2025 PROJECT OF THE YEAR NOMINATION

CONTINENTAL RANCH REGIONAL PUMP STATION (CRRPS) FORCE MAIN AUGMENTATION PROJECT

APWA - Project of the Year - Environment- $25-$75 Million
02.10.2025

APWA AWARDS PROGRAM
PROJECT OF THE YEAR
NOMINATION FORM

CATEGORY (select only one)

- ◯ Structures
- ◯ Transportation
- ● Environment
- ◯ Historical Restoration/Preservation
- ◯ Disaster or Emergency Construction/Repair

PROJECT DIVISION (select only one)

- ◯ Less than $5 Million
- ● $25 Million to $75 Million
- ◯ $5 Million to $25 Million
- ◯ More than $75 Million

Please address each of the following areas in your nomination, adhering to the sequence below when possible:

- Use of good construction management techniques and completion of the project on schedule.
- Safety performance and demonstrated awareness of the need for a good overall safety program during construction.
- Community relations as evidenced by efforts to minimize public inconvenience due to construction, safety precautions to protect public lives and property, provision of observation areas, guided tours, or other means of improving relations between agency and the public.
- Demonstrated awareness for the need to protect the environment during the project. This includes any special considerations given to particular environmental concerns raised during the course of the project.
- Unusual accomplishments under adverse conditions including, but not limited to age or condition of the facility, adverse weather, soil or other site conditions over which there is no control. Additional conditions deemed of importance to the public works agency, such as exceptional efforts to maintain quality control and, if value engineering is used, construction innovations as evidenced by time and/or money saving techniques developed and/or successfully utilized.
- Use of alternative materials, practices or funding that demonstrates a commitment to sustainability and/or use of sustainable infrastructure rating system or the equivalent.

NOTE: Supporting documentation is **limited to 20 pages**, exclusive of photographs and nomination form. Photographs will be used for promotional purposes by the association. Submittal should be a single PDF file (25 MB maximum) that includes the nomination form and supporting documentation. No letters of recommendation please. Simultaneous nomination of the same project in both Public Works Project of the Year and Small Cities/Rural Communities Project of the Year or in two categories is not permitted.

PROJECT INFORMATION

Continental Ranch Regional Pump Station (CRRPS) Force Main Augmentation Project

Project Name

December 9, 2024

Project Completion Date-Project must be substantially completed and open for public use in 2023.

Pima County

County or Municipal Government Entity (Project Owner)

Pima County Regional Wastewater Reclamation Department (PCRWRD)

Managing Agency/Department

Jaime Rivera, PE, Deputy Director

Managing Agency/Department Contact

3355 N Dodge Blvd

Address (if Post Office Box, include street address)

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Phone Number (include area code)

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Email Address

NOMINATING ORGANIZATION/INDIVIDUAL INFORMATION

Jaime Rivera, P.E.

Name

Deputy Director- Pima County Regional Wastewater Reclamation Department

Title

773656

APWA Member ID # if not a member please note N/A

Pima County Regional Wastewater Reclamation Department

Agency/Organization

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Email Address

PRIMARY DESIGN CONSULTANT INFORMATION

WestLand Engineering & Environmental Services

Firm Name

Peter Mulvey, P.E.

Firm Contact Name

Project Manager, Water/Wastewater- WestLand Engineering & Environmental Services

Title

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APWA Member ID # if not a member please note N/A

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PRIMARY CONTRACTOR INFORMATION

Borderland Construction Company, Inc.

Company Name

Joel Harris, P.E.

Title

Vice President, Borderland Construction- Design-Build Team Project Manager

Company Contact Name

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Email Address

Please Note: The project cannot be submitted in multiple categories in the same year. Please include a separate description in less than 100 words, and in layperson's terms, why this project is worthy of special recognition. Describe the key award criteria that this project satisfies. This description will provide the basis for the Awards Ceremony overview and any Arizona Chapter publicity. Nominations not chosen in a specific year for the Public Works Project of the Year Award cannot be resubmitted in a subsequent year in another category.

Deadline: 12:00 Noon (Arizona Time), Monday, February 10, 2025 (only electronic submittals accepted)- late nominations will not be considered by the Awards Committee

Presentation: The winner is presented with a statue for the project owner, primary design consultant and primary contractor at the Awards Recognition Ceremony Luncheon during the Statewide Conference and featured in APWA publications. All applications will be forwarded by the Arizona Chapter to the APWA National Awards Committee for national award consideration. The Arizona Chapter and APWA National may make award selections in each category that differ.

