

The Future of Construction Site Automation



What's in it for me? What your construction job will look like in the future.

By David Gaw,

The construction site is changing rapidly. Automation, new technologies and methods—and the demands to continuously improve cost, schedule, safety and quality—are all pushing modern construction management into a completely new era. We hear the buzzwords: the Internet of Things, the connected jobsite, analytics. But what do they really mean for the day to day work on a jobsite? How will they really impact the true business goals of construction?

Life on the Construction Site of the Future

Paul Moore has been a project manager for eight years executing a variety of medium to larger commercial construction projects. In this story we imagine the near future and what a typical day would be like on Paul's project.

Paul is fortunate to have the latest automated site monitoring system in place on this project. His day starts with a weather alert that flags several planned tasks as being potentially impacted. He is able to quickly coordinate with team members to make contingencies for those tasks to minimize schedule and staffing impacts. The recorded weather data is used during future contract discussions with subcontractors about weather impacts to their tasks.

Paul is concerned about a major assembly operation planned for today. He pops open the as-built image archive that the site monitoring system is providing. He is able to zoom in and confirm that the prior metal assemblies were indeed completed correctly, and so he gives the team the go ahead to proceed.

During his walk around, Paul receives an alert about the scheduled drone flight. He looks around to ensure that a flight would be safe and clicks "ok," allowing the drone to take off from its nest. These aerial images are helpful in planning placement of some major material deliveries coming up. Paul also likes that the fully self-driving drones do not require the kind of operation or training time from his staff that the old ones did.

A small alert screen on his tablet shows the icons representing all staff currently onsite. Staff are automatically screened as they enter, and problems with credentials or safety gear are reflected in icon colors. A touch of the icon can send them a reminder message. All entrances and exits from the site are logged with summary reports available.

His tablet then pops up an urgent alert that he is copied on. The safety officer has received an alert that there is equipment detected in a restricted area. Since he is near the location, he walks over and directs the team to move the equipment and then clicks on the alert to mark it "handled."

Paul then flips to his "asset planning" screen to see utilization of assets onsite and planned delivery/pickup schedules. He notices a "low" utilization on one of the large excavators. He makes a quick call to his crew and confirms that they indeed had been able to complete some earlier steps quicker than expected. He clicks on the "notify vendor" button ordering that excavator's early pick up, helping him keep on budget.

He gets a call from the VP of construction, Don. Don was browsing the real-time camera feed images. He noticed that materials for the upcoming

pad build had been delivered and placed on the south corner. This would be a problem for the next excavation steps. The alert to Paul meant they avoided delay.

Paul walks to the second-floor bridge structure that had been completed last week. He knows this will be a critical path next week. He pulls up the BIM augmented-reality app on his tablet to view the BIM model overlaid on the site. It describes the next assembly steps. He clicks the image archive for that viewpoint, and replays the timestamped images taken during the last assembly steps. He is able to confirm that the steps were done according to plan. He is confident they are ready for the next step.

Back in the trailer, Paul takes a quick look at the aerial imagery collected by the drone flights this morning. It is nicely overlaid on the floorplan from the BIM, and he quickly notices that there is a gap on the northwest corner. He reaches out to the team and finds out that some materials had been in the way of completing the excavation the day before but have since been moved, and that the team was planning to complete it later today.

Paul receives an alert on his tablet that a new materials delivery has just arrived on the site. The system automatically pops up the planned delivery schedule, so that

Continued on page 5

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California Sub-Bid Request Ads



Kiewit

Kiewit Infrastructure West Co.
4650 Business Center Drive Fairfield, CA 94534
Attn: Victor Molina • norcal.bids@kiewit.com
Fax: 707-439-7301

Requests sub-bids from qualified Subcontractor, Service Providers, Consultants, and/or Suppliers seeking to participate in the City of Shasta Lake Wastewater Treatment Plant Upgrade in City of Shasta Lake, CA.

