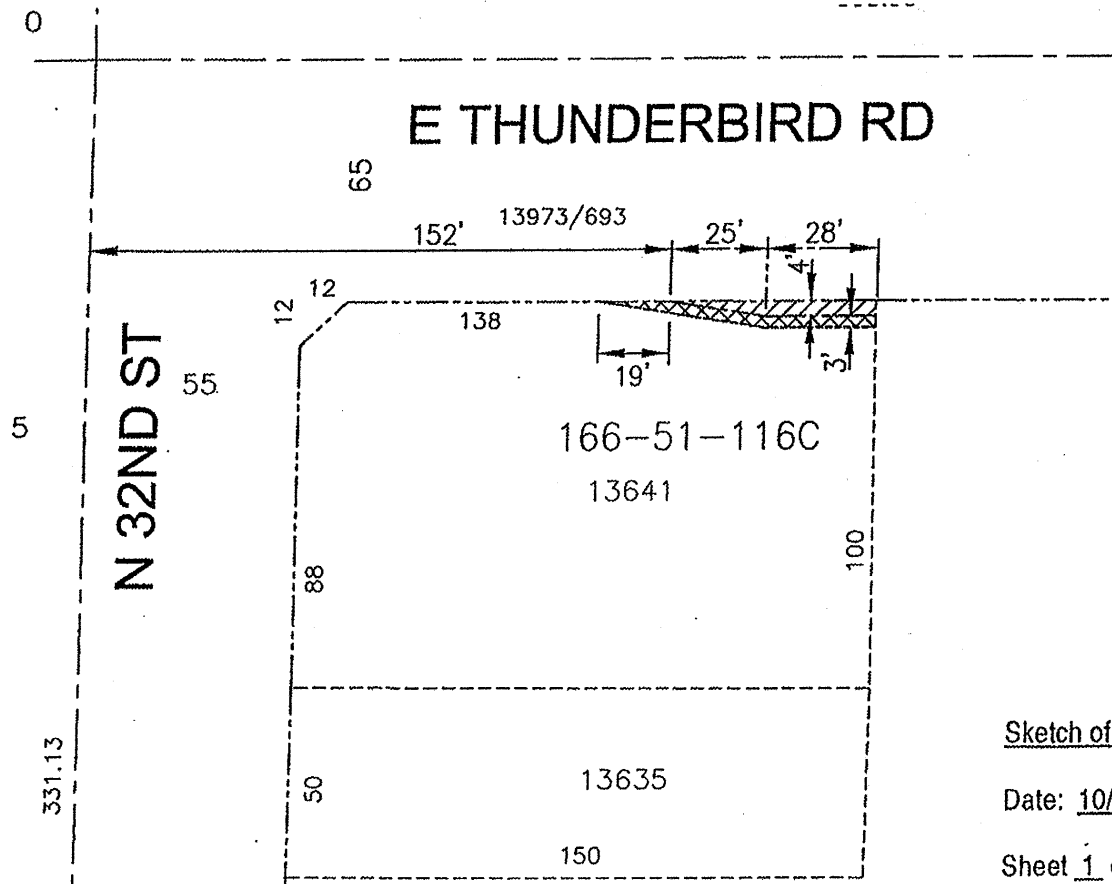
Parcel No.: 166-51-116C

Street Address: 13641 N. 32nd Street.

Type of Acquisition	Symbol	Area of Exist. Parcel		Area to be Acquired		Area Remaining	
		Sq. Ft.	Acres	Sq. Ft.	Acres	Sq. Ft.	Acres
Exist. Parcel *		14929.00	0.3427				
Fee R/W				162.00	0.0037	14767.0	0.3390
Temp. Const. Esmt.				190.00	0.0044		

* Existing Square footage is from the Maricopa County Assessor site property data.

Computations:



Sketch of Parcel

Date: 10/18/07

Sheet 1 of 1

Temporary Right-of-Entry Form

(Sidewalk Construction – Driveway Reconnect)

Project No.: _____

Project Name: _____

Date: _____

Project Location: _____

We, the undersigned, as owners or agents of the above property, do hereby grant the City of Phoenix and its agents permission to temporarily access that portion of our property needed for sidewalk construction, driveway reconnection and property restoration (See attached Exhibit A). This license is temporary and will expire upon completion.