Email nomination and attachment(s) to:

apwaaz@gmail.com

Attention: AZAPWA Awards Committee

PROJECT OVERVIEW

Project Category:
Environment

Project Division:
$25 Million - $75 Million

Managing Agency:
Pima County Regional Wastewater Reclamation Dept. (PCRWRD)

Substantial Completion:
December 9, 2024

Primary Contractor:
Borderland Construction Company, Inc. (Borderland)

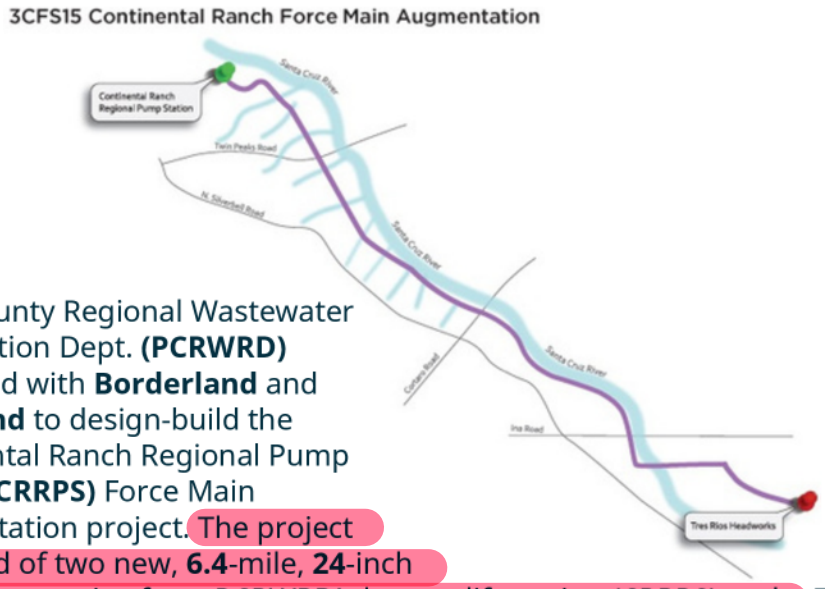
Primary Consultant:
WestLand Engineering and Environmental Services, Inc. (WestLand)

Project Cost:
32.9 Million

Project Extent:
6.4 Miles

Delivery Method:
Design Build

Other Owners:
Pima County Regional Flood Control District (PCRFCD)
Town of Marana Parks & Recreation
Town of Marana Water Department



Pima County Regional Wastewater Reclamation Dept. **(PCRWRD)** partnered with **Borderland** and **WestLand** to design-build the Continental Ranch Regional Pump Station (**CRRPS)** Force Main Augmentation project. The project consisted of two new, **6.4**-mile, **24**-inch sewer force mains from PCRWRD's largest lift station (CRRPS) to the Tres Rios Wastewater Reclamation Facility **(TRWRF)**. The addition of the dual force main pipelines increased sewer conveyance capacity, operational flexibility, and added redundancy to the existing pump station operations.

CRRPS Force Main by the Numbers:

- 67,700 LF of 24" Diameter HDPE Pipeline
  - 800 LF of 42" Steel Casing Jack&Bore (Twin Peaks Rd)
  - 950 LF of 42" Steel Casing Jack&Bore (Cortaro Road)
  - 1,960 LF of 24" Horiz. Direct. Drill (Santa Cruz River)
  - 550 LF of 24" Horiz. Directional Drill (Ina Rd)
- (2) 96" Dia. Precast Polymer Junction Structures
- (2) 84" Dia. Precast Polymer Interceptor Structures
- (3) 60" Dia. Precast Polymer Pig Catching Structures
- 53,000 SF of Water Harvesting Basins
- 14,876 SF (2,250 LF) of New Bank Protection
- 195 Trees Planted Along CHL Path
- 42 Acres of Hydroseed
- 3.6 Miles of New CHL Asphalt Path

The alignment along the western bank of the Santa Cruz River was optimized for construction and operations and passed through the Town of Marana jurisdictional limits, Pima County Regional Flood Control District (PCRFCD) parcels, public right-of-way, and private property. The PCRFCD parcels involved in this project included ones which contain infrastructure such as soil cement bank protection and the Chuck Huckelberry Loop (CHL), a highly used 137-mile multi-use trail system that goes throughout Pima County. These sections of asphalt pathway and landscaping were replaced and further enhanced with water harvesting basins and a diverse native hydroseed mix as part of the impacts from construction of the CRRPS project.

1. CRRPS Force Main Augmentation Project

Use of Good Construction Management Techniques and Completion of the Project on Schedule

i. Design Build Delivery

The design phase collaboration between PCRWRD, PCRFCD, CMID, WestLand, and Borderland was critical to managing construction phasing, schedule, and costs across the 6.4 mile project.

Borderland Construction, as the Design Builder for the CRRPS Force Main Project, partnered with Westland for design, planning, value engineering, and construction sequencing. By leveraging the design-build approach, Borderland streamlined communication and created a single point of responsibility, fostering stronger collaboration between design and construction teams. This approach accelerated project completion, reduced risk, provided cost savings, and ensured better quality control throughout the process.

What started as a transmission pipeline project for PCRWRD quickly expanded into a collaborative effort with PCRFCD, Town of Marana, CMID, and adjacent developments like the Amazon Distribution Site. Coordination near Ina Road resulted in a pipeline alignment that included new bank protection from PCRFCD, a shared-use path for Marana, and improved offsite infrastructure for Amazon.

ii. Phased Construction

The Design-Build project delivery was leveraged to develop a phasing plan that allowed expedited construction of initial improvements while addressing complicated design elements. Executed under an accelerated timeline, the project involved installing 6.4 miles of dual-force sewer beneath three major roadways - Twin Peaks, Cortaro, and Ina Road - and across the Santa Cruz River. Careful planning and precise execution across all phases included:

Use of Good Construction Management Techniques and Completion of the Project on Schedule

Phase 1A Tres Rios WRF Modifications – Existing headworks inlet piping and structures were replaced to accommodate the new dual force main system:

- (2) 96" Dia. Precast Polymer Junction Structures
- (2) 84" Dia. Precast Polymer Interceptor Structures
- (3) 60" Dia. Precast Polymer Pig Catching Structures
- Temporary Bypass Pumping/Flow Management
- Emergency Overflow Basin (EOB) piping & flow meters

Phase 1 – Tres Rios WRF to North of Ina Rd - Installation coordinated with several adjacent properties/projects:

- PC landfill remediation (alignment coordination)
- Santa Cruz River and Ina Rd Crossings (Horiz. Dir. Drill)
- Amazon Site Development (alignment coordination)
- PCRFCD Bank Protection (alignment coordination)
- Chuck Huckelberry Loop (Regional Shared Use Path)

Phase 2 – CRRPS to Phase 1 Limits - Installation coordinated with several adjacent properties/projects:

- Connection to existing CRRPS
- Marana: Waterline Project, Disc Golf, Crossroads Park
- Twin Peaks Rd and Cortaro Road Crossings (Jack & Bore)
- Chuck Huckelberry Loop (Regional Shared Use Path)

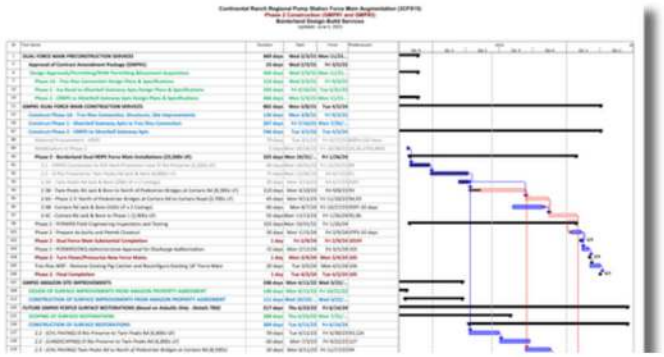
iii. Cost Management

The overall project cost was strategically managed using multiple GMP work packages to better control long-lead material purchases, construction durations/schedules, and unknown costs associated with stakeholder negotiations, such as:

- **Guaranteed Maximum Price (GMP):** GMP's were developed to efficiently construct the most time sensitive improvements and meet critical milestones while minimizing inherent inefficiencies of construction phasing such as overlapping/throw-away improvements, and duplicate mobilizations. This ensured both cost control and timely project delivery.
- **Progressive Cost Models:** Progressive cost models were developed for key elements of the CRRPS Force Main Project, such as the HDPE pipeline installation and long lead material purchases. These models were based on current market pricing, historical production rates, and detailed quantity takeoffs. This allowed the team to establish and validate the overall project budget.
    - As individual GMPs were identified for construction, Cost Model Updates were prepared for remaining preliminary designs. This allowed for short term Guaranteed Maximum Pricing in areas ready for construction while maintaining confident long-term budgeting and FY programming.

Use of Good Construction Management Techniques and Completion of the Project on Schedule

- **Carry-Forward Budgeting**: As construction of early GMP's reached substantial completion, unused line-item budgets and contingencies were carried forward to the following GMP package. This carry-forward approach ensured the project was not over-encumbered from a budgeting perspective. Even though the overall project started as two separate design efforts, careful planning allowed for one seamless and logical construction effort that maximized efficiency.
- **Scope Enhancements/Budget Flexibility**: Even with the total construction cost coming lower than the initial cost models, several scope enhancements/betterments that were not originally anticipated were easily accommodated.



iv. Successful Scheduling

The Design Build (D-B) team utilized several techniques to stay on track including:

- **Critical Path Method (CPM) Scheduling:** the project was executed under an expedited timeline, which added another layer of complexity to the task. However, CPM allowed us to focus on critical tasks to optimize the sequence of a project
- **Property Agreements & Landowner Negotiations**: The team successfully negotiated property agreements, securing easements, and managing conflicts with landowners such as Amazon, PCRFCD, CMID, and Town of Marana.
- **Weekly Progress Meetings:** 218 weekly progress meetings were held, allowing the team to stay aligned on potential schedule impacts. A three-week look-ahead schedule was monitored to track short-term activities, while Borderland management updated their internal six-month look-ahead to commit resources and meet milestones.
- **Supply Chain and Material Management:** Amid COVID-19 supply chain disruptions, the D-B team proactively secured materials like PVC pipelines and precast concrete manholes, anticipating long lead times to avoid delays. They closely tracked price fluctuations, strategically timed purchases to capitalize on favorable market conditions, and worked closely with suppliers to ensure on-time deliveries. This combination of foresight, strategic timing, and supplier collaboration allowed the project to stay on track.
- **Third-party Coordination:** dependencies like utility relocations, temporary construction easements (TCEs), permits, subcontractors, and vendors were well coordinated in advance.