<http://www.epa.gov> / <http://www.sba.gov> /
www.californiaucp.org

Subcontractors and Suppliers for the following project:

CoSL Wastewater Treatment Plant Upgrade Project – Bid No. 2018-01

Owner: City of Shasta Lake

Bid Date: November 02, 2017 @ 2:00 P.M.

Disadvantaged Business Enterprises (DBEs)

Minority Business Enterprise (MBE), Women Business Enterprise (WBE), Small Business Enterprise (SBE), Small Business in a Rural Area (SBRA), Labor Surplus Area Firm (LSAF), or Historically Underutilized Business (HUB) Zone Businesses wanted for the following scopes, including, but not limited to:

Asphalt Paving, Minor Concrete, Concrete Pumping, Concrete Ready-mix, Masonry, Reinforcement, Precast Concrete, Cast in Place Concrete, Clear & Grub, Earthwork, Electrical, Equipment, Grading, HVAC, Joint Sealant, Metals, Paintings & Coatings, Piping, Valves & Gates, Instrumentation & Controls, Street Sweeping, SWPPP, Thermal & Moisture Protection, Trucking & Hauling, Joint Sealant, FRP Fabrication, Roof Insulation, Rough Carpentry, Demolition, Crack Repair & Misc. Metals

Bonding, insurance, and any technical assistance or information related to the plans or specification and requirements for the work will be made available to interested CUCP, MBE, SBE, SBRA, LSAF or HUB Certified DBE business suppliers and subcontractors. Assistance with obtaining necessary equipment, supplies, materials, or services for this project will be offered to interested certified suppliers and subcontractors.

Subcontractor and Supplier Scopes are due

October 27, 2017 and

Quotes NO LATER THAN November 1, at 5 PM.

Plans are available for viewing at our office at our address below and through SmartBidNet (SBN).

All subcontractors that are registered in our SBN database will receive an invitation to bid. Please visit <http://www.kiewit.com/districts/northern-california/overview.aspx> to register your company to be able to receive bidding information, view plans and specifications.

You can view the plans in our office during regular business hours by appointment.

Performance Bond and Payment Bonds may be required for subcontractors and a suppliers bond for suppliers.

Prevailing Wages apply.

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DIR # 1000001147



Is requesting quotes from qualified DBE Subcontractors, Suppliers, and Service Providers for the following (but not limited to) work

Pavement Grinding, AC Paving, Stripe & Mark, Traffic Control, Aggregate, Pipe PVC, SWPPP, Schedule, Shoring, Bore & Jack, CCTV

Hi-Desert Water District Wastewater Reclamation Project Phase 1 Collection System Bid Package C

Located in Yucca Valley, San Bernardino County, California

Hi-Desert Water District

BID DATE October 10, 2017 @ 2:00 p.m.

Sub & Vendor Scopes and Bids Due Prior

Sukut Construction, LLC

4010 W. Chandler Avenue, Santa Ana, CA 92704

Contact: Robbie Zwick

Phone: (714) 540-5351 • Fax: (714) 545-2003 • Email: estimating@sukut.com

Plans/specs are available for viewing at our office by appointment, by Sukut FTP, or from Owner's website at <https://atkins.box.com/s/mgqmr22xz2ge18jqhmi3w1qxsnsurq>. Subcontractors must be prepared to furnish 100% performance and payment bonds and possess current insurance and workers' comp coverage. Sukut Construction will assist qualified subcontractors in obtaining bonds, insurance, and/or lines of credit. Subcontractors/Vendors will be required to sign Sukut's Standard Subcontract/Purchase Order. Copies are available for examination. Please contact Sukut Construction for assistance in responding to this solicitation.

Sukut Construction's listing of a Subcontractor in its bid to the agency is not to be construed as an acceptance of all of the Subcontractor's conditions or exceptions included with Subcontractor's price quotes. Quotations must be valid for the same duration as specified by Owner for contract award.

