



QUALITY CONTROL PLAN

For

KE&G CONSTRUCTION INC.

CONSTRUCTION MANAGER AT RISK (CMAR) SERVICES

22nd STREET SEWER AUGMENTATION

PROJECT NO. 322A55

PIMA COUNTY

REGIONAL WASTEWATER RECLAMATION DEPARTMENT

Respectfully Submitted:

David P. Hayes, PE
Executive Vice President
Tucson Branch Manager



Expires 3/31/18



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1. PROJECT INFORMATION

This Quality Control Plan (QCP) was developed and prepared in accordance with those typically provided to Pima County, when required. KE&G Construction, Inc. is the Construction Manager at Risk for the project and will be enforcing the QCP requirements.

The project is located in the City of Tucson, Pima County. Approximately 2 miles of wastewater lines including the evaluation and repair/replacement of approximately thirty-five (35) manholes will be augmented. The specific area is along 22nd Street, from Alvernon Way downstream end to Craycroft Road, the upstream end. Starting at manhole 5831-04 and ending at MH 8651-16. The sewer line is 10 inches in diameter vitrified clay pipe (VCP) between Alvernon Way and Swan Road and 8 inches in diameter VCP between Swan Road and Craycroft Road. This project will be designed in two packages. The first package will cover Alvernon Way to Swan Road, while the second package will cover Swan Road to Craycroft Road. The first package will be constructed under this project with the second package as an alternative based on final estimate and funding availability.

Quality Control sampling and testing services on this project will be performed for the following materials:

- a. Pipe Bedding
- b. Pipe Shading
- c. Pipe Backfill
- d. Trench ABC
- e. Trench AC

The KE&G Project Superintendent will be responsible for any corrective action required for unacceptable test results. Quality Control personnel (ATL), will not be responsible for directing the efforts of the contractor, subcontractor or supplier personnel, but will present recommendations to the prime contractor for their action.

ATL participates in programs of inspection and quality control instituted by the Arizona Department of Transportation (ADOT), Cement and Concrete Reference Laboratory (CCRL), and AASHTO Material



Reference Laboratory (AMRL). ATL is certified by AASHTO through the AMRL R18 program. ATL's current tests certifications may be found at <http://amrl.net> in the Accreditations@ section under AMRL R18.



2. QUALITY CONTROL ORGANIZATION

A. Personnel

ATL will provide ATTI qualified personnel on this project as required by the City of Tucson Standard Specifications, 2003 Edition. Mr. S. Ty Brackeen will be assigned as the ATL Quality Control Supervisor on this project, with additional qualified technicians to be assigned as required. The following personnel are anticipated for assignment on this project: All individuals listed below have completed a nuclear gage safety course and have a certification attesting to such in their files.

ASSIGNMENT	INDIVIDUAL	QUALIFICATIONS
Quality Control Supervisor	Nick Moore	ATTI Field Certified ATTI Asphalt Certified ACI Certified
Laboratory Supervisor	George Roat	ATTI Asphalt Certified ATTI Soils & Aggregate Certified ATTI Field Certified ACI Certified
Technicians	Elaine Friedl Paul Stephenson	ATTI Field Certified ACI Certified

B. Laboratory

ATL's Tucson laboratory is AMRL/CCRL/ADOT certified, and in addition, participates in the proficiency sample programs of each agency and conforms to the requirements of ASTM D3666.



C. Reporting

It will be the responsibility of ATL testing personnel to sample and test these materials in accordance with, and at the frequencies called for in the project specifications. Copies of field tests will be submitted to KE&G Construction Co, Inc. the day of the test. A weekly summary with edited test results will be provided to KE&G Construction Co, Inc. The weekly reports shall state the types of work, such as earthwork, asphaltic concrete, etc, which have been performed during the report period and shall also include the process control measures to assure quality. The report shall also provide sample identification information for materials tested during the report period.

The report period shall end at midnight of each Friday, and the report shall be submitted to the Owner prior to the weekly progress meeting.

D. Emergency Telephone Numbers

One of the following individuals should be contacted in case of an emergency.

	<u>Cell</u>	<u>Home</u>
Nick Moore	(520) 975-8468	(520) 466-3167
David P. Hayes	(520) 444-1971	(520) 744-0649

-- End of Section --



3. TESTING FREQUENCY

As part of the Quality Control Program, testing frequency must be included in order to insure testing results indicate the general effort by the Contractor. This Section includes the tests and their minimum test frequencies typically specified by the Pima County RWRD. The Contractor can always increase the frequency or add tests to provide additional information if needed.

Random sampling/testing will be conducted in accordance with ADOT requirements. Since ATLS Tucson laboratory is within 20 miles of the sample project site, no field laboratory has been proposed. The testing frequency shown in Table 1 is proposed for this project:

- Table 1 -

Type of Test	Test Method	Sampling Point	Minimum Testing Frequency
Option A - Trench Backfill			
Gradation	ARIZ 201	Stockpile	1 per Source
Plastic Index	AASHTO T89, 90	Stockpile	1 per Source
Proctor Density/ Optimum Moisture	ARIZ 225 ARIZ 245 ARIZ 226	Stockpile	1 per Source or material change
Field Compaction/ Moisture	ARIZ 227 ARIZ 232 ARIZ 230 ARIZ 235 ARIZ 231 ARIZ 246	In-Place	1 per 2 feet of vertical height of trench backfill between manholes
Option A -- Manhole Base			
Proctor Density/ Optimum Moisture	ARIZ 225 ARIZ 245 ARIZ 226	In-Place	1 at center of base
Option A -- Manhole Structure			
Field Compaction/ Moisture	ARIZ 227 ARIZ 232 ARIZ 230 ARIZ 235 ARIZ 231 ARIZ 246	In-Place	1 per 2 ft. lift, rotating at 120 degree intervals



Type of Test	Test Method	Sampling Point	Minimum Testing Frequency
Section 203 - Structural Backfill			
Gradation	ARIZ 201	Stockpile	1 per 500 CY per Source
Plastic Index	AASHTO T89, 90	Stockpile	1 per 500 CY per Source
Proctor Density/ Optimum Moisture	ARIZ 225 ARIZ 226 ARIZ 245	Stockpile	1 per Source
Field Compaction/ Moisture	ARIZ 227 ARIZ 230 ARIZ 231 ARIZ 232 ARIZ 235 ARIZ 246	In-Place	1 per 200 CY, minimum one per lift
Section 203 - Subgrade			
Gradation	ARIZ 201	Roadway	1 per Soil Type
Plastic Index	AASHTO T89, 90	Roadway	1 per Soil Type
Proctor Density/ Optimum Moisture	ARIZ 225 ARIZ 226 ARIZ 245	Roadway	1 per Soil Type
Field Compaction/ Moisture	ARIZ 227 ARIZ 230 ARIZ 231 ARIZ 232 ARIZ 235 ARIZ 246	Roadway	1 per Soil Type
Section 203 - Embankment			
Proctor Density/ Optimum Moisture	ARIZ 225 ARIZ 226 ARIZ 245	In-Place	1 per Soil Type

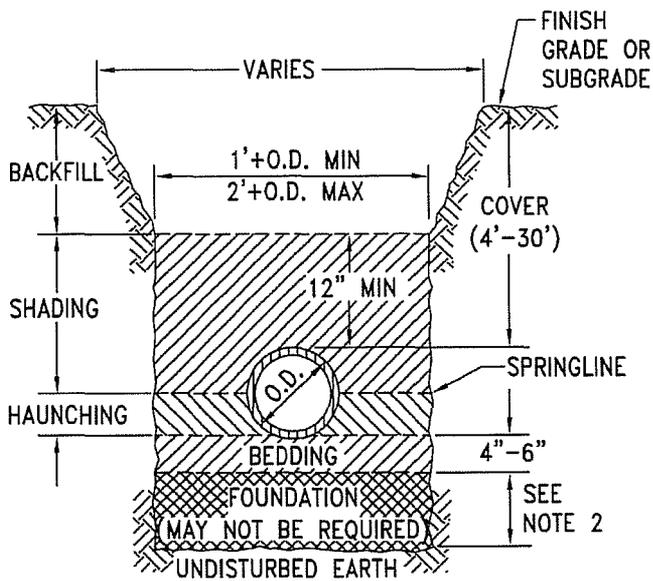


Section 203 - Borrow within Three Feet of Finished Subgrade Elevation			
Gradation	ARIZ 201	In-Place	1 per 2,000 CY
PI	AASHTO T89, T90	In-Place	1 per 2,000 CY
Section 303 - Aggregate Base			
Fractured Coarse Aggregate Particles	ARIZ 212	Crusher Belt or Stockpile	1 per 1,200 CY
Gradation	ARIZ 201	Crusher Belt or Stockpile	1 per 600 CY
PI	AASHTO T89, T90	Crusher Belt or Stockpile	1 per 600 CY
Proctor Density/ Optimum Moisture	ARIZ 225 ARIZ 226 ARIZ 245	Crusher Belt or Stockpile	1 per Source and as needed
Field Density/ Moisture	ARIZ 227 ARIZ 230 ARIZ 232 ARIZ 235 ARIZ 246	Roadway	1 per 600 CY
Section 406 --Asphaltic Concrete			
Voids	ARIZ 415 ARIZ 417 ARIZ 424	Roadway or Plant	1 per 500 tons of AC produced
Bitumen Content	ARIZ 421 ARIZ 427	Roadway or Plant	1 per 500 tons of each AC mix produced
Gradation	ARIZ 201 ARIZ 427	Cold Feed or Plant	1 per 500 tons
Compaction	ARIZ 412 ARIZ 104, Sec 3 ARIZ 410a	Roadway	1 per 300 tons of AC produced, Minimum of one per shift