Safety Performance and Demonstration of Awareness of the Need for a Good Overall Safety Program During Construction

i. Construction Zone Safety

Safety was a top priority for the D-B team, which was reflected by the crews working approximately 79,885 manhours without a lost-time accident. Safety was an integral part of the Design Build team's culture, reinforced through Borderland's full-time Safety Director, Occupational Safety and Health Administration (OSHA)'s consultation program, and a formal Safety and Health Program (SHP). Borderland made every effort to prevent the occurrence of injury or accidents within our workforce and to all others affected by our work. This was accomplished in part by consistent education, reiterating the importance of worksite safety, and by using the following tools:

- **Job Hazard Analysis:** Crews started each day with a Job Hazard Analysis to identify potential risks, including field conditions, subcontractor work zones, public safety, and hydration.
- **Special Task Hazard Analysis:** Conducted frequently for specific tasks like working near the Santa Cruz River, protecting utilities, and trench shoring.
- **Specialized Safety Training:** Site-specific training for crews working near the Santa Cruz River.
- **Inspections & Continuous Education:** Regular job site inspections by Borderland's Safety Director and ongoing training (OSHA, confined space, etc.).
- **Mandatory Safety Training:** Required for all new hires and subcontractors.
- **PPE Program:** Required training on proper use, maintenance, and care of personal protective equipment.
- **Excavation/Trenching/Shoring**: Strict adherence to OSHA excavation standards with supervisors inspecting trenches throughout the day.
- **Confined Space:** Employees working in confined spaces were trained in OSHA standards, including detection monitors and rescue systems.
- **SDS/MSDS & Hazard Communication:** All employees received training, and MSDS books were updated regularly for new chemicals used on-site.
- **Overhead Electric Protection:** Use of wrapping or other devices to prevent electric arcs.

Safety Performance and Demonstration of Awareness of the Need for a Good Overall Safety Program During Construction

ii. Public Safety

Safety for residents, businesses, schools, and the public was a priority throughout the project. Road closures and traffic changes were communicated via Pima County PR, message boards, and meetings with impacted businesses. Ongoing updates and traffic control monitoring ensured a safe environment for the traveling public.

- **Improved System Redundancy**: The upgrades to Marana's wastewater system improved environmental quality by reducing contamination risks. By effectively managing wastewater, the project helped protect public health and prevent environmental degradation. The added system redundancy further minimized the risk of operational failures, ensuring the prevention of potential health and environmental hazards.
- **Comprehensive Traffic Management Plan:** A well-planned traffic management system was implemented to minimize disruptions in the surrounding area. This included temporary lane closures, on-site traffic control (with flaggers), and a dedicated project website to keep the public informed about construction activities, traffic disruptions, and the expected timeline for each phase of the project.
- **Noise and Dust Control**: Measures were put in place to control noise and dust during construction. This included using noise-reducing equipment, water trucks to minimize dust, and implementing sound barriers around the work area to ensure that nearby residents and businesses were not disturbed.

The general nature of underground utility installation- specifically horizontal directional drilling (HDD) can be inherently dangerous for construction crews, inspection staff, surrounding property owners, and the traveling public. This project was particularly high-risk due to the new gravity sewer alignment that:

- Paralleled West Bank of the Santa Cruz River for 6.4 miles
- Crossed W Ina Rd (Trenchless - Horizontal Directional Drill Crossing)
- Crossed Cortaro Rd (Trenchless - Jack & Bore Crossing)
- Crossed Twin Peaks Rd (Trenchless - Jack & Bore Crossing)
- Crossed the Santa Cruz River (Trenchless - Horizontal Directional Drill Crossing)
- Required trenches/excavations up to 20-feet deep

3. CRRPS Force Main Augmentation Project

Community Relations

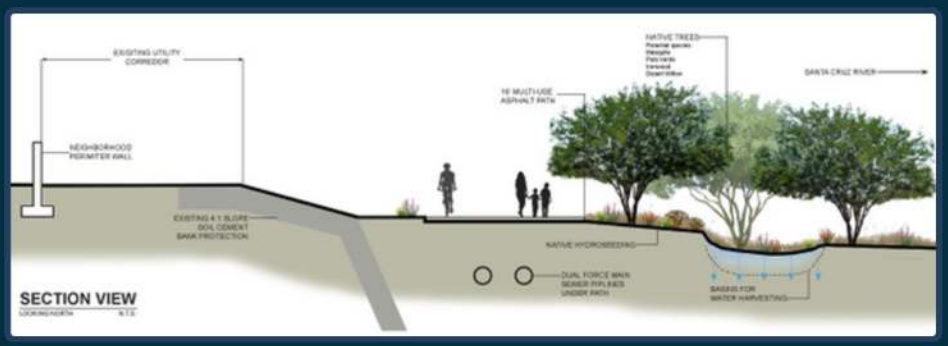
As Evidenced by Efforts to Minimize Public Inconvenience Due to Construction, Safety Precautions to Protect Public Lives and Property, Provision of Observation Areas, Guided Tours, or Other Means of Improving Relations Between Agency and the Public

i. Website

A website was maintained throughout all three phases of the Dual Force Main project. Traffic/construction alerts and maps were posted each time a change in traffic control was implemented. Traffic alerts were also sent via Constant Contact e-blast to everyone who requested project information through the website. **https://www.sewerimprovements.com/construction**

Engagement included:

- Flyers and notifications via the Marana and PCRWRD website, signage with QR codes along the path that kept residents updated on path openings and closures throughout construction, and the opportunity for the public to engage in questions and answers through the website.
- Tucson Department of Transportation (TDOT) and Arizona Department of Transportation (ADOT) Traffic Alerts
- Coverage on local news outlets- KGUN9 News, KOLD News 13, Arizona Daily Star



ii. Information Line

- A project information line was maintained throughout the duration of all phases of the project.
- Closures and repaving of the Chuck Huckelberry Loop (CHL) were communicated to the public through QR codes in nearby neighborhoods and along the path, linking to the project website with a map showing open and closed sections. Updates were also posted on the Town of Marana website.
- Traffic Management:
  - Traffic control was coordinated to ensure daily access to major nearby I-10 exits: Cortaro Road, Ina Road, Twin Peaks Road, CRRPS, Tres Rios Water Reclamation Facility (WRF), and the Amazon Distribution Center.
  - Managed construction across 3 major roadway Crossings along with high traffic implications.
  - Each traffic shift was carefully coordinated with adjacent stakeholders and construction phasing to minimize disruptions.