Sukut Construction, LLC

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CAHILL CONTRACTORS, LLC

Colby Smith at estimating@cahill-sf.com
(415) 677-0611

CAHILL CONTRACTORS, LLC requests bids from Certified SBE Subcontractors and Suppliers **EXCEPT** for the following TRADES:

Site Clearing & Demo / Windows & Glazing / Shoring & Underpinning / Piles / Drilled Piers & Ground Improvement / Personnel Hoist / Crane Service / Elevators / MEP Design Build / Fire Sprinklers / Exterior Building Maintenance / Signage

1296 SHOTWELL ST.
SENIOR AFFORDABLE HOUSING (REMAINING TRADES)
1296 Shotwell Street,
San Francisco, CA 94110

This is CMD project with construction workforce and prevailing wage requirements.

BID DATE: 10/13/17 @ 2PM

Voluntary Pre-bid Meeting:
9/26/17 @ 2PM, Cahill's Office
425 California St., Suite 2200
San Francisco, CA 94104
Voluntary Job Walk: 9/27/17 @ 10AM

BID DOCUMENTS:

Please contact Colby for access to documents on BuildingConnected.

CAHILL CONTRACTORS, LLC

Colby Smith at estimating@cahill-sf.com
(415) 677-0611

CAHILL CONTRACTORS, LLC requests bids from ALL Certified SBE Subcontractors and Suppliers **EXCEPT** for the following TRADES:

Site Clearing & Earthwork / Shoring & Underpinning / Exterior Building Maintenance / Fire Sprinklers / Plumbing / HVAC / Electrical / Solar Panels

PARCEL Q (REMAINING TRADES)
1491 Sunnydale Ave,
San Francisco, CA 94134

This is a CMD project with construction workforce and prevailing wage requirements.

BID DATE: 9/29/17 @ 2PM

Voluntary Pre-bid Meeting:

8/31/17 @ 10AM,

Cahill's Office

425 California St., Suite 2200
San Francisco, CA 94104

BID DOCUMENTS:

Please contact Colby for access to documents on BuildingConnected.

1984

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California Sub-Bid Request Ads



Project Name: Mission Bay Block 3E – SPECIAL INSPECTION
Location: San Francisco, California
Bid Date: October 12, 2017 @ 2:00 PM

Nibbi Brothers has been selected as the General Contractor for the Mission Bay Block 3E project in San Francisco. We are in receipt of the bid documents and are currently requesting bids from qualified subcontractors including those certified with the Office of Community Investment and Infrastructure (OCII) for SPECIAL INSPECTION. The Office of Community Investment and Infrastructure (OCII) participation goal has been established for this project 50% SBE/LBE goal with first consideration for San Francisco-based MBEs, WBEs and SBEs located in zip code areas 94124,94134 and 94107 followed by all areas in San Francisco. The Mission Bay Block 3E program goal is to provide a safe and healthy home for families and veterans. In addition, Nibbi Brothers is committed to supporting this goal by achieving a minimum of 5% Disable Veteran Business Enterprise (DVBE) participation. All bidders should visit <https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx> to search for DVBE's and solicit their participation in some capacity with your specific scope of work. Your proposed DVBE participation in your bid will be evaluated along with the bid and scope inclusions. The project consists of new construction of 101 affordable housing units in San Francisco with a total of 123,701 gross square-feet. The 4-story type V over 1-story type I housing project is to provide a safe and healthy home to support spaces for families and veterans. The building is organized into three wings surrounding a large landscaped multi-use courtyard. The project will also include a main lobby, activity rooms, administrative offices, storage, bike parking and an on-grade parking garage with 25 spaces.

To obtain bid documents through Building Connected, please contact Kristin Medwick, Senior Precon and Estimating Coordinator, kristinm@nibbi.com. For specific questions regarding this project please contact Joanna Chellino, Preconstruction Manager, joannac@nibbi.com.