For and in consideration of the access provided, the City of Phoenix agrees to reconnect our driveway to the improved street at the City's sole expense, and to restore our property to as good a condition as it was immediately prior to the construction.

Owner: _____

Agent: _____

Mailing Address: _____

Telephone: _____

Signed: _____

Date: _____

APPENDIX A-5

Subsurface Utility Engineering (SUE) Request/Authorization Form



Subsurface Utility Engineering (SUE) Request/Authorization Form

CITY OF PHOENIX SUE REQUEST / AUTHORIZATION

TO BE COMPLETED BY C.O.P. PROJECT ENGINEER:

(PROJECT ENGINEER IS RESPONSIBLE TO PROVIDE THE BELOW INFORMATION AND ONE SET OF PLANS FOR EACH UTILITY REQUESTED AND TWO SETS FOR THE CONTRACTOR)

PROJECT NO. _____ DATE: _____
 DESCRIPTION: _____

HOLE #	SHEET #	STATION	OFFSET (R/L)	SIZE & TYPE UTILITY

PROJECT ENG. _____ CONSULTANT: _____
 PHONE: _____ PHONE: _____

FOR C.O.P. UTILITY USE ONLY:
 RETURN THIS FORM BY: January 13, 1900

TO:
 CITY OF PHOENIX
 ENGINEERING & ARCHITECTURAL SERVICES DEPARTMENT
 UTILITY COORDINATION
 CITY HALL
 200 W WASHINGTON STREET, 7TH FLOOR
 PHOENIX AZ 85003

ATTN: Greg Nielson PHONE: 602.534.6137 FAX: 602.495.5514

*PROJECT ENGINEER IS RESPONSIBLE TO PROVIDE ABOVE INFORMATION AND ONE SET OF PLANS FOR EACH UTILITY REQUESTED AND TWO SETS FOR THE CONTRACTOR

TO BE COMPLETED BY UTILITY COMPANY

UTILITY CO: _____
 POTHOLE BY CITY CONTRACTOR
 IF NO, GIVE REASON.

YES	NO	REASON

NOTICE TO UTILITY COMPANY
 THIS SECTION MUST BE SIGNED TO BE VALID.
 YOUR AGENCY WILL BE BILLED FOR EACH POTHOLE AT A COST OF \$370 PER HOLE, TIME AND MATERIAL \$165 PER HOUR, OR A PRORATED AMOUNT OF THE TOTAL BASED UPON THE NUMBER OF UTILITY FACILITIES FOUND IN EACH HOLE.