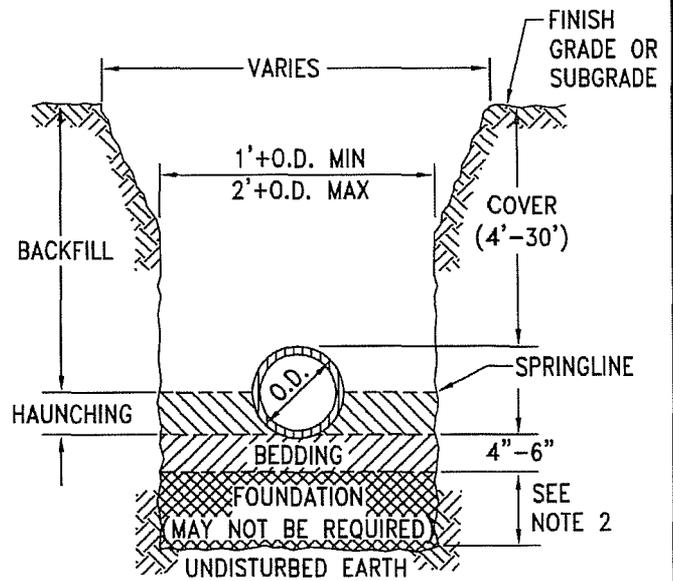
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APPENDIX C

Standard RWRD Specifications and Standard Detail 104



**FLEXIBLE PIPE
TRENCH DETAIL**
N.T.S.



**RIGID PIPE
TRENCH DETAIL**
N.T.S.

TABLE 1: APPROVED TRENCH MATERIALS AND GRADATION REQUIREMENTS

CRUSHED STONE (FOUNDATION, BEDDING, HAUNCHING & SHADING)		SAND (BEDDING, HAUNCHING & SHADING)		EXCAVATED NATIVE MATERIAL (BACKFILL)		SELECT IMPORT MATERIAL (BACKFILL & FOUNDATION)	
NOM. SIZE	% PASSING	NOM. SIZE	% PASSING	NOM. SIZE	% PASSING	NOM. SIZE	% PASSING
1"	100	1"	100	6"	100	3"	100
3/4"	90-100	#4	60-100	ALSO SEE SUBSECTION 3.1.2(C)		3/4"	60-100
3/8"	20-55	#200	0-10			#8	35-80
#4	0-10	MAX. P.I.=5				SUM OF #200 + P.I. ≤ 25	
#8	0-5	MAX. L.L.=30				ALSO SEE SUBSECTION 3.1.2(D)	
6.0 ≤ pH ≤ 12.0		6.0 ≤ pH ≤ 12.0					
MIN. RESISTIVITY = IN-PLACE MATERIAL OR 2,000 ohm-cm		MIN. RESISTIVITY = IN-PLACE MATERIAL OR 2,000 ohm-cm					
ALSO SEE SUBSECTION 3.1.2(A)		ALSO SEE SUBSECTION 3.1.2(B)					

NOTES:

- FOR SEWER LINES GREATER THAN 16 INCH DIAMETER OR COVER DEPTHS NOT CONFORMING TO THE STANDARD TRENCH DETAILS, SEE PLANS FOR MODIFIED TRENCH DETAILS.
- FOUNDATION IS REQUIRED FOR OVEREXCAVATION SUCH AS FOR ROCK OR UNSUITABLE MATERIALS. SEE SUBSECTION 3.1.3(B) FOR MORE INFORMATION.
- IN CASES WHERE GROUNDWATER IS ENCOUNTERED, INSTALLATION OF AN APPROVED GEOTEXTILE FABRIC ENCLOSING CRUSHED STONE SHALL BE REQUIRED FOR STABILIZATION.

ISSUED:	STANDARD DETAIL TYPICAL TRENCH FOR GRAVITY SEWER LINES		DETAIL NO.
8/92			RWRD 104
REVISED:			SHEET 1 OF 1
12/12			

E. Backfill

Prior to placement of backfill material, all trash, forms, sheeting, bracing, loose rock or loose earth shall be removed from the trench.

Backfill material shall be compacted in lifts to attain a minimum of 95% standard proctor, in accordance with the requirements of the applicable test methods of the *ADOT Materials Testing Manual*, as directed and Approved by the Field Engineer, unless otherwise noted in the Sewer Plans. Backfill material and compaction shall also conform to the requirements of the Agency having jurisdiction of the Right-of-Way in which Public Sewers are being installed.

Compaction through water settling or jetting is not permitted. Backfill shall not be wheel loaded until 3 feet of cover is provided over the top of the pipe.

Failure of backfill compaction test results will result in rejection of that portion of the pipe installation. Replacement of trench materials and pipe will be at the Contractor's expense.

F. Backfill Density Testing Procedures

Additional density testing procedures for the compaction of backfill shall be provided for sewer construction projects meeting any of the following criteria:

- A cumulative total of 500 LF or more of new Public Sewer lines;
- The depth of either trench excavation or cover is greater than 20 feet;
- The geotechnical report, soil borings or historical records indicate a potential for the presence of groundwater; or
- The Department deems that site soil conditions warrant a geotechnical oversight (e.g. difficult to process soil type).

Density testing services shall be provided by a Geotechnical Engineer. Contact information for the Geotechnical Engineer and the field technicians working under his direction, shall be provided to the Field Engineer at the pre-construction meeting.

The Contractor shall continuously review density test results during backfill activities. Successive lifts of backfill shall not be placed until density test results show conformance to compaction requirements. Failure by the Contractor to adhere to these requirements will result in suspension of inspection by the Department and cancellation of the construction permit.

It is option of the Contractor to select either Procedure A or Procedure B for the density testing of backfill. Each procedure is described in the following Subsections.

i. Procedure A

The Geotechnical Engineer shall prepare and seal a *Geotechnical Quality Control Plan* (GQCP). The GQCP shall include the following:

- Project information;
- Quality Control Organization;
- Resumes;
- AASHTO Laboratory Certificate; and
- Control Procedures (i.e. moisture and density per lift).

The GQCP shall specify the minimum frequencies of random density and moisture tests to be performed for the Project and shall meet the minimum testing requirements of Subsection 3.1.3(F). It shall be submitted to the Field Engineering section for conformance review. A written notice to proceed will be issued by the Field Engineering section when the GQCP is Approved.

The applicable density test method will be dictated by the variability of backfill material to ensure proper compaction values are recorded.

The Contractor and the Geotechnical Engineer shall be equally responsible for ensuring proper backfill compaction is accomplished. Daily density testing results shall be made available upon request to the Contractor and the Field Engineer. Density test results shall meet or exceed minimum compaction requirements and shall be submitted to the Field Engineer on a weekly basis.

Density testing procedures shall conform to the following requirements:

- (1) Perform random density and moisture tests in accordance with the GQCP (additional tests may be performed at any given location at the discretion of the Geotechnical Engineer).
- (2) Perform a visual inspection of the trench bottom and check for unsuitable materials. If unsuitable material is encountered, it shall be over-excavated and replaced as directed by the Geotechnical Engineer.
- (3) Trench Backfill:
 - Density testing of trench backfill shall commence at approximately 2 feet above top of sewer pipe and continue to the base of the roadway structural section, or to the base of the stabilized surface, as applicable; and
 - For each sewer reach installed, a minimum of one density test shall be taken at every vertical 2 feet of backfill between manholes, or one every 300 feet, whichever is shorter. The field technician shall conduct backfill density tests randomly, both horizontal and vertical, in accordance with the GQCP. These tests shall provide a representation of the compacted effort throughout the sewer reach length.