3. CRRPS Force Main Augmentation Project

Community Relations

Silverbell Gateway Distribution Center, Amazon

iii. Stakeholder Engagement

- **Chuck Huckelberry Loop (CHL):** The CHL is used by a large portion of the Pima County population, approximately 140,000 documented path users annually. Engagement included notifications via the PCRWRD project website and signage along the path that was updated throughout construction. **The project reconstructed 3.6-miles of shared-use path through the highly used Continental Ranch area.**
- **Adjacent Amazon Distribution Site Development:** The PCRWRD's design-build team coordinated several improvements with Town of Marana, Amazon, and PCRFCD while installing the new force main pipelines. Instead of four separate/individual projects, the single design-build effort provided an elevated pathway that protected the pipelines during flooding events, enhanced flood protection for the Amazon site, relieved Marana from recurring path damage/ maintenance, and delivered much-needed upgrades to the CHL. The team also took special care to preserve and protect the community bird sculptures along the path throughout construction. Ultimately, the public was provided a safer and more reliable walking and biking experience (See response to Question 3 for additional details)

Environmental Considerations

Demonstrated awareness for the need to protect the environment during the project. This includes any special considerations given to particular environmental concerns raised during the course of the project.

- **Proximity to residential homes**: With construction running near multiple residential neighborhoods, careful coordination was essential to minimize disruption. To keep residents informed of potential disturbances, regular updates were provided through flyers and notifications on PCRWRD & Marana websites.
- **Disturbance next to the Santa Cruz River (SCR)**: Environmental concerns were addressed through studies and the opportunity for the public to engage in questions and answers through the project website, ensuring quick resolutions and minimizing disruptions throughout the process.
- **Economic Development:** The project greatly improved the capacity and reliability of the regional wastewater infrastructure, enabling it to accommodate increased demand and supporting future growth in the Northwest Tucson/Marana area. By implementing a second force main and enhancing system redundancy, the project laid the groundwork for sustained economic expansion and ensured the infrastructure could effectively manage its existing system while also supporting growth and development in the region.
- **Environmental Risk Mitigation and Erosion Control:** Comprehensive assessments were conducted to identify potential environmental risks, evaluating impacts on local wildlife, water quality, and soil stability. To mitigate erosion and sedimentation, specific measures were integrated into the design, including the use of silt fences and sediment basins, ensuring nearby water bodies remained unaffected by construction activities.
- **Environmental and Safety Measures:** Environmental protection protocols, including the Stormwater Pollution Prevention Plan (SWPPP), were strictly followed to safeguard nearby water sources and habitats throughout the construction process. The team implemented BMP erosion control measures, such as silt fences and sediment basins, to prevent runoff and protect surrounding water bodies, including the Santa Cruz River, from contamination. Special attention was given to minimizing the impact on local wildlife, with temporary fencing to direct animals away from construction zones.

5. CRRPS Force Main Augmentation Project

Primary Stakeholders:

- The Town of Marana
- Pima County Regional Flood Control District (PCRFCD)
- Pima County Regional Wastewater Reclamation Department (PCRWRD)
- Cortaro-Marana Irrigation District (CMID)
- Adjacent development projects – including the Silverbell Gateway Amazon Distribution Center
- Future development
- Local utility providers
- Traveling public

Unusual Accomplishments Under Adverse Conditions

Including, but not limited to age or condition of the facility, adverse weather, soil or other site conditions over which there is no control.

By all definitions, the stakeholder collaboration and partnering efforts demonstrated in this project, resulted in a real-world example of a successful Public-Private Partnership to overcome complex issues and provide a direct benefit to the local community.

When Design-Build (D-B) team was initially selected by PCRWRD to design and expedite construction of critical dual force main sewer pipelines, the primary focus was determining the most appropriate sewer alignment that minimized impacts to Pima County Regional Flood Control District (PCRFCD) property and the existing Santa Cruz River (SCR) flood control bank protection. As such, the paralleling undeveloped property was an efficient choice for acquisition and location of the new sewer pipelines.

Unbeknownst to the PCRWRD D-B team, one of the selected undeveloped properties was nearing completion of the Town of Marana's planning, design, and permitting process for construction of a new Amazon Distribution Site. VanTrust Real Estate and Rick Engineering (similarly unaware of PCRWRD's critical sewer infrastructure project) had designed new site improvements to include a SCR flood control bank protection and avoid impacting the existing Chuck Huckelberry Loop (CHL) multi-use path (that was often a maintenance challenge for Marana due to frequent floods).