SIGNATURE: _____
 DATE: _____
 PHONE # _____
 PERSON TO CONTACT FOR INSPECTION OF HOLES.
 NAME: _____
 TITLE: _____

APPENDIX A-6

Project Cost Estimate Example



Major Street Paving

Project No. ST85100044

Deer Valley Road: 7th Street to Cave Creek Road

Project Cost Estimate Example

	Item	Description	Unit	Quantity	Unit Price	Total
1	C3000022	Geomembrane, Contingent Item	Sq. Yd.	3,249	20.00	64,980.00
2	C3000025	Geofoam, Contingent Item	Cu. Ft.	67,900	6.00	407,400.00
3	C3000026	Geofoam Concrete Load Distrubution Slab, Contingent Item	Sq. Yd.	4,358	22.00	95,876.00
4	C3456000	Adjusting Frames, Covers, Valve Boxes On Existing Non-City Utilities, Contingent Item	Each	20	650.00	13,000.00
5	E6992000	"Allowance For Stormwater Pollution Prevention Best Management Practices (BMP'S)"	Lump Sum	1	65,000.00	65,000.00
6	M1042005	Allowance for Extra Work	Job	1	800,000.00	800,000.00
7	M1042030	Construct and Maintain Detour Road	Job	1	75,000.00	75,000.00
8	M1042600	Work for A.P.S.	Job	1	300,000.00	300,000.00
9	M1042700	Work for QWEST	Job	1	45,000.00	45,000.00
10	M1042800	Work for Cox	Job	1	90,000.00	90,000.00
11	M2060150	Drilled Shafts 5'-0"	Lin. Ft.	840	550.00	462,000.00
12	M2060155	Drilled Shafts, 5'-6"	Lin. Ft.	530	650.00	344,500.00
13	M2112000	Fill Construction	Job	1	600,000.00	600,000.00
14	M3010001	Subgrade Preparation	Sq. Yd.	100,521	1.25	125,651.25
15	M3210100	Asphalt Concrete Surface Course, Type D 1/2 For Driveway, Sidewalk and Parking Lot Connections	Ton	757	85.00	64,345.00
16	M3210115	Asphalt Concrete Surface Course,	Ton	8,492	70.00	594,440.00
17	M3210360	Asphalt Concrete Base Course, Type A 1-1/2, 6" Thick	Ton	33,934	70.00	2,375,380.00
18	M3241100	Concrete Approach Slab	Sq. Ft.	9,218	22.00	202,796.00
19	M3290100	Emulsified Asphalt For Tack Coat,	Ton	85	475.00	40,375.00
20	M3304100	Power Broom	Hour	100	200.00	20,000.00
21	M3400000	Concrete Median Nose	Sq. Ft.	204	15.00	3,060.00
22	M3400400	Concrete Sidewalk, Std. Detail P-1230	Sq. Ft.	105,625	5.00	528,125.00
23	M3400409	Concrete Sidewalk, Std. Detail P-1230,	Sq. Ft.	5,271	10.00	52,710.00
24	M3400543	Concrete Driveway Entrance, Std. Detail P-1243	Sq. Ft.	3,177	10.00	31,770.00
25	M3400555	Concrete Driveway Entrance,	Sq. Ft.	7,663	10.00	76,630.00
26	M3400556	Concrete Driveway Entrance,	Sq. Ft.	2,930	10.00	29,300.00
27	M3402201	Combined Concrete Curb and Gutter, Std. Detail 220, Type "A", H=6"	Lin. Ft.	27,040	18.00	486,720.00
28	M3402221	Concrete Single Curb, Std. Detail 222, Type "A"	Lin. Ft.	7,231	18.00	130,158.00
29	M3420000	Decorative Pavement Per Detail	Sq. Ft.	2,495	9.00	22,455.00
30	M3420500	Decorative Pavement For Flush Median, Special Detail	Sq. Ft.	1,293	12.00	15,516.00
31	M3450020	Adjust Existing Manhole Frame and Cover, Standard Detail 422	Each	16	400.00	6,400.00
32	M3453001	Adjust Existing Type "A" Water Valve, Standard Detail P-1391 and P-1391-1	Each	40	350.00	14,000.00
33	M3453015	Adjust Existing Fire Hydrants	Each	3	2,000.00	6,000.00
34	M3500010	Remove Portland Cement Concrete Single Curb; Curb and Gutter; Header Curb and Embankment Curb	Lin. Ft.	1,378	6.00	8,268.00
35	M3500020	Remove Portland Cement Concrete Sidewalk, Driveway, Valley Gutter & Slab	Sq. Ft.	2,595	3.00	7,785.00