- (4) Perform a visual inspection of each manhole base and check for unsuitable materials. If unsuitable material is encountered, it shall be over-excavated and replaced as directed by the Geotechnical Engineer. Where over-excavation and replacement under a proposed structure base is required, a minimum of one density test shall be taken at the approximate center of the proposed structure, or as directed by the Geotechnical Engineer.
- (5) Density testing for backfill around manholes shall consist of one test per lift, and rotating with successive 2-foot increments at 120 degree intervals. Density testing of backfill around formed structures shall require one test per lift, alternating sides with successive 2-foot increments as instructed by the Geotechnical Engineer and in accordance with the GQCP. Density tests will be taken as close as possible to the structure to determine the representative compaction density, but not so close as to interfere with the functioning of the testing equipment.

Upon completion of sewer construction and prior to issuance of the ECC, the Geotechnical Engineer shall provide the Field Engineer with a *Final Compaction Report* (FCR) for review and approval. The FCR shall be certified with a cover letter and include all test data (i.e. re-tests, calibration tests, and test methods) and a map showing testing locations, referenced by station, depth below grade and percent compaction achieved. The Geotechnical Engineer shall also include a statement confirming that the FCR meets the original requirements of the GQCP.

Under the provisions of the compaction testing requirements herein, geotechnical oversight by the Geotechnical Engineer shall be taken to include review of the Sewer Plans, development of the GQCP and the FCR, supervision of and coordination with the field technician(s) performing compaction testing, and review of test results for compliance.

ii. Procedure B

The Geotechnical Engineer shall provide a full-time field technician, working under his/her direction, for observation and collection of the density testing results for sewer construction.

Density testing results meeting or exceeding minimum approved Project requirements shall be demonstrated through a *Daily Observation and Testing Report* (DOTR) prepared by the field technician. The Contractor and Geotechnical Engineer shall effectively communicate density test results to ensure proper backfill compaction is accomplished. The DOTR shall be made available to the Field Engineer and the Contractor by the end of each day.

Upon completion of sewer construction, the Geotechnical Engineer shall compile all DOTRs into a complete package. This package shall also include a sealed cover letter stating that backfill density testing procedures were adhered to in accordance with the Department's requirements.

G. Stabilized Surface Treatment for Public Sewer Easements

Stabilized surface treatment for Public Sewer easements shall conform to S.D. RWRD-111, unless otherwise indicated in the Sewer Plans.

3.2 Sanitary Sewer Pipe

3.2.1 Description

The work under Subsection 3.2 shall consist of furnishing and installing sanitary sewer pipe, and all other appurtenant materials required, including excavation and the furnishing, placing and compacting of bedding and backfill material, all in accordance with the details shown in the Sewer Plans and the requirements of the *Standard Specifications and Details*.

3.2.2 Materials

A. General

At each location where a pipe is to be installed, the pipe material, diameter and length, along with the requirements for each approved option at that location, such as wall thickness, coatings, lining, class and strength, shall be in accordance with the Sewer Plans.

Certification documents from the manufacturer shall be furnished attesting that the pipe and appurtenances (excluding linings and coatings if applied by an independent applicator) meet the requirements set forth in the *Standard Specifications and Details*. All pipe and appurtenances shall be clearly marked with the name or trademark of the manufacturer, the batch number, and the location of the manufacturing plant.

B. Vitrified Clay Pipe (VCP)

VCP shall be new and extra strength. All materials, manufacture and testing for VCP shall meet the requirements of ASTM C700, C1208, ASTM C896, ASTM C301 and ASTM C425.

C. Polyvinyl Chloride (PVC) Pipe

Except as modified herein, all materials, manufacture and testing for PVC gravity sewer pipe and fittings shall conform to ASTM D3034 for diameters of 4 through 15 inches and ASTM F679 for diameters of 18 inches and larger. PVC gravity sewer pipe shall be SDR 35 unless otherwise shown in the Sewer Plans.

PVC gravity sewer pipe shall have a minimum pipe stiffness of 46 psi at 5% deflection, in accordance with ASTM D2412.

PVC gravity sewer pipe and fittings shall be made of PVC plastic having a cell classification of 12454 or 12364, as defined in ASTM D1784. Additives and fillers, including, but not limited, to stabilizers, antioxidants, lubricants, colorants,

etc., shall not exceed 10 parts by weight per 100 parts of PVC resin in the compound.

PVC gravity sewer pipe joints shall be gasketed, bell-and-spigot, push-on type, conforming to ASTM D3212. Because each pipe manufacturer has a different design for push-on joints, gaskets shall be part of a complete pipe section and purchased as such. Gaskets shall conform to ASTM F477 and be factory-installed and locked-in. Lubricant shall be as recommended by the pipe manufacturer.

Standard laying lengths for PVC gravity sewer pipe shall be 14 feet.

Service connections shall be installed with "Tee" or "Wye" fittings, gasketed "Tee" saddles with stainless steel bands, or other tapping devices as Approved by the Field Engineer. Solvent welded "Wye" saddles are not Approved.

All fittings shall be compatible with the pipe to which they are attached.

Pipes or fittings may be rejected by the Field Engineer for failure to comply with the requirements herein.

D. Ductile Iron Pipe (DIP)

All materials, manufacture and testing for DIP shall be in accordance with ASTM A746 and the latest revision of ANSI/AWWA C151/A21.51. Each pipe shall be subjected to a hydrostatic pressure test of at least 500 psi at the point of manufacture. DIP shall be manufactured in nominal 18 or 20-foot laying lengths.

DIP shall have standard asphaltic coating on the exterior, unless otherwise specified in the Sewer Plans.

DIP shall have an Approved interior lining installed by the pipe manufacturer or a third-party lining applicator. Refer to the Department's List of Approved Products for the recommended DIP interior lining materials.

The party responsible for applying the interior lining shall provide a certification statement as described in the following:

- *ALL DIP AND FITTINGS HAVE AN INTERNAL LINING COMPRISED OF [insert type of lining]. THE INTERNAL LINING THICKNESS IS 40 MILS NOMINAL (35 MILS MINIMUM) IN THE BARREL AREA, 10 MILS MINIMUM IN THE BELL AREA, AND 10 MILS MINIMUM ON THE EXTERIOR OF THE SPIGOT END.*
- *EACH PIECE OF PIPE AND EACH FITTING HAVE BEEN CHECKED FOR HOLIDAYS UTILIZING A TESTING VOLTAGE OF 7,500 V WITH A DRY CONDUCTIVE PROBE IN THE BARREL AREA AND A TESTING VOLTAGE OF 67.5 V WITH A WET SPONGE IN BOTH THE BELL AREA AND THE EXTERIOR OF THE SPIGOT END, AND THAT NO HOLIDAYS WERE FOUND.*

ii. Mirror Inspections

Mirror inspections shall be used for identifying alignment deficiencies in a sewer line during the progress of construction and prior to the final CCTV inspection. Each sewer line reach (manhole-to-manhole) shall be visually inspected by directing a beacon of light into the pipe from a light source such as a flashlight or reflecting sunlight with the use of mirrors. If the illuminated interior or "moon" of the pipe indicates deficiencies in alignment such as bellies, sags, reverse slopes or offset joints, the Contractor shall correct the alignment deficiency prior to the final CCTV inspection.

iii. Low-Pressure Air Testing

After new sewer lines and service laterals (HCS/BCS) are constructed and backfilled to finish grade, each reach shall be tested for no excessive leakage by low-pressure air testing. The requirements for low-pressure air testing shall be in accordance with the applicable methods specified in AAC R18-9-E301(D) and the installed pipe material's air testing requirements. Sewer lines and service laterals found with excessive leakage shall be corrected by the Contractor and re-tested as necessary until the results are passing. Testing results and any required corrections shall be documented by the Contractor and provided to the Field Engineer.

Low-pressure air testing for a reaches sewer line with composite pipe materials (i.e. PVC with DIP sections) shall be in accordance with the predominant pipe material within that reach.

iv. Joint Testing

For sewer lines greater than 48 inches in diameter, low-pressure air testing may be superseded by testing each pipe joint for no excessive leakage in accordance with ASTM C1103 (RCP) and the applicable pipe manufacturer recommendations. Pipe joints found with excessive leakage shall be corrected by the Contractor and re-tested as necessary until the testing are passing. Testing results and any required corrections shall be documented by the Contractor and provided to the Field Engineer.

Specific guidelines for joint testing procedures are provided in the following:

(1) Joint Testing Equipment

The Contractor shall provide all materials, labor and equipment necessary for joint testing.

The joint tester frame assembly shall be constructed of a heavy gauge metal that can be broken down easily into small sections for ease of handling and installation/removal from sewer manholes.

Sewer Plans, the Contractor shall notify the Field Engineer immediately. Table 3.1 is provided as a guideline for determining the allowable slope tolerances for 8-inch diameter sewer lines. For larger diameter sewer lines, the allowable slope tolerances will be determined by the Department. In no case, shall slope tolerances allow for constructed slopes to be less than the minimum slopes required per AAC R18-9-E301(D)(2)(e).