This new development caused several issues, including the potential need for alternative 0.75-mile pipeline alignment that would push closer to the existing CHL path and linear park - an existing public amenity that was purposefully being avoided by the design-build team due to public disturbance, replacement costs, and proximity to the Santa Cruz River floodplain. The existing CHL path experienced recurring flooding during significant rain events just north of Ina, which created numerous safety, erosion, and maintenance issues for Marana Parks and Recreation.

Unusual Accomplishments Under Adverse Conditions

In the end, rather than four individual projects/property owners working independently with little consideration for each other, Pima County negotiated to obtain easements from the Amazon Distribution Site, allowing the D-B team to integrate seamlessly with the VanTrust Site Development team and Marana Parks & Recreation staff to provide:

1. **Timely modification** of previously designed/permitted Amazon Site improvements, coordinated with new public sewer and flood control improvements - without delaying completion of the site construction.
2. **2,000 LF** of new SCR flood control bank protection - to be operated and maintained by PCRFCD (ensuring regional flood control management goals) and reducing long-term liability for the Amazon Distribution Site property.
3. **2,500 LF** of new CHL multi-use asphalt path that was raised out of the floodplain – to be operated and maintained by Marana Parks & Recreation Department (new location significantly reduces maintenance and path closures due to flooding and provides regional multi-modal connectivity to parks, roadways, and communities)
4. **New dual force main sewer pipelines** that are located out of the Santa Cruz River floodplain and protected behind the new bank protection, and under the new asphalt pathway – to be operated by PCRWRD on PCRFCD property, ensuring existing and future sewer service for the rapidly developing areas of Pima County and Marana.
5. **Revegetation and planting plan** – providing cooling, shade and returning the area to a community feature. Landscaping planning services are being provided by WestLand's landscape architects

This exemplary team-work delivered a win-win-win-win solution for each of the major stakeholders – all of which resulted in an extremely popular community recreational facility that had not been previously envisioned by any of the original projects. This project team has proven that Partnership Works!

i. Complexities

- **Supply Chain, Material Management, and Long-Lead Procurement:** Amid COVID-19 supply chain disruptions, the D-B team proactively secured materials like HDPE pipelines and precast polymer concrete manholes, anticipating long lead times to avoid delays. The team closely tracked price fluctuations, strategically timed purchases to capitalize on favorable market conditions, and worked closely with suppliers to ensure on-time deliveries. This combination of foresight, strategic timing, and supplier collaboration allowed the project to stay on track.
- **Underground Utility Infrastructure Complexities and Risks**: The proximity of existing underground utilities relative to the new pipelines and manholes required careful handling, trenching, and placement. Improper installation could have led to structural failures, leaks, or blockages, which would compromise both existing and new system functionality. Additionally, working with sewage systems presents health and environmental risks, such as exposure to hazardous materials or contamination of nearby water sources. Managing these risks involved rigorous safety protocols, regular inspections, and specialized equipment to ensure safe and efficient installation

Quality Control and Construction Innovations

Additional conditions deemed of importance to the public works agency, such as exceptional efforts to maintain quality control and, if value engineering is used, construction innovations as evidenced by time and/or money saving techniques developed and/or successfully utilized.

i. Design Phase Quality Control Efforts Enhanced by Design Build Delivery

Long-term operational efficiency of the new dual force main sewer system was a major priority for the project's design. To ensure quality design, WestLand's engineering staff prepared progressive plan sets for each phase of the project that included real-time collaborative review and input from stakeholders. Dozens of over-the-shoulder design reviews were held to build a better understanding and trust amongst the project team. This approach ensured the "big picture" quality goals were achieved, while short-term decisions were implemented. Each progressive design plan set (30%, 60%, 90%, etc.) was peer reviewed by management level staff at WestLand, PCRWRD, Borderland (D-B), and/or a directly impacted stakeholder. The design build delivery ensured that the design documents met the highest professional standards while exceeding compliance measures with relevant owner specifications and/or permitting requirements.

ii. Total Commitment to Quality Control during Construction

- Once the project moved into construction, a collaborative all-hands-on-deck approach was implemented to deliver the highest quality improvements possible. Every major stakeholder contributed to the overall construction quality, and the keys to success included:
- PCRWRD Conveyance Staff and PCRWRD Field Engineering Staff performing daily inspection of force main sewer system installation
- WestLand Engineering staff remaining under contract with PCRWRD for post-design engineering services joined weekly progress meetings, visited the construction site, and assisted with optimizing construction as it occurred.
- Qualifications-based selection of the design build contractor (Borderland) that employs highly skilled professionals, tradesmen, and construction experts with a locally owned fleet of equipment that was uniquely suited for the specific scope of work
- Borderland developed a project-specific quality control plan based on a plan-do-check-act process, that included:
- Establishing a material submittal review process and log with PCRWRD and Westland for tracking materials and shop drawings to ensure compliance with Plans and Specifications
- Early incorporation of stakeholder construction permitting requirements in the construction implementation plan (ADEQ Construction Authorization, Survey Cut Sheets, Bedding Sand Analysis, Ductile Iron Certifications, etc.).
- Developing an inspection log that was included in the weekly meeting agenda to ensure advance notification/scheduling of upcoming inspections and testing needs.
- A permit close-out/action item log that was included in the weekly meeting agenda to ensure quality requirements were progressively being met and monitored so close-out could occur in a timely manner.