36	M3500030	Remove Structures, Backfill & Compact (Includes Handrail)	Job	1	12,000.00	12,000.00
37	M3500033	Remove Existing Bridge as Detailed on Plans	Job	1	225,000.00	225,000.00
38	M3500040	Remove Pipe, Backfill & Compact	Lin. Ft.	250	55.00	13,750.00
39	M3500060	Remove Asphalt Concrete Pavement	Sq. Yd.	8,289	1.40	11,604.60
40	M3500150	Remove Tree, 12" Diam. and Larger	Each	18	3,000.00	54,000.00
41	M3500300	Miscellaneous Removal and Other Work	Job	1	712,000.00	712,000.00
42	M3513120	2" PVC Conduit For Traffic Signal	Lin. Ft.	340	14.00	4,760.00
43	M3513125	2-1/2" PVC Conduit For Traffic Signal	Lin. Ft.	1,300	17.00	22,100.00
44	M3513235	No. 3-1/2 Junction Box	Each	4	200.00	800.00
45	M3513250	No. 5 Junction Box	Each	5	300.00	1,500.00
46	M3513270	No. 7 Junction Box	Each	1	400.00	400.00
47	M3513500	Type A Signal Pole Foundation	Each	6	1,500.00	9,000.00
48	M3513503	Controller Foundation	Each	1	3,500.00	3,500.00
49	M3513505	PSP Foundation (APS Service Pedestal)	Each	1	3,500.00	3,500.00
50	M3513520	Special Type SM Signal Pole, Foundation, Cage, Bolts, Nuts, 20-Ft. Mast Arm, 8-Ft. Luminaire, COP Dwg. 7690.	Each	1	7,400.00	7,400.00
51	M3513525	Special Type SM Signal Pole, Foundation, Cage, Bolts, Nuts, 25-Ft. Mast Arm, 8-Ft. Luminaire, COP Dwg. 7690	Each	1	7,600.00	7,600.00
52	M3513546	Special Type SR Signal Pole, Foundation, Cage, Bolts, Nuts, 45-Ft Mast Arm, 8-Ft Luminaire, COP Dwg. 7690	Each	2	10,000.00	20,000.00
53	M3600355	Furnish and Install Fiber Optic System	Job	1	30,000.00	30,000.00
54	M4005150	Decorative Steel Fence, Height= 4'-6"	Lin. Ft.	343	165.00	56,595.00
55	M4005157	Decorative Steel Fence, Height = 7'- 0"	Lin. Ft.	448	230.00	103,040.00
56	M4012000	Traffic Control Devices	Job	1	480,000.00	480,000.00
57	M4013000	Allowance for Uniformed, Off-duty Law Enforcement Officer	Job	1	220,000.00	220,000.00
58	M4051201	Survey Marker, MAG Standard Det. 120-1, Type "A"	Each	1	350.00	350.00
59	M4051202	Survey Marker, MAG Standard Det. 120-1, Type "B"	Each	10	150.00	1,500.00
60	M4200038	Chain Link Fence, ADOT Detail C-12.10, Type 2, H=8'0"	Lin. Ft.	819	12.00	9,828.00
61	M4303000	Plant Establishment Guarantee and Maintenance (including water and power)	Month	6	1,400.00	8,400.00
62	M4304003	Decomposed Granite, 1/4" Minus For Multi-Purpose Trails	Cu. Yd.	54	100.00	5,400.00
63	M4304010	Decomposed Granite, 1/2" Minus For General Landscape	Cu. Yd.	1,485	90.00	133,650.00
64	M4305001	1 Gallon Shrub	Each	3,441	7.00	24,087.00
65	M4305005	5 Gallon Shrub	Each	766	15.00	11,490.00
66	M4305024	24" Box, Trees	Each	362	175.00	63,350.00
67	M4305900	Saguaro	Each	32	425.00	13,600.00
68	M4305901	Ocotillo	Each	78	60.00	4,680.00
69	M4307010	Hydroseed, Type B, Non-Woody Plant Material	Sq. Ft.	572,351	0.08	45,788.08
70	M4309800	Cacti, Transplant	Each	6	42.00	252.00
71	M4309820	Saguaro, Tranplanting	Each	2	2,000.00	4,000.00
72	M4400050	1/2", Class 315 PVC Irrigation Pipe	Lin. Ft.	13,725	1.75	24,018.75
73	M4400075	3/4", Class 200 PVC Irrigation Pipe	Lin. Ft.	36,230	1.80	65,214.00
74	M4400262	2" PVC Irrigation Pipe, Sch. 40	Lin. Ft.	4,945	3.50	17,307.50
75	M4400270	1 1/2", PVC Irrigation Pipe, Schedule 40	Lin. Ft.	1,136	2.75	3,124.00
76	M4400272	1 1/4" PVC Irrigation Pipe, Schedule 40	Lin. Ft.	2,770	2.75	7,617.50