For constructed slopes of sewer lines that are not within the slope tolerances specified by the Department, the Contractor may request a Variance in accordance with the *Design Standards*, Subsection 2.3. The Department will review the request and elect one of the following options:

- Approve the Variance request;
- Require the As-Built Plans to be certified by the Design Engineer with a statement indicating that the constructed sewer meets the intent of the design and conforms to R18-9-E301 – 4.10 General Permit; or
- Require unacceptable sewer construction to be removed and reconstructed in accordance with the Sewer Plans.



1601 PASEO SAN LUIS, SUITE 202
SIERRA VISTA, ARIZONA 85635
(520) 458-9594
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Commissioning Program

A commissioning program is not required for this project.



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Cost Estimate & Basis of the Model

Attached is the GMP Constuction Cost Model for the work to be completed in association with the 22nd Street Sewer Augmentation Project. This model is based on a variety of assumptions and prepared utilizing KE&G project specific crews and equipment for the work where applicable and allowances for specified subcontracted work.

KE&G is planning on utilizing subcontractors for the following scopes of work:

- Jack & Bore
- Sweeping
- Surveying
- Quality Control / Testing
- Community Relations
- Trucking / Hauling
- Sanitary Sewer Manhole Installation
- Traffic Controls

Our construction cost model is based upon the following;

SEWER INSTALLATION

Item 1.00 – Mobilization

KE&G self-performance equipment from local sources anticipated 12 loads for the project

Item 2.00 – Removals

Removal, stockpiling, hauling, and disposing of asphalt or concrete debris generated from the project based upon 8" asphalt thickness per geotechnical report borings B1-B5. Excludes any costs for the removal of hazardous materials.

Item 2.10 – 8" Sewer Removal

Removal of the existing 8" Vitrified Clay Pipe (VCP) from manhole 8911-08J to manhole 5602*04. Removal shall not commence until a Discharge Authorization for the new 12" sewer has been issued by ADEQ and released by PCRWRD.

Item 2.50 – SWPPP

Project SWPPP preparation, inspection, and implementation per AZDEQ. Includes providing catch basin protection, track out at staging yard, and street sweeping as required.

Item 3.00 – Aggregate Base

Delivery and installation of five inches of PAG specification aggregate base materials per the soil borings B1-B5 for a trench width of four feet wide along the project alignment. Native material will be used for trench backfill.

Item 4.00 – Trench Patching

Installation of 8" PAG specification mix no. 2 arterial in a four foot-one inch wide trench. Trench patching or restoration is bid to match the existing for any pavement areas disrupted.

Replacement per PC/COT Std. Det. 216 Type 2. Work to take place between the hours of 6:00 am and 6:00 pm. Excludes cost of any chip sealing, crack sealing, or fog coating.



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Item 4.05 – Mill / Plate Excavation

Trenches will be plated for protection of traffic while crews are not working. Per the City of Tucson Standard, the plates will be milled to a depth flush with existing asphalt and cold mix applied in place. Up to 500 linear feet of plating shall be utilized on the project and rotated in and out of service throughout the project duration.

Item 5.00 – Jack & Bore 30”

This item is based on a maximum length of 60 linear feet (LF) to be auger bored, carrier pipe to be placed on wood skids inside of the 30 inch casing, annular space to be filled with pea gravel, end seals to be installed, and casing supported beneath the pipe with CLSM per TW-800. Shoring used for the jack & bore pits will be engineered to have steel crossing plates placed so that traffic may drive over the trenches during the day.

5.15 – 12” DIP Sanitary Sewer

Installation of 12” SP2000 coated DIP will occur in two locations: the first is 60 LF at the water crossing located at Columbus Blvd where the new sanitary sewer lies above the existing water lines; the second is 20 LF at the water crossing at Irving where there is less than 2’ of separation between the existing water line and new sewer line. In addition there are two locations where 12” bare DIP lined with CIPP coating will be installed: the first is 165 LF from manhole 5622-36 to new manhole #1, across the intersection and through the casing at Alvernon Way & 22nd Street. The second is 20 LF from new manhole #14 to manhole 5905-01A at the Swan Rd & 22nd St tie-in point.

5.20 – 12” PVC Sanitary Sewer

Installation of the underground sanitary sewer pipe per plans dated July 2015 provided by EEC. Work will take place between the hours of 6:00 pm and 6:00 am. Pipe material is SDR35 PVC. Excludes any cost associated with hard dig conditions, rock excavation, blasting or hydraulic breakers of any kind.

5.25 – House Connections

Includes tying 17 house/business connections into the new 12” sewer main and extending a 4” sewer service to the property line with a cleanout assembly installed at the property line. Existing services will tie into the new cleanout assembly. New services will terminate at the cleanout assembly.

5.30 – Sanitary Sewer Testing

Includes pressure testing and deflection testing of PVC pipelines and mixed material pipelines. CCTV inspection of completed pipelines is to be provided by RWRD.

5.40 – New 60” Diameter Sanitary Sewer Manholes

Installation of new concrete manholes per RWRD Std. Dtl. 206. Includes concrete collar installation per RWRD Std. Dtl 211.

5.45 – Existing Manhole Connections

Concrete coring and patching on the connection points including existing manhole 5905-01A on the upstream and existing manhole 5622-36 on the downstream. Cores shall be 2” larger than the pipe diameter to accommodate gaskets and non-shrink grout installation. Includes bench rehabilitation after new pipe is installed.

5.50 – Sanitary Sewer Manhole Testing

Vacuum testing of sanitary sewer manholes per Arizona Administrative Code Title 18, Ch.9 section 3.e.



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5.60 – Bypass Pumping

Hydrostatic pressure testing of flow management main-line discharge lines to be tested at 1.5 times the operating pressure of the system or at 30 PSI, whichever is greater. Suction and discharge hoses connected directly to pumps are exempt from these pressure tests. HDPE discharge lines to be disinfected and cleaned prior to removal using 12.5% Hypochlorite solution. Only includes bypass pumping for the upstream tie-in, the downstream tie-in will use flow-thru plugs.

5.70 – Existing 10” Line Repairs

The 10” repairs consist of:

1. Ultra Violet (UV) repair between manhole 5547-01 and manhole 5831-12
2. Cured In Place Pipe (CIPP) repair between manhole 5831-12 and manhole 5831-11
3. UV repair between manhole 5831-11 and manhole 5831-10
4. Trim protruding service between manhole 5831-07 and manhole 5831-06
5. Install tophat between manhole 5831-06 and 5831-05

UV patches will cover a point repair area of 4’ and include CCTV of the line after installation. CIPP will rehabilitate the entire length of the pipe and will include pre-cleaning and pre and post CCTV of the pipe. The service to be trimmed will be trenchless and performed by a mechanical whole-saw. The tophat installation will be trenchless and performed by CCTV trucks.

6.10 – Concrete Curb

Curb removal and replacement per PC/DOT Std. Detail 209, type 2 vertical curb. Due to minimal quantity, concrete testing is excluded.

6.20 – Concrete Sidewalk

Sidewalk removal and replacement per PC/DOT Std. Detail 200. Due to minimal quantity, concrete testing is excluded.

7.00 – Traffic Control

Includes daily setup and takedown for the duration of the project.

7.10 – Uniformed Officers

City of Tucson off duty officers utilized for point control while crossing the intersections of Alvernon, Columbus, and Swan Roads.

7.20 – Striping

Striping to be damaged by equipment and trench plate location along 22nd street for the length of the project. Temporary paint as well as thermoplastic replacement of stop bars, skip lines, reflective pavement markers, and crosswalks are included.

7.30 – Signal Loop Replacement

Includes replacing advance loops and stop loops at the intersections of Alvernon, Swan, and Columbus.

8.00 – Survey / As-Built

Includes construction survey, control verification, utility potholing verification, and as-built survey for the work in place.

8.10 – QC Testing

Includes testing of new sewer installation, including three compaction tests per line segment, compaction tests every 2 vertical feet of manhole backfill, and concrete cylinder casting at new manholes with 24 hour, 7 day, and 28 day breaks.



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8.20 – Public Relations

Need for public relations outreach to businesses, public meetings, website construction updates, and hotline phone monitoring for the anticipated duration of 4 months.

9.00 – Permits

Includes Arizona Department of Environmental Quality Storm Water Pollution Prevention Permit Notice Of Intent, Pima County Department of Environmental Quality dust control permit, and City of Tucson Right of Way permit. Sewer permit to be provided at no cost from RWRD.

11.00 – General Conditions

Based upon 18 working weeks including supervisory personnel, sanitation facilities, drinking water, construction small tools, construction water, staging yard rental, staging yard security fencing, and garbage services.