Kiewit / Manson MOTCO, AJV

4650 Business Center Drive Fairfield, CA 94534
 Attn: Victor Molina • norcal.bids@kiewit.com
 Fax: 707-439-7301

Requests quotes/bids from qualified Small Business Concerns (SBC), including SDB, WOSB, HUBZone SB, VOSB & SDVOSB certified by The System for Award Management (SAM).

<https://www.sam.gov/portal/public/SAM>
 Subcontractors and Suppliers for the following project:

Replacement/Upgrade Pier 2 - Military Ocean Terminal Concord (MOTCO)
Location: Concord, CA
Solicitation No. W9123817R0065
Owner: U.S. Army Corps of Engineers (USACE)
Bid Date: October 26, 2017 at 12:00 P.M.
Quotes Due: October 20, 2017 at 4:00 P.M.

Small Business Concerns (SBCs)

Wanted for the following scopes, including, but not limited to:

Asphalt paving, Biological assessment and monitoring, Building Construction, Site Mechanical, Utilities, Concrete Reinforcing, Concrete Repair, Concrete, Concrete Pumping, Underwater Demolition (ordnances), Earthwork/Excavation, Electrical, Marine Fenders, Marine Towing; Piling, Precast Concrete, Quality Control/Assurance, Dynamic Pile Testing, MEC/UXO, Street Sweeping, Trucking/Hauling and Water Truck.

Bonding, insurance and any technical assistance or information related to the plans or specification and requirements for the work will be made available to interested certified, SBC suppliers and subcontractors. Assistance with obtaining necessary equipment, supplies, materials, or services for this project will be offered to interested suppliers and subcontractors.

Subcontractor and Supplier Scopes are due October 16, 2017 and Quotes

NO LATER THAN October 20, 2017 by 4 PM.

Plans and specifications are available through SmartBid-Net (SBN) or the Government's website at www.fbo.gov. All subcontractors that are registered in our SBN database will receive an invitation to bid. Please visit <http://www.kiewit.com/districts/northern-california/overview.aspx> to register your company and to be able to receive bidding information, view plans and specifications.

You can view the plans in our office during regular business hours by appointment.

Performance Bond and Payment Bonds may be required for subcontractors and a suppliers bond for suppliers.

Buy American Act applies
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Gallagher & Burk, Inc.

344 High Street • Oakland, CA 94601
 Phone: (510) 261-0466 • FAX (510) 261-0478
 Estimator: Jim Yackley
 Website: www.gallagherandburk.com

Gallagher and Burk, Inc. is soliciting for L/SLBEs for the following project.

CITYWIDE PAVEMENT REHABILITATION
REBID PROJECT NO. C1003298

L/SLBE GOAL: 50%

OWNER: CITY OF OAKLAND
 250 Frank H. Ogawa Plaza, Room #101,
 Oakland, CA 94612

BID DATE: OCTOBER 5, 2017 @ 2:00 P.M.

We hereby encourage responsible participation of Local & Small Local Business Enterprises, and solicit their subcontractor or materials and/or suppliers quotation for the following types of work including but not limited to:

Adjust Iron, Minor Concrete, Roadside Signs, Roadway Excavation, Slurry Seal, Striping, Survey/Staking, Traffic Control Systems, Trucking, Water Trucks, Street Sweeping, Class 2 Aggregate Base Material, Hot Mix Asphalt (Type A) Material, Hot Mix Asphalt (Type B) Material and Rubberized HMA (Gap Grade Material).

Plans and specifications may be reviewed at our offices located at 11555 Dublin Boulevard, Dublin, CA or 7700 College Town Drive, Sacramento, CA, or at your local Builders Exchange, or reviewed and downloaded from the ftp site at <ftp://ftp%25gallagherburk.com:f7pa55wd@pub.gallagherburk.com> (if prompted the username is ftp@desilvagates.com and password is f7pa55wd) or from the Owner's ISupplier System free of charge at <http://www2.oaklandnet.com/Government/CP/s/ContractingPurchasingOpportunities/index.htm> or from CIPList.com <http://ciplist.com/plans/?Oakland/city/9392>.