77	M4400280	2 1/2" PVC Irrigation Pipe, Schedule 40	Lin. Ft.	690	9.00	6,210.00
78	M4403100	1" Reduced Pressure Backflow Prevention Unit and Cage	Each	4	1,800.00	7,200.00
79	M4404100	1" Electric Remote Control Valve And Assembly	Each	18	175.00	3,150.00
80	M4404199	1" Electric Remote Control Valve And Emitter Control Assembly Per Detail	Each	28	275.00	7,700.00
81	M4404500	Bubbler And Riser Assembly	Each	364	10.00	3,640.00
82	M4404501	Emitters And Risers Assembly	Each	2,706	10.00	27,060.00
83	M4405800	8" Schedule 40 PVC Irrigation Sleeve	Lin. Ft.	1,356	18.00	24,408.00
84	M4406012	Calsense ET2000 (12 Station) CR-RR-SSE-R Sprinkler Controller with Surge Protection and Security Cabinet	Each	2	14,000.00	28,000.00
85	M4406016	Calsense ET2000 (16 Station) -CR-RR-SSE-R Sprinkler Controller with Surge Protection and Security Cabinet	Each	1	14,500.00	14,500.00
86	M4406024	Calsense ET2000 (24 Station) CR-RR-SSE-R Sprinkler Controller with Surge Protection and Security Cabinet	Each	1	15,000.00	15,000.00
87	M4406906	1" Master Valve and Flow Sensor Assembly	Each	4	2,500.00	10,000.00
88	M5050004	Concrete Barrier Transition Tangent Departure, Type 2, ADOT Detail C-10.75	Each	4	3,500.00	14,000.00
89	M5050009	Concrete Bridge Barrier	Lin. Ft.	772	105.00	81,060.00
90	M5050017	Concrete Retaining Wall, Per Plans	Sq. Ft.	1,399	100.00	139,900.00
91	M5050021	Concrete Barrier Per Special Detail	Lin. Ft.	599	100.00	59,900.00
92	M5050105	TRACC Energy Absorbing End Treatment	Each	4	14,000.00	56,000.00
93	M5051035	Concrete Class "S", fc=3500 psi	Cu. Yd.	1,515	500.00	757,500.00
94	M5051040	Concrete Class "S", fc= 4000 psi	Cu. Yd.	68	450.00	30,600.00
95	M5051045	Concrete Class "S", fc= 4500 psi	Cu. Yd.	1,792	500.00	896,000.00
96	M5055000	Steel Reinforcement	Lb.	543,020	0.60	325,812.00
97	M5056200	Bridge Deck Joint Assemblies	Lin. Ft.	556	110.00	61,160.00
98	M5059500	Elastomeric Bearing Pads per Plans	Each	66	600.00	39,600.00
99	M5061001	Precast Concrete Girders	Lin. Ft.	4,506	210.00	946,260.00
100	M5200105	Concrete Barrier Handrail	Lin. Ft.	772	120.00	92,640.00
101	M5200125	Steel Railing Per Detail	Lin. Ft.	72	120.00	8,640.00
102	M5200150	Steel Bollards per Plans	Each	3	400.00	1,200.00
103	M6014900	Trenching For Street Light Circuit	Lin. Ft.	20,856	14.00	291,984.00
104	M6014922	Install Duct Bank	Lin. Ft.	1,080	33.00	35,640.00
105	M6101801	Relocate Existing Water Meter, Box, and Cover	Each	13	500.00	6,500.00
106	M6101810	3/4" or 1" Water Meter Service Connect. Pipe and Fittings, Main to Meter, Furnish & Install	Lin. Ft.	789	25.00	19,725.00
107	M6104012	12" Ductile Iron Water Pipe & Fittings, Restrained, Furnish & Install	L. F.	409	150.00	61,350.00
108	M6108010	Relocate Fire Hydrant	Each	13	4,000.00	52,000.00
109	M6108015	Relocate Water Valve	Each	7	2,700.00	18,900.00
110	M6108052	Relocate Valve Assembly, Phx. Supp. Detail P-1352	Each	1	5,500.00	5,500.00
111	M6303012	12" Valve, Box and Cover, Furnish & Install	Each	2	2,700.00	5,400.00
PROJECT TOTAL:						\$14,800,985