12.00 – CMAR Overhead

Based upon yearly audit.

13.00 – CMAR Fee

As per preconstruction services.

14.00 – Payment & Performance Bonds

KE&G payment and Performance bond rate at 0.91% of project total dollar value.

15.00 – Insurance

General Liability Insurance based upon 1% of the project total.

16.00 – Sales Tax

Based upon general contracting for a government entity. Base rate of 65% of 8.1% includes City of Tucson, RTA, and State Sales Taxes

WATER MODIFICATIONS

2020041 – Removal of Pipe

Removal of existing waterline shall be completed for the existing 36" diameter Concrete Cylinder Pipe in the same location as the new line to be installed. Removal of the existing 6" diameter water line shall be located where tie-ins and connections take place. The existing 6" diameter water line shall be abandoned where it crosses beneath the existing drainage culvert.

4060114 – Utility Trench Patch (Type 2)(PC/COT STD 216)

Trench patching shall be greater than 4' in width, and a type 2 pavement patch is anticipated. The existing structural section shall be matched, based upon geotechnical engineering, approximately 5" of aggregate base course shall be placed followed by 8" to 10" of PAG 2 asphalt.

51000001 – 6" Jack & Bore

The 18" jack & bore under the reinforced concrete box culvert is to be a maximum of 100 linear feet. Shoring used for the jack & bore pits will be engineered to have steel crossing plates placed so that traffic may drive over the trenches during the day.

51001106 – Pipe, DIP, 6"

6" Class 350 ductile iron pipe shall be utilized. The pipe shall be fully restrained and the new alignment parallel to the existing allowing for a new installation with proper separation allowing for jack & bore operations beneath the storm drain box culvert.

51001124 – Pipe, DIP, 24"

24" pipe shall be installed with minimum class 350 ductile iron pipe and fully restrained. A 24" x 6" tee shall be installed to facilitate the installation of a zone valve.



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51001136 – Pipe, DIP, 36”

The new 36” ductile iron pipe shall be class 350 and be fully restrained. Included are the fittings to facilitate a vertical and horizontal offset. Backfill of the pipe shall be native material. To complete the installation a weekend closure of the intersection is required. The pipe tie in location is anticipated to be within the travel lanes of E 22nd Street and N Alvernon Way.

5102406, 5102424, 5102436 – Gate Valve, Box & Cover

All valves are anticipated to be vertical gate valves based upon existing potholing data at the intersection. Valve Boxes and Covers shall follow City of Tucson Water Standard.

5102604 – Combination Air Release Valve, 1”

A single new 1” air release valve is anticipated to be added on the 6” relocated water line. The new ARV is expected to be placed outside of traffic lanes and placed in a #2 meter box per Tucson Water Standard.

5102606 – Combination Air Release Valve, 2”

A single new 2” air release valve is anticipated to be added on the 36” relocated water line. The new ARV is expected to be placed outside of traffic lanes and placed in a #2 meter box per Tucson Water Standard.

5106006 – 6” Connections

New 6” connections shall include necessary dewatering, excavation, and connection to existing pipe, regardless of type.

5106024 – 24” Connections

24” Connection to the existing water line shall include all excavation, shoring / bracing, dewatering and connection to the existing 24” diameter concrete cylinder pipe using a specialty manufactured welded steel connection piece. The connection piece shall be fully welded and contain a 16” flanged outlet for interior welding access.

5106030 – 30” Connections

30” Connection to the existing water line shall include all excavation, shoring / bracing, dewatering and connection to the existing 30” diameter concrete cylinder pipe using a specialty manufactured welded steel connection piece. The connection piece shall be fully welded and contain a 16” flanged outlet for interior welding access.

5106036 – 36” Connections

36” Connection to the existing water line shall include all excavation, shoring / bracing, dewatering and connection to the existing 36” diameter concrete cylinder pipe using a specialty manufactured welded steel connection piece. The connection piece shall be fully welded and contain a 16” flanged outlet for interior welding access.

5107004 – Final Corrosion Report

A final corrosion report shall be completed by a certified NACE technician in accordance with the City of Tucson Water Department specifications.

5107120 – Corrosion Test Station

Corrosion test stations shall be located outside of the roadway and be located at each tie in location verifying the isolation of the dissimilar pipe materials.

5107624, 5107630, 5107636 – Flange Insulating Kits

A total of three large diameter Flange Insulating Kits shall be used, to isolate the dissimilar pipe materials at the 24”, 30” and 36” connection.



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7010001 – Maintenance and Protection of Traffic

It is anticipated that a closure of the intersection be allowed for the pipe crossing. Included is the estimated to include setup / takedown and devices for the associated waterline work. No uniformed officer / point control is included.

7310010 – Pole (Type A)

A traffic signal pole is required to be removed and replaced during the waterline crossing. Included is the electrical disconnection, removal of the pole, and re-installation of the pole on the existing foundation.

7310200 – Pole Foundation (Type A)

If necessary removal and installation of a new pole foundation is required, includes electrical conduits to a maximum of 5' radius from the existing pole.

7350100 – Loop Detector

4 traffic signal loop detectors are anticipated to be damaged from the associated waterline construction. Included is the reinstatement of signal loops to existing signal junction boxes. Saw-cutting asphalt and sealing of the joint is included.

9080005 – Concrete Vertical Curb

Type 209 concrete vertical curb following City of Tucson standard details of construction. Class B 2500 psi concrete shall be used. Testing shall be per City of Tucson Standard Specifications Section 1006.

TUCSON DOT ROADWAY RESTORATION

400 – Mill & Overlay North Half of 22nd St / Alvernon Way

Includes milling out 2.5" of the north half of the Alvernon Way & 22nd St intersection going from the bullnose of the median on the west side of 22nd St across Alvernon to the bullnose of the median on the east side of 22nd St and north to the southbound crosswalk on Alvernon Way. Also included at southbound Alvernon Way is milling from the crosswalk and going north 60 feet from the bike lane on southbound Alvernon Way to the median on the north side of Alvernon Way. Pavement replaced with PAG 2 Arterial mix per PC/COT Std. Det. 216. Temporary paint and thermoplastic striping is included. Any damages to traffic loops is not included.

401 – Mill & Overlay Alvernon Way to Bryant Ave

Includes milling the entire width of westbound 22nd St from the end of the bullnose of the median on the east side of the intersection of Alvernon Way & 22nd St to Bryant Ave. Pavement replaced with PAG 2 Arterial mix per PC/COT Std. Det. 216. Temporary paint and thermoplastic striping is included. Any damages to traffic loops is not included.

402 – Mill & Overlay Bryant Ave to Swan Rd

Includes milling the left westbound lane of 22nd St from Bryant Ave east to the point where the new 12" sewer main will cross the median on 22nd St and go southeast to it's tie-in point. Pavement replaced with PAG 2 Arterial mix per PC/COT Std. Det. 216. Temporary paint and thermoplastic striping is included. Any damages to traffic loops is not included.

403 – Type 1 Trench Patch at Swan Rd

Includes a type 1 utility patch over approximately 230 feet of trench extending across the eastbound right lane of 22nd St through the Swan Rd intersection. Pavement replaced with PAG 2 Arterial mix per PC/COT Std. Det. 216. Temporary paint and thermoplastic striping is included. Any damages to traffic loops is not included.



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Site Security Plan

This project is located in a heavily used and trafficked area of town which presents the possibility of hazardous and unsafe conditions to the public and to the employees working on it. Keeping the site secure and safe for all will be continuously monitored as the project is ongoing. Some of the different measures that will be taken to keep the site secure include:

- Trench Plates
- Traffic Control Barricades/Signing
- Wire Fencing
- Security Guards (if needed)

These practices used in conjunction with one another should ensure the security of the project. The project consists of open trenching a mile of the west bound left lane on 22nd, therefore anytime work is not being done on-site the trench will be covered with steel crossing trench plates to ensure no one falls or drives into the trench. Traffic control barricades and signing will be used extensively to safely direct traffic around the open trench and the people working on it. In addition to the barricades and signing, off duty officers will be used for point control during work at intersections. Wire mesh fencing will be installed on KE&G's laydown yard to prevent vandalism and theft and to protect the public from any dangerous equipment or materials being stored. The wire mesh fencing can also be used around larger excavations, such as the jack and bore pit, to keep people and traffic safe as needed. If it is found these measures are not sufficing we will employ security guards on-site aiding in protecting equipment, materials, and helping to ensure the public is staying safe and away from the construction areas.