Fax your bid to (510) 261-0478 to the attention of Estimator Jim Yackley. If you have questions for the Estimator, call at (510) 261-0466. When submitting any public works bid please include your DUNS number and DIR number. For questions regarding registration for DIR use the link at: www.dir.ca.gov/Public-Works/Public-Works.html

If you need L/SLBE support services and assistance in obtaining bonding, lines of credit, insurance, necessary equipment, materials and/or supplies or related assistance or services, for this project call the Estimator at (510) 261-0466, or contact your local Small Business Development Center Network (<http://californiasbdc.org>) or contact the California Southwest Transportation Resource Center (www.transportation.gov/osdbu/SBTRCs). GBI is willing to breakout portions of work to increase the expectation of meeting the L/SLBE goal. At our discretion, 100% Payment and 100% Performance bonds may be required as a subcontract condition. This will be a PREVAILING WAGE JOB. GBI is an equal opportunity employer.

TAFT ELECTRIC COMPANY
 1694 EASTMAN AVENUE, VENTURA, CA 93003
 Contact: Arnold Tostado • atostado@taftelectric.com
 Phone: (805) 642-0121 • Fax: (805) 650-9015

Invites sub-bids from qualified DBE businesses for the following project:
Highway Safety Improvement Program (HSIP) Traffic Signal Upgrades
Phase II - HSIPL-5007 (073)
Location: Santa Barbara, California
BID DATE: October 5, 2017 @ 3:00 PM

Trades: Traffic Control, Traffic Signal Material

We are an Equal Opportunity Employer and intend to seriously negotiate with qualified Disadvantaged Business Enterprise subcontractors and suppliers for project participation.

Payment and performance bonds may be required. Please contact us at the above listed number for further information regarding bidding on this project. To the best of our abilities we will help with bonds/insurance/credit. Plans are available for viewing at our office.

We Are An Equal Opportunity Employer



California Sub-Bid Request Ads



Graniterock

5225 Hellyer Avenue, Suite #220
San Jose, CA 95138
Phone (408) 574-1400 Fax (408) 365-9548
Contact: Patrick McDonald
Email: estimating@graniterock.com

REQUESTING SUB-QUOTES FROM QUALIFIED SBE / MBE / WBE / DBE SUBCONTRACTORS/SUPPLIERS/TRUCKERS FOR:

2017 Storm Damage Repair, Phase 1
Owner: Contra Costa Water District
Engineers' Estimate: \$2,600,000.

BID DATE: October 17, 2017 @ 10:00 AM

Items of work include but are not limited to: SWPPP, Trucking, Fence, Traffic Control and Hydroseeding.

Granite Rock Company 'Graniterock' is signatory to Operating Engineers, Laborers, Teamsters, Carpenters and Cement Masons unions. 100% performance and payment bonds will be required from a qualified surety company for the full amount of the subcontract price. Bonding assistance is available. Graniterock will pay bond premium up to 1.5%. In addition to bonding assistance, subcontractors are encouraged to contact Graniterock Estimating with questions regarding obtaining lines of credit, insurance, equipment, materials and/or supplies, or with any questions you may have. Subcontractors must possess a current contractor's license, DIR number, insurance and worker's compensation coverage. Subcontractors will be required to enter into our standard contract. Graniterock intends to work cooperatively with all qualified firms seeking work on this project.

We are an Equal Opportunity Employer



Graniterock

5225 Hellyer Avenue, Suite #220
San Jose, CA 95138
Phone (408) 574-1400 Fax (408) 365-9548
Contact: Vicki Narciso
Email: estimating@graniterock.com

REQUESTING SUB-QUOTES FROM QUALIFIED SBE SUBCONTRACTORS/SUPPLIERS/TRUCKERS FOR:

Main Avenue and Madrone Pipeline Restoration Project
Contract No. C0633

Owner: Santa Clara Valley Water District
Engineers' Estimate: \$12,000,000.