Project No. ST83110041
STORM
DRAIN

Item	Description	Unit	Quantity	Unit Price	Total
112	M1042005 Allowance for Extra Work	Job	1	250,000.00	250,000.00
113	M2001005 Earthwork for Basin,includes clearing and grubbing of the site, excavation, grading and shaping	Cu. Yd.	18,402	5.00	92,010.00
114	M2150100 Grader Ditch, Depth Per Plans	Lin. Ft.	1,555	4.00	6,220.00
115	M2150110 Grade Drainage Swale	Lin. Ft.	2,005	4.00	8,020.00
116	M2200007 Rip-Rap, D50=6"	Cu. Yd.	24	150.00	3,600.00
117	M2200012 Rip Rap, D50= 12"	Cu. Yd.	202	170.00	34,340.00
118	M2200024 Rip-Rap, D50=24"	Cu. Yd.	34	160.00	5,440.00
119	M2200036 Rip Rap, D50=36"	Cu. Yd.	1,070	90.00	96,300.00
120	M2205067 Gabion Mattress	Sq. Yd.	96	100.00	9,600.00
121	M3100000 Aggregate Base Course	Ton	339	42.00	14,238.00
122	M3360130 Asphalt Concrete For Permanent Pavement Replacement, Type D 1/2, 3" Thick	Sq. Yd.	153	30.00	4,590.00
123	M3500150 Remove Tree, 12" Diam. and Larger	Each	13	3,300.00	42,900.00
124	M4200011 Swing Gate Per Plans	Each	5	4,500.00	22,500.00
125	M4304005 Decomposed Granite, Stabilized, for Slopes	Cu. Yd.	793	75.00	59,475.00
126	M4405404 4" Schedule 40 PVC Pipe	Lin. Ft.	80	75.00	6,000.00
127	M5050002 Concrete Drop Structure Per Plans	Each	2	150,000.00	300,000.00
128	M5050700 Soil-Cement Bank Protection	Cu. Yd.	8,115	80.00	649,200.00
129	M5051530 Concrete Catch Basin, Type "M-1, L=3-Ft" Phx. Supp. Detail P-1569-1	Each	8	3,000.00	24,000.00
130	M5051531 Concrete Catch Basin, Modified, Type "M-1, L=3-Ft", Phx. Supp. Detail P-1569-2	Each	8	3,000.00	24,000.00
131	M5051535 Concrete Catch Basin, Type "M-1, L=6-Ft" Phx. Supp. Detail P-1569-1	Each	2	3,700.00	7,400.00
132	M5051536 Concrete Catch Basin, Modified, Type "M-1, L=6-Ft", Phx. Supp. Detail P-1569-2	Each	16	3,700.00	59,200.00
133	M5051540 Concrete Catch Basin, Type "M-1, L=10-Ft", Phx. Supp. Detail P-1569-1	Each	4	4,000.00	16,000.00
134	M5051541 Concrete Catch Basin, Modified, Type "M-1, L=10-Ft", Phx. Supp. Detail P-1569-2	Each	10	4,000.00	40,000.00
135	M5051545 Concrete Catch Basin, Type "M-1, L=17-Ft", Phx. Supp. Detail P-1569-1	Each	1	5,000.00	5,000.00
136	M5051546 Concrete Catch Basin, Type "M-1, L=17-Ft", Phx. Supp. Detail P-1569-2	Each	1	5,000.00	5,000.00
137	M5051560 Concrete Catch Basin, Type "M-2, L=17-Ft", Phx. Supp. Detail P-1569-1	Each	1	8,000.00	8,000.00
138	M5051565 Concrete Catch Basin, Type "N, Single", Phx. Supp. Detail P-1570	Each	15	2,500.00	37,500.00
139	M5051645 Concrete Catch Basin, ADOT Detail C-15.92, Double	Each	1	3,000.00	3,000.00
140	M5052070 Concrete Spillway with Rip-Rap Basins	Each	7	3,500.00	24,500.00
141	M5055021 Concrete End Sections, MAG Standard Detail 545	Each	1	1,500.00	1,500.00
142	M5055022 Headwall for 36" Pipe, MAG Standard Detail 501-3, Modified	Each	1	6,000.00	6,000.00
143	M5057096 Concrete Inlet Wings, ADOT Std. Detail B-04.30, Modified	Cu. Yd.	26	825.00	21,450.00
144	M5057097 Concrete Outlet Wings, ADOT Std. Detail B-04.10, Modified	Cu. Yd.	38	900.00	34,200.00
145	M5057120 Single Barrel 4' X 6' Reinforced Box Culvert,	Lin. Ft.	337	800.00	269,600.00