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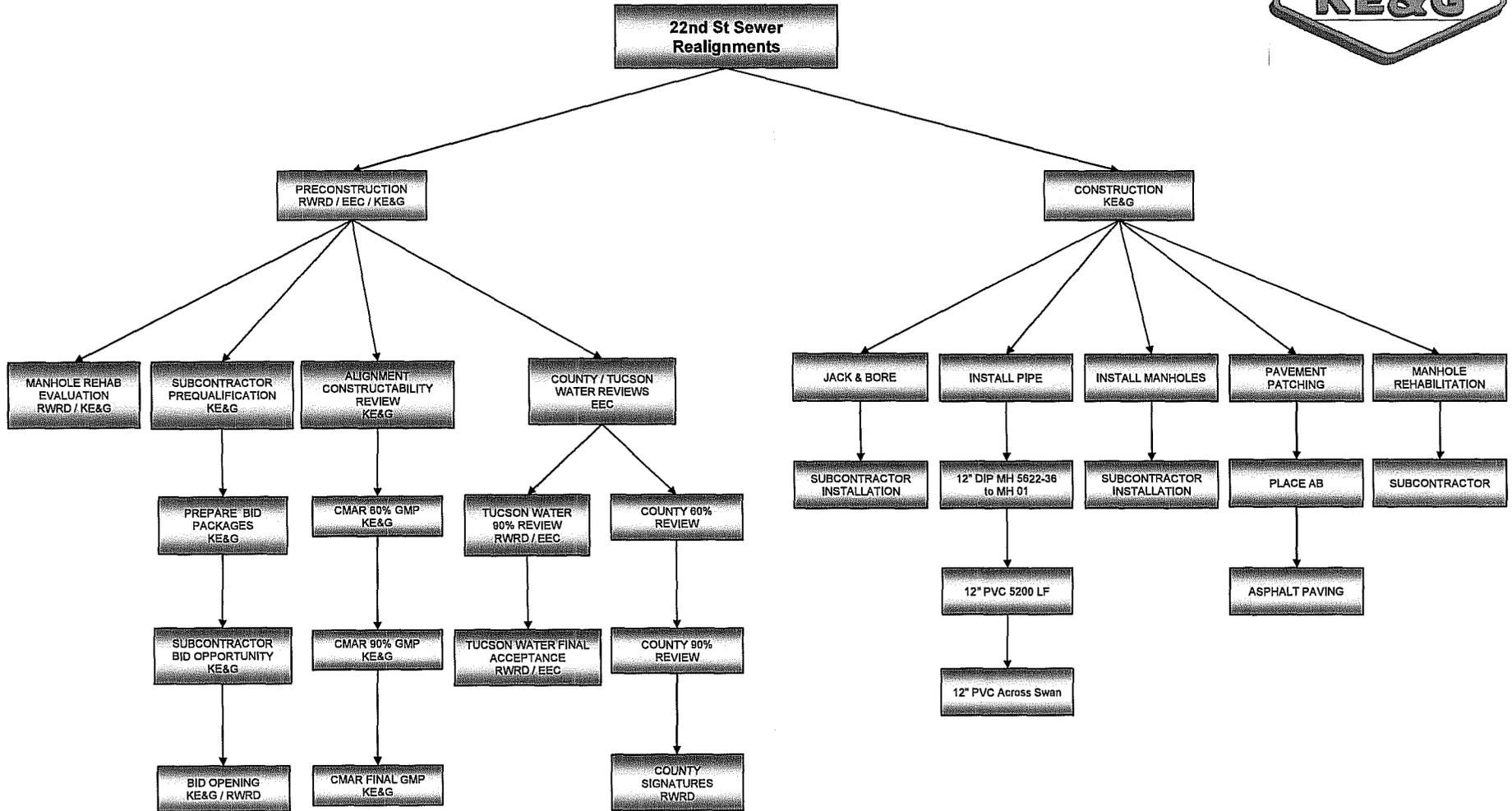
Define Scope Basis

As identified by RWRD, the scope of the project is the augmentation of the existing 10 inch diameter clay sewer located on the south side of 22nd street. To achieve this augmentation, a new 12 inch diameter sewer will now be placed in the left lane of westbound 22nd street. To achieve project completion in an expedited process, there are a few key milestones which must be met.

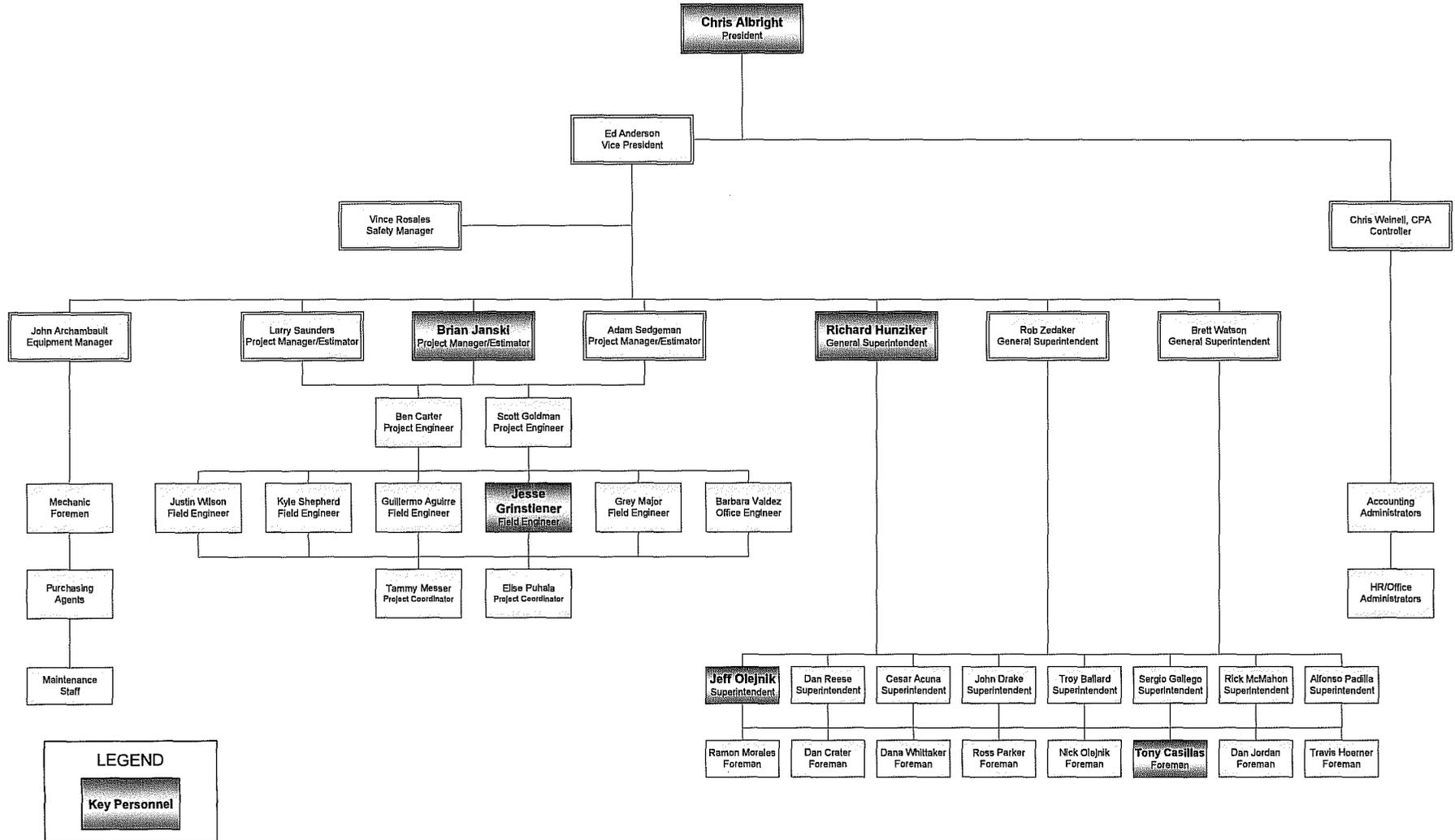
Preconstruction - One key milestone is acceptance of the plans by the City of Tucson Water Department. It is planned on submitting the plans to Tucson Water at the 90% level to incorporate key notes or changes prior to 100% design. Another key milestone is final signatures by Pima County RWRD. This milestone achievement will allow the plans to be sent to the Arizona Department of Environmental Quality for an authorization to construct the new sanitary facilities. Determination of the repair of existing manholes located on the existing line shall be determined and agreed upon during this process of the project to eliminate future scope creep. With the project defined as an augmentation of the sewer within 22nd street, it will be essential that both the eight inch line in addition to the 10 inch sewer line be addressed and augmented where possible. While government approvals are taking place, acceptance of a GMP not to exceed the budgeted amount and construction contracts will be progressing as well as construction planning and construction sequencing activities will be ongoing.