BID DATE: October 11, 2017 @ 2:00 PM

Items of work include but are not limited to: Sawcutting, Clearing & Grubbing, HDPE Pressure Pipe, Traffic Control, Slope Protection, Filter Fabric, Adjust Utilities and Trucking.

Granite Rock Company 'Graniterock' is signatory to Operating Engineers, Laborers, Teamsters, Carpenters and Cement Masons unions. 100% performance and payment bonds will be required from a qualified surety company for the full amount of the subcontract price. Bonding assistance is available. Graniterock will pay bond premium up to 1.5%. In addition to bonding assistance, subcontractors are encouraged to contact Graniterock Estimating with questions regarding obtaining lines of credit, insurance, equipment, materials and/or supplies, or with any questions you may have. Subcontractors must possess a current contractor's license, DIR number, insurance and worker's compensation coverage. Subcontractors will be required to enter into our standard contract. Graniterock intends to work cooperatively with all qualified firms seeking work on this project.

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DESILVA GATES CONSTRUCTION

11555 Dublin Boulevard • P.O. Box 2909
Dublin, CA 94568-2909
(925) 829-9220 / FAX (925) 803-4263
Estimator: VICTOR LE
Website: www.desilvagates.com
An Equal Opportunity Employer

DeSilva Gates Construction (DGC) is preparing a bid as a Prime Contractor for the project listed below:

CALTRANS ROUTE 680 – CONSTRUCTION ON STATE HIGHWAY IN FREMONT AND AT SUNOL FROM MISSION BOULEVARD SEPARATION TO KOOPMAN ROAD UNDERCROSSING,
Contract No. 04-4G0564,
Federal Aid Project No. ACIM-680-1(079)E,
Disadvantaged Business Enterprise Goal
Assigned is 12%

OWNER: STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
1727 30th Street, Bidder's Exchange, MS 26,
Sacramento, CA 95816

BID DATE: OCTOBER 3, 2017 @ 2:00 P.M.

DGC is soliciting quotations from certified Disadvantaged Business Enterprises, for the following types of work and supplies/materials including but not limited to:

AC DIKE, ASBESTOS COMPLIANCE PLAN, BIOLOGIST CONSULTANT, BRIDGE, CLEARING AND GRUBBING/DEMOLITION, CONCRETE BARRIER, CONSTRUCTION AREA SIGNS, CHANNELIZER, TRAFFIC PLASTIC DRUM, CRACK SEALING, CRACK AND SEAT, ELECTRICAL, EROSION CONTROL, FABRIC/GEOSYNTHETIC PAVEMENT INTERLAYER, FENCING, LEAD COMPLIANCE PLAN, METAL BEAM GUARDRAIL, MINOR CONCRETE, MINOR CONCRETE STRUCTURE, PREPAVING INERTIAL PROFILER, PREPAVING GRINDING DAY, LCB, JPCP, ISR & APPROACH SLAB, ROADSIDE SIGNS, DELINEATOR, OBJECT MARKERS, RUMBLE STRIP, SIGN STRUCTURE, SOLDIER PILE WALL, SOIL NAIL & GROUND ANCHOR WALL, STRIPING, SURVEY/STAKING, SWPPP/WATER POLLUTION CONTROL PLAN PREPARATION, TEMPORARY EROSION CONTROL, UNDERGROUND, VEGETATION CONTROL, VIBRATION MONITORING, SURVEY AND MONITORING, TRUCKING, WATER TRUCKS, STREET SWEEPING, CLASS 2 AGGREGATE BASE MATERIAL, CLASS 2 AGGREGATE SUBBASE MATERIAL, HOT MIX ASPHALT (TYPE A) MATERIAL, PERMEABLE MATERIAL, RUBBERIZED HMA (OPEN GRADE) MATERIAL, RUBBERIZED HMA (GAP GRADE) MATERIAL.