Quality Control and Construction Innovations

- A full-time Quality Control subconsultant was onsite as part of the Design Build construction team to provide real-time testing results that met or exceeded project requirements, all demonstrated through the Daily Observation and Testing Reports prepared by the field technician. Upon completion of sewer construction, all of the daily tests and observations, making up thousands of pages, were compiled into a complete QC package for PCRWRD. The package represents all of the reports validating that all testing procedures were adhered to in accordance with stakeholder requirements.
- Pima County Department of Transpiration performing daily inspections of all surface restorations within Pima County roadways and ROW.

iii. Innovative/Original Considerations

- **Horizontal Directional Drilling (HDD)**: Instead of traditional open-cut trenching, HDD was utilized to install the pipeline underneath challenging areas, such as the Santa Cruz River and Ina Road. This method involved drilling a pilot hole along a planned path (at nearly 40-feet deep) then the pipeline was pulled through, thereby minimizing surface disruptions and making it an environmentally friendly solution within the Santa Cruz River riparian area.

- **Jack & Bore:** Trenchless technology was used to cross under Cortaro Rd and Twin Peaks Rd) with minimal disruption to existing public right-of-way, utilities, and traffic. This technique involved augering a horizontal tunnel while pushing a steel casing that carried the HDPE pipelines. By employing this method, we minimized the impact on surrounding infrastructure and the environment, allowing for efficient installation without disrupting traffic or damaging the roadways.

- **Dual-Pump System Design:** The installation of two new 6.4-mile, 24-inch sewer force mains - one dedicated to capacity and the other for redundancy - ensures greater operational flexibility and system reliability.

- **3D LiDAR Scanning:** Surveying drone technology was used to capture precise data and create a detailed 3D model of the existing topography. This enabled us to ensure all surface restorations, pathway paving, and landscaping/water harvesting features seamlessly aligned with existing improvements. The flexibility of numerous drone surveys, immediately following pipeline backfill operations, significantly reduced time and costs associated with surface restoration designs, while improving accuracy and execution of the project.

Quality Control and Construction Innovations

iv. Value Engineering

At the start of the project, a comprehensive analysis was conducted to evaluate the cost-benefit of various materials for manholes, structures, and pipes, focusing on longevity, installation costs, and future maintenance. PCRWRD reviewed these options to select the best materials, considering the unique challenges of operating and maintaining a sewer system. Factors such as the corrosive nature of sewer flows, low slopes, densely populated location, and extensive length of the system - all contributing to hydrogen sulfide production and corrosion - were key considerations. To address these challenges, materials resistant to corrosion were prioritized for long-term sustainability.

- **Pipeline Material Analysis:** The team analyzed various pipeline materials (HDPE, PVC, FRP, SaniTite HP Dual Wall, GRP) considering long-term performance and market conditions. Ultimately, high-density polyethylene (HDPE) was selected for its flexibility, durability, long lifespan, corrosion resistance, cost-effectiveness, and lightweight nature, all of which contributed meeting the project schedule.
- **Alternative Precast Concrete Manholes:** The precast polymer manholes accelerated installation and provided 50-year corrosion protection, reducing long-term maintenance. Selected for their superior corrosion resistance, lightweight design, and extended lifespan, they also offer better chemical resistance and potential cost savings due to reduced maintenance needs. Ideal for harsh environments like sewer systems, these manholes enhanced both project efficiency and durability, ensuring long-term performance with minimal upkeep and superior cost benefit.

Use of Alternative Materials and Practices for Sustainable Infrastructure

Use of alternative materials, practices or funding that demonstrates a commitment to sustainability and/or use of sustainable infrastructure rating system or the equivalent.

The complex, 6.4-mile sewer installation project required innovative solutions to meet the demands of both the Town of Marana and PCRWRD. The traditional gravity sewer system approach would have involved strict adherence to PCRWRD standards and open-trench installations, requiring significant additional improvements along the project route, including roadways, utilities, and private properties. The Design-Build delivery method allowed PCRWRD, WestLand, and Borderland to recognize the project as more than just pipeline and manhole installation.

The team utilized several alternative materials and methods to optimize value, reduce impacts, and maximize overall benefit to PCRWRD. Key examples included, **Precast Polymer Concrete Manholes, coupled with Hobas, HDPE, and PVC pipelines,** which are all corrosion resistant and require minimum maintenance with no linings to repair or structures to rebuild. To optimize force main design, **six air-vacuum release valves** were placed in above-ground protective enclosures. An engineering analysis confirmed that daily flows were sufficient to move accumulated air, reducing the number of required air valve locations, minimizing maintenance efforts and vulnerability to damage or vandalism.

The project utilized sustainable construction practices, including **recycling asphalt** for restoring and resurfacing roads and pathways. Recycled asphalt reduces the need for new raw materials and minimizes the environmental impact associated with mining, transporting, and manufacturing the material.

i. Creates Jobs and Stimulates the Economy

The project is strategically aligned with the rapid growth of the northwest Tucson/Marana area, which includes residential and commercial developments. A more robust wastewater system was crucial for sustaining this growth, making the area more attractive to developers, businesses, and residents. These efforts led to new job opportunities in both construction and long-term operations and maintenance of the infrastructure, leading to stable jobs in wastewater management.