Construction - Assuring the most complete manhole rehabilitation expectations and replacement expectations are clarified during preconstruction is the most appropriate way to eliminate future items that may potentially impact the project scope. With the rehabilitation method and expectations clearly identified, a milestone event will be the acceptance of rehabilitation on the existing 10 inch sewer system. A separate milestone achievement will be the successful crossing of Alvernon Rd. with the new 12 inch sewer. This will set the precedent for the remainder of the project and allow for an exact location for the new gravity line elevation. Upon continuation of the sewer installation, providing a linear work progression will remain a top priority. This linear progression includes the installation of new sanitary sewer pipe and manholes, testing of said products, asphalt patching, and tying over of necessary sanitary sewer services. Other milestone activities are the crossing beneath the 36 inch Concrete Cylinder Pipe (CCP) located along the median of 22nd street in the eastbound north travel lane and the tie in at the upstream location at the southeast corner of 22nd street and Swan road.

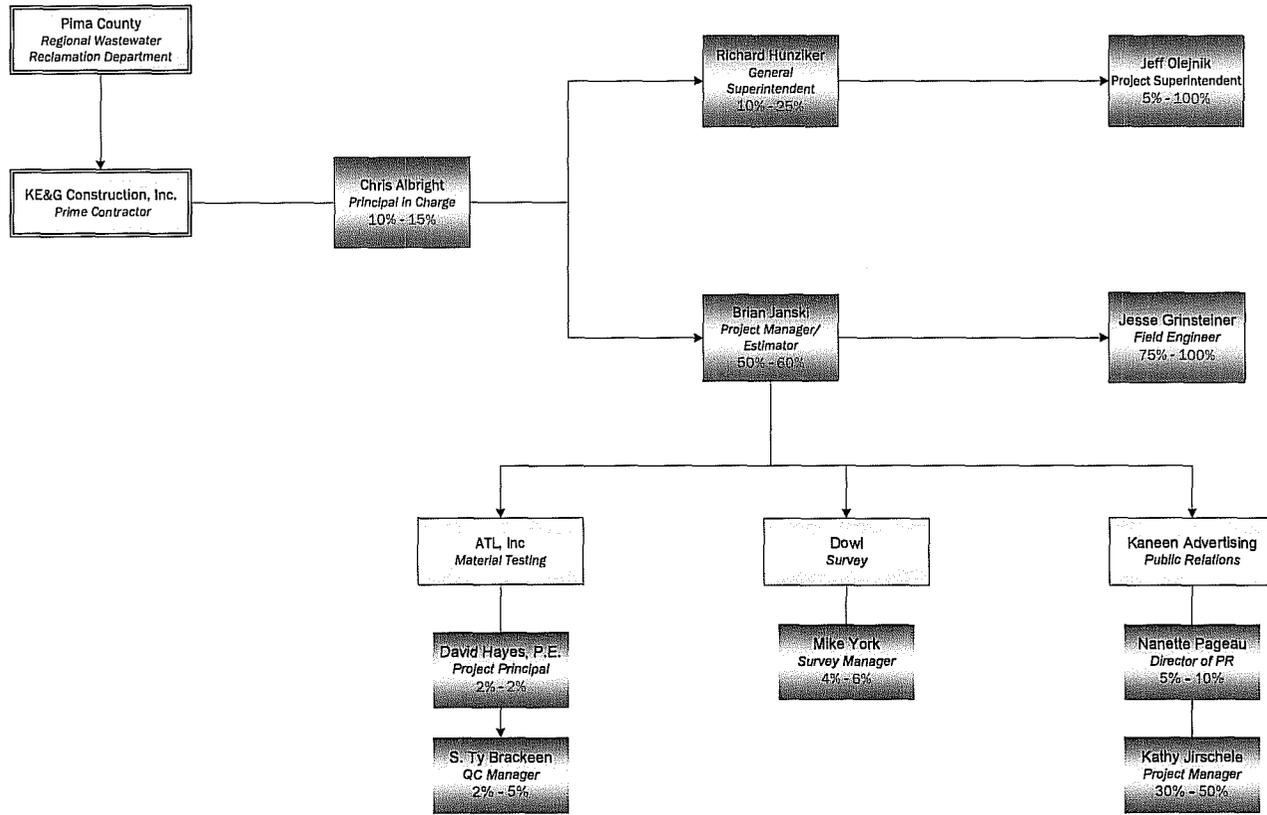
KE&G WORK BREAKDOWN STRUCTURE



KE&G ORGANIZATION CHART



PROJECT TEAM ORGANIZATION CHART



LEGEND

Key Personnel

% Time (Pre-Con) - % Time (Construction)



22nd Street Sewer
Augmentation
Project
Quality Assurance Plan

July 2015



Introduction

As a company which builds infrastructure for the future, it is our responsibility to ensure that a quality product is produced every time. Quality management is essential to the delivery of successful product while maintaining productivity, employee safety and public safety

This Quality Assurance Plan is intended to provide a guideline to maintain proper quality throughout the company, ensuring a quality end product is delivered to the project owner.

The QA plan is in place to provide a quality product by, KE&G Construction, Inc. Specific areas of commitment are:

- Self-Performed work by KE&G
- Work Performed by Subcontractors
- Materials Received by Vendors

Quality Checkpoints

A. Procurement:

During the procurement stage of any project it is the responsibility of the project estimator to evaluate potential subcontractors and vendors.

Subcontractor selection shall be based on the criteria located in the subcontractor plan, but not limited to:

1. Financial stability
2. Company history
3. Ability to perform work
4. Availability to conform to project schedule

Vendors shall also be evaluated by a set of criteria, not limited to:

1. Financial stability
2. Company history
3. Availability to conform to project schedule

All criteria shall be reviewed by the Operations Manager. Subcontractors and Vendors shall then be selected.

B. Pre-Construction:

In the pre-construction phase of any specific project, agreements shall be drafted to both subcontractors and vendors indicating specific delivery requirements. A project Submittal / Shop Drawing checklist shall be generated by the project management / estimating staff to serve as a communication tool between the project team of



vendors, subcontractors, and prime contractor. The Project Manager shall review and verify that all requirements have been met prior to construction. The Project Supervisor shall document all needed manpower and equipment necessary to complete the project within the project timeline, while paying attention to project safety, and quality measures

C. Construction:

All project deliveries shall require delivery receipt and include lot numbers or product codes and indication of materials delivered if applicable. Onsite supervisors shall review the materials onsite to verify materials and material tickets match. The Project Manager shall review all material delivery tickets verifying conformance to the project plans and specifications. During construction the Project Supervisor shall review installation of the materials maintaining that all work is performed by craftspeople knowledgeable and capable of installation. For all excavation activities, the project site shall be backfilled and tested for compaction per project plans and specifications. All materials or compaction testing shall be performed by an ASTM certified technician employed by an independent testing agency.

D. Post Construction:

The Project Manager shall review all project documentation and transmit final as-built documents to the project owner. All documentation shall be available on file to the project owner and shall remain on file at the contractor's office for the period of seven years.



Reviews

Quality Assessments & Reviews

The quality review shall begin from the bottom and continue up. Quality begins by employing experienced craftspeople capable of performing quality work. During construction all employees shall be responsible for verifying a quality installation. If an employee discovers a defective installation, the information is conveyed to the supervisor on up. Prior to the owner's representative completing a punch list, the Project Supervisor shall conduct a walk through with the Project Manager, identifying any project defects or items of need which will be addressed prior to owner and contractor walk through.



Preventive Measures

Prior to construction and on a weekly basis during construction the Project Supervisor shall meet with members of the management team, including the Project Manager, Branch Manager, and General Superintendent to discuss potential problems / resolutions, upcoming project resource needs, and the project schedule. If necessary, additional meetings will be scheduled as required to define the project intricacies and details, examples of specialized situations are:

- Concrete Pre-Pour Plan
- Job Hazard Analysis Plan
- Station Shutdown Sequence Plan
- Tie – Over Sequencing

If a defective installation was due to a mistake by an employee, that employee is the one which is responsible for correcting the defect (with additional oversight.) This method ensures that the employee who made the mistake will be able to learn from the mistake. Upon completion of a project the Project Supervisor shall meet with the Project Manager debriefing the project and discussing lessons learned which will be incorporated on all future projects.

Corrective Action

If problems are identified during the review of submittals in the preconstruction phase, the material which was to be submitted shall either, be rejected and a material meeting the project documents shall be submitted, or the material shall be submitted for approval prior to submittal for use on the project.



Upon identifying product deliveries which do not match documentation, the product shall not be installed until the proper documentation is received. If the vendor or subcontractor is unable to produce the proper documents the materials or shipments shall be rejected.

Upon detection that part or all of the project installation does not meet the requirements of the project documents, the defective materials or installation shall be removed or corrected as necessary.