146	M5155505	Access Barrier, C.O.P. Supplement to MAG, P-1562,P-1563	Each	1	2,000.00	2,000.00
147	M6103710	Waterline Realignment, 10" and 12", Contingent Item	Each	4	13,000.00	52,000.00
148	M6180018	18" Storm Sewer Pipe	Lin. Ft.	1,123	100.00	112,300.00
149	M6180024	24" Storm Sewer Pipe	Lin. Ft.	165	130.00	21,450.00
150	M6180030	30" Storm Sewer Pipe	Lin. Ft.	186	135.00	25,110.00
151	M6180036	36" Storm Sewer Pipe	Lin. Ft.	767	140.00	107,380.00
152	M6180042	42" Storm Sewer Pipe	Lin. Ft.	880	100.00	88,000.00
153	M6180054	54" Storm Sewer Pipe	Lin. Ft.	1,415	140.00	198,100.00
154	M6180060	60" Storm Sewer Pipe	Lin. Ft.	3,187	160.00	509,920.00
155	M6181015	15" Catch Basin Connector Pipe	Lin. Ft.	2,191	145.00	317,695.00
156	M6181018	18" Catch Basin Connector Pipe	Lin. Ft.	212	190.00	40,280.00
157	M6181024	24" Catch Basin Connector Pipe	Lin. Ft.	227	150.00	34,050.00
158	M6186004	18" X 18" X 15" Prefabricated Tee	Each	8	2,000.00	16,000.00
159	M6186008	24" X 24" X 15" Prefabricated Tee	Each	1	2,000.00	2,000.00
160	M6186028	36" X 36" X 15" Prefabricated Tee	Each	3	2,000.00	6,000.00
161	M6186040	42" X 42" X 15" Prefabricated Tee	Each	3	3,400.00	10,200.00
162	M6186043	54" X 54" X 15" Prefabricated Tee	Each	5	3,400.00	17,000.00
163	M6186044	60" X 60" X 15" Prefabricated Tee	Each	8	3,400.00	27,200.00
164	M6186045	60" X 60" X 18" Prefabricated Tee	Each	2	3,400.00	6,800.00
165	M6186091	42" X 42" X 18" Prefabricated Tee	Each	1	3,400.00	3,400.00
166	M6186100	42" X 42" X 24" Prefabricated Tee	Each	1	3,400.00	3,400.00
167	M6186154	54" X 54" X 18" Prefabricated Tee	Each	1	3,400.00	3,400.00
168	M6186200	54" X 54" X 24" Prefabricated Tee	Each	4	3,400.00	13,600.00
169	M6210012	12" C.M.P.	Lin. Ft.	26	125.00	3,250.00
170	M6250005	Storm Sewer Manhole, MAG Standard Detail 522, COP Supp. Std. Detail P-1520	Each	16	5,500.00	88,000.00
171	M6250015	Storm Sewer Manhole Base Transition, Phoenix Supp. Detail P-1560 and MAG Std. Detail 522	Each	13	5,000.00	65,000.00
172	M6259000	Dry Well per Detail	Each	10	4,000.00	40,000.00

PROJECT TOTAL: \$4,004,318

**Project No. WS85500049
WATER MAIN RELOCATION-CITYWIDE**

	Item	Description	Unit	Quantity	Unit Price	Total
173	C6100122	1-1/2" and 2" Water Service Replacement Per Special Provisions, Contingency Item	Lin. Ft.	100	55.00	5,500.00
174	C6100341	3/4" and 1" Water Service Replacement Per Special Provisions, Contingent Item	Lin. Ft.	200	35.00	7,000.00
175	C6101803	Replacement Water Meter Box & Cover, Furnish, Contingent Item	Each	10	600.00	6,000.00
176	M6309065	Debris Cap, Including Locator Coil, Install	Each	60	600.00	36,000.00
177	M6309066	Debris Cap, Including Locator Coil, Non-Paved Areas, Install	Each	20	600.00	12,000.00

PROJECT TOTAL: \$66,500

GRAND TOTAL:

\$18,871,803