Use of Alternative Materials and Practices for Sustainable Infrastructure

ii. Reducing GHG Emissions

The project employs trenchless technology, such as Horizontal Directional Drilling (HDD) under the Santa Cruz River and Ina Road, minimizing excavation and reducing emissions from construction activities like fuel consumption and soil disturbance. This method helps preserve local ecosystems and riparian habitats. Additionally, the project enhances infrastructure in the rapidly developing areas of northwest Tucson and Marana, enabling higher-density, sustainable development. By improving wastewater management, it supports compact, energy-efficient urban growth, reducing sprawl and the carbon footprint of new housing and commercial projects. While the direct emissions reduction may be modest, the project plays a key role in Pima County's carbon-neutral goals by providing foundational infrastructure that supports broader sustainability efforts, such as energy use reductions and renewable energy integration in wastewater operations.

iii. Reducing Water & Energy Usage through Sustainable Infrastructure

The new dual-force main sewer system was designed to enhance operational efficiency. By optimizing wastewater conveyance, the system reduces the need for excessive pumping and energy-intensive operations, lowering overall energy consumption. This supports broader sustainability goals by reducing energy use in wastewater treatment processes. Additionally, by minimizing leaks and improving system capacity, the project reduces water loss and maximizes the utilization of available water for treatment.

iv. Promoting Social Equity and Community Cohesion

The project's benefits extend well beyond the immediate stakeholders, positively impacting the broader community. The creation of new public recreational spaces has provided residents across the County with opportunities for outdoor activities such as biking, walking, and running. With 140,000 documented path users annually, this new public space will serve the community for years to come, fostering greater social equity and community cohesion.

v. Improving Public Health, Safety, and Access to Essential Services

The project enhances both public health and safety by improving sewage transport and flood control infrastructure. It ensures more efficient and reliable sewage conveyance to treatment facilities, reducing the risk of overflows or system failures that could lead to water contamination and the spread of waterborne diseases. The project also adds 2,000 linear feet of protective bank stabilization along the Santa Cruz River, significantly reducing flood risks and safeguarding local residents and infrastructure from potential hazards. These upgrades prevent property damage and contribute to safer, more resilient communities.

vi. Cost-Effective & Leading to Long-Term Operational Efficiencies

The new dual-force main sewer system improves the reliability and durability of wastewater conveyance, reducing the risk of system failures and minimizing the need for frequent repairs, which in turn lowers ongoing maintenance costs. The addition of a second force main ensures uninterrupted operation, even during maintenance, reducing costly downtime. This scalable system also increases wastewater transport capacity, supporting future growth in the area. By incorporating efficient technologies and sustainable materials, the project delivers long-term savings in material procurement, transportation, and construction.

7. CRRPS Force Main Augmentation Project

Use of Alternative Materials and Practices for Sustainable Infrastructure

Description	Amount ($)
Original GMP Amount	$38.1 M
Final Construction Cost	$32.9 M
TOTAL SAVINGS	**$5.2 M**

- **Efficient Project Delivery:** By utilizing a Design-Build approach, the team was able to streamline the design and construction processes, ensuring timely approvals, permitting, and material procurement. The phased construction allowed for early completion of critical tasks, while the use of Guaranteed Maximum Price (GMP) work packages helped control costs and reduce inefficiencies. Regular progress meetings, detailed scheduling, and close coordination with stakeholders ensured **the project was delivered on time and nearly $5.2 M under budget.**
- **Cost-effective Solutions:** Recognizing budget constraints, the team provided cost-effective solutions, such as designing a temporary bypass pump station, which ensured continuous, uninterrupted flow of wastewater and eliminated the need for expensive backup generators while ensuring operational continuity in the event of a failure.
- **Preparing for Future Growth:** By designing and implementing a second force main and addressing system redundancy, the project supported future growth in Pima County, more specifically The Town of Marana, positioning the infrastructure to handle increased wastewater flow and supporting continued economic development.
- **Minimized Disruption:** The team used phased construction techniques to reduce design conflicts and ensure a smooth, efficient construction process, minimizing disruptions to utilities impacted, the pump station's operations, and the surrounding community.
- **Enhanced System Capacity and Reliability:** The installation of two new 6.4-mile, 24-inch sewer force mains significantly increased the system's capacity, allowing it to accommodate future wastewater flows. The redundant pipeline ensures that the system remains operational even in the event of failure or maintenance, providing critical reliability for the Pima County Regional Wastewater Reclamation Department (PCRWRD).

Why This Project is Worthy of Special Recognition

The CRRPS Force Main Project successfully exceeded the owner's expectations by applying effective construction management techniques that ensured the project was completed on schedule and within budget. A strong safety program was implemented, safeguarding both workers and the public, while minimizing community disruption through phased construction and proactive engagement efforts. Environmental stewardship was prioritized, with measures in place to protect wildlife and water sources throughout the construction process. Despite challenging site conditions, the team delivered innovative solutions, including temporary bypass systems and the use of alternative materials, resulting in time and cost savings. The project also demonstrated a commitment to sustainability, utilizing eco-friendly materials and practices to enhance the long-term resilience of the infrastructure.

By addressing the full scope of the owner's needs and delivering a future-ready, compliant, and efficient wastewater conveyance system, the project not only met but exceeded the owner's expectations.

Borderland WOULD LIKE TO EXTEND A HUGE

THANK YOU

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