Roles and Responsibilities

Operations Manager

- Review project subcontractor and vendor qualifications at the procurement stage.

Estimator

- Review project subcontractor and vendor qualifications at the procurement stage.
- Develop Shop Drawing / Submittal tracking logs at the pre-construction phase.

Project Manager

- Review project subcontractor and vendor qualifications at the procurement stage.
- Develop Shop Drawing / Submittal tracking logs at the pre-construction phase.
- Review material deliveries, verify conformance to project plans and specifications, and review testing logs during the construction phase.
- Review all project documentation during the post-construction phase.

Project Supervisor

- Document necessary equipment and manpower in the pre-construction phase.
- Review project material delivery acceptance during construction.
- Oversee front line quality performance of all construction.
- Schedule independent testing during construction.



Overview

At the onset of the project, our project representatives will meet with Owner's inspectors to ensure that the project team understands each other's roles in the project and the desired product. During construction, our project supervisor will interact with the owner's site inspector to schedule inspections and discuss project development. KE&G's project manager will follow-up with the site inspector and/or the owner's project manager about the project quality. Regular project meeting frequency will be determined at the pre-construction meeting to ensure that frequency meets the project's needs. Throughout the project we will utilize an escalation ladder to address any quality concerns. This escalation ladder will allow issues to be resolved at the lowest level, however, quality deficiencies and successes will be conveyed to all project team members during regular project meetings.



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Communication Plan

Communication is vital to any successful project and KE&G will make sure there are open lines to all parties involved so there is no confusion or misunderstanding as the project is underway. KE&G will utilize several different methods to keep parties informed and up-to-date with the project. The different parties included in this project include but are not limited to:

- RWRD
- Engineering and Environmental Consultants, Inc. (EEC)
- Kaneen Advertising & Public Relations
- Utility Companies with Assets Along 22nd. St
- Businesses/Residences Along 22nd. St

With RWRD, EEC, and KE&G leading this project there will be weekly meetings with all three parties in attendance to go over the progress of the project and what is required to be completed next. During the preconstruction phase these meetings will utilize storyboards and block schedules to ensure the different entities are getting their respective tasks done in a timely matter during preconstruction. Prior to construction beginning an open house will be held with the public, this will aid in informing the public about construction. In addition, weekly updates will be sent out to the media as construction progresses or if there are changes in traffic patterns along the thoroughfare. Also prior to construction, KE&G and Kaneen Advertising, in coordination with EEC and RWRD, will hold a TSM (Traffic & Safety Management) meeting with emergency responders, schools, trash services, SunTran, and others to inform them about the project, it's reasoning, and other particular parameters which may be of concern. Once construction has commenced KE&G will provide updated schedules to show the progression of the project. Meeting minutes will also be kept by KE&G for future reference. Kaneen Advertising will be brought into the weekly meetings as needed to contribute with their public relation work. In order to inform the Utility companies that have conflicts along 22nd. we will have an on-site meeting to describe the project to the representatives of the different companies and from that point on will keep in touch with their locators to make sure we're clear of their assets. Communication with the businesses along 22nd. St will be vital to this project to help ease worries and confusion about the project. We will have a meeting for all of the businesses along 22nd. St to attend and voice their concerns and ask questions about the impacts the construction will have. Kaneen Advertising will also be sending out flyers to the businesses and residents in the area informing them of the project. In addition Kaneen Advertising will be maintaining RWRD's sewer construction website and keeping it up-to-date with the project so the public may find the answers to their questions online.



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Risk Management

During the 22nd Street augmentation project, risk management will be addressed in multiple phases. KE&G will perform Constructability Reviews throughout the course of design to ensure that the design is compatible with best construction practices and eliminate risk, where opportunities exist. This results in high quality control conformance and avoids disputes resulting from potential ambiguities in the contract documents.

During the pre-construction phase, the project team will analyze the design and evaluate the risk that may be encountered while performing the construction phase. This will be completed through detailed breakdown of the work to be performed and assessment of the risk that accompanies each task. Each task will appraise the labor, equipment, subcontractor, material, and public risks. Below is a list of the types of risks/issues that may be encountered by category:

Labor

Safety Training
Access/Protection from Public
Scheduling
Capability
Capacity
Fatigue
Training

Equipment

Lifting Capacity
Width
Turning/Swing Radius
Parking Location(s)
Availability
Schedule
Access
Protection from Public
Theft Deterrent/Avoidance
Vandalism Deterrent/Avoidance

Subcontractor

Capability
Capacity
Schedule
Cost

Material

Availability
Specifications
Cost
Life Cycle Cost
Suitability

Public

Protection from Work
Traffic Control
Pedestrian Control/Access
Notification
Bypass Impact
Construction Impact

Once these issues are analyzed, the project team will discuss the project impact. The results from this discussion will be incorporated into the project planning and guaranteed maximum price, if applicable. This risk assessment will be utilized to determine the correct measures to engineer out risk or account for potential risks. If risks cannot be engineered out, the risk will be mitigated through several options such as: additional training, additional planning, use of spotters, use of security guards, additional traffic control, etc.

The risks can come in several varieties such as: safety, 3rd party, equipment damage, material failure, quality/rework, material delivery, etc. These types of risks have many approaches to elimination, reduction or mitigation. To address the proper solution to these risks, the team will work to develop a plan for the construction of the project.



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As the pre-construction phase progresses and throughout the construction of the project, planning will be instrumental in the risk assessment, reduction, and mitigation. The planning for the project will be a living document that will be continually revised to ensure that as the project progresses, conditions change, or new information becomes available; the plan addresses these changes. Planning follows the Plan-Do-Check-Act cycle. At the project level there is no substitute for a well-conceived and detailed PLAN which is implemented, DO evaluated during implementation, CHECK and subject to specific actions taken for continuous improvement, ACT upon observations that were made. Successful plans incorporate safety and quality as integral parts of the process along with production issues at the time when key decisions and commitments are being made.

Pre-activity meetings will be held with employees, subcontractors, vendors, inspectors and owner representatives to ensure that the plan is adequately conveyed and understood by the team. These meetings will be an open collaboration to allow every member to provide input/ideas to make the plan better.

Throughout the construction process, the verification of the team's plan will occur at several levels, which allows for further checks that the plans, specifications are adhered to. On the field level, the supervisor has the ability to utilize daily task planning to provide the employees with in-depth information about each specific task they will be performing and receiving verification that they have received the information. This will allow the supervisor to use this information to track progress and conformance. Also on the field level, the crew supervisor and management have the opportunity to utilize checklists for the work being performed to verify conformance and utilize these checklists to communicate quality control with inspectors.

It is necessary to ensure that all project material deliveries are accompanied with delivery receipts and include lot numbers or product codes and indicating the type of materials delivered if applicable. Onsite supervisors shall review the materials onsite to verify materials and material tickets coincide. The Project Manager shall review all material delivery tickets verifying conformance to the project plans and specifications. During construction the Project Supervisor shall review the installation methods of the materials verifying that all work is performed by craftspeople knowledgeable and capable of the installation. For all excavation activities, the project site shall be backfilled and tested for compaction per the project plans and specifications. All materials or compaction testing shall be performed by an ASTM certified technician employed by an independent testing agency.

Utilizing these risk identification, elimination, and planning actions the team intends to create a safe and productive project that is completed with high quality and on or ahead of schedule.



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Procurement Plan

During the procurement stage of any project it is the responsibility of the project estimator to evaluate potential subcontractors and vendors.

Subcontractor selection will be based on the criteria located in the subcontractor plan, but not limited to:

1. Ability to perform work
2. Availability to conform to project schedule
3. Company history
4. Financial stability

Vendors shall also be evaluated by a set of criteria, not limited to:

1. Availability to conform to project schedule
2. Company history
3. Financial stability

All criteria shall be reviewed by the Operations Manager. Subcontractors and Vendors shall then be selected.

KE&G will begin with the prequalification of subcontractors early on in the preconstruction phase. Once that initial prequalification is completed, the pre-qualification packages shall be graded and weighted to provide a pricing factor.

KE&G will work with the project team to create bid packages for work to be performed. Based upon these bid packages, the potential subcontractors will be identified and invited to bid on the project.

Based upon the project schedule, qualified subcontractors will be provided with plans and specifications for the project. If necessary, a pre-bid conference will be held. A standard hard-bid solicitation process will be followed. Bids will be required to be turned in to the designated location at or ahead of the bid time to be valid. Should KE&G bid any of the bid packages, we will be subject to the same scrutiny. The lowest most responsive bidder will be selected and subcontracts will be issued.

Materials procurement will require that a minimum of three quotes are obtained for permanent materials that are specified. Should project specific sole source materials be specified, the project team will evaluate potential "or equal" items that will promote competition, while still providing a quality product.