Plans and specifications may be reviewed at our offices located at 11555 Dublin Boulevard, Dublin, CA or 7700 College Town Drive, Sacramento, CA, or at your local Builders Exchange, or reviewed and downloaded from the ftp site at <ftp://ftp%25desilvagates.com:f7pa55wd@pub.desilvagates.com> (if prompted the username is ftp@desilvagates.com and password is f7pa55wd) or from the Owner's site at www.dot.ca.gov/hq/esc/oe/weekly_ads/all_adv_projects.php

Fax your bid to (925) 803-4263 to the attention of Estimator Victor Le. If you have questions for the Estimator, call at (925) 829-9220. When submitting any public works bid please include your DUNS number and DIR number. For questions regarding registration for DIR use the link at: www.dir.ca.gov/Public-Works/PublicWorks.html

If you need DBE support services and assistance in obtaining bonding, lines of credit, insurance, necessary equipment, materials and/or supplies or related assistance or services, for this project call the Estimator at (925) 829-9220, or contact your local Small Business Development Center Network (<http://californiasbdc.org>) or contact the California Southwest Transportation Resource Center (www.transportation.gov/osdbu/SBTRCs). DGC is willing to breakout portions of work to increase the expectation of meeting the DBE goal.

At our discretion, 100% Payment and 100% Performance bonds may be required as a subcontract condition. This will be a PREVAILING WAGE JOB. DGC is an equal opportunity employer.



Proven Management, Inc.

225 3rd Street, Oakland, CA 94607 Phone: 510-671-0000 • Fax: 510-671-1000

Requests proposals/quotes from all qualified and certified DBE/WBE subcontractors, suppliers, and truckers for the following project:

MISSION BLVD CORRIDOR IMPROVEMENTS, PHASE 2
CITY OF HAYWARD
Bids: 10/31/2017 @ 2 PM

CLEARING/GRUBBING; SWPPP; TRAFFIC CONTROL; STRIPING & MARKING; CONCRETE CURBS & GUTTERS; SIDEWALK; MEDIANS; ROADWAY EXCAVATION; PORTLAND CEMENT CONC; REINFORCED CONC PIPE & CONNECTION; ROADSIDE SIGNS; LANDSCAPE/IRRIGATION; TREE PRESERVATION/PRUNING; SITE FURNISHING & ACCESSORIES; INTERLOCKING PAVERS; DECORATIVE METAL FENCE & PANEL; DECOMPOSED GRANITE PAVING; CONC UNIT MASONRY; MANUFACTURED STONE VENEER; TEMP TRAFFIC SIGNAL & LIGHTING; CIDH CONCRETE PILE FOUNDATIONS; STEEL PEDESTALS & POSTS; ELECTRICAL CONDUIT; PULL BOXES; FIBER OPTICE CABLE & EQUIPMENT; CCTV; LUMINAIRES; ILLUMINATED STREET NAME SIGNS

100% Payment & Performance bonds will be required from a single, Treasury-listed surety company subject to PMI's approval. PMI will pay bond premium up to 1.5%. Subcontractors awarded on any project will be on PMI's standard form for subcontract without any modifications. For questions or assistance required on the above, please contact Ben Pearce at ben@provenmanagement.com PMI is signatory to the Operating Engineers, Carpenters, and Laborers Collective Bargaining Agreements.

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The Future of Construction Site Automation

Continued from page 1

he can see it is on track. The materials delivery is also displayed on a map of the site so he can quickly see that the location is acceptable. He likes that the site monitoring system will also generate an alert if that material leaves the site. This feature has cut down substantially on material theft from his projects.

At the end of the day, Paul does a final walk around, recording his notes verbally. The notes are automatically turned into a report and include relevant images captured by the site monitoring system. The report is filed to the BIM system.

As Paul heads home, he rests easy knowing that his supervisor will receive real-time alerts of anyone onsite after hours. He can address them directly or “defer” to the monitoring service for dispatch of police. This system helps with both theft deterrence as well as compliance with the company’s safety policies, reducing liability from trespassers.

How we Get There

The above scenario may seem farfetched or off in the distant future. It is not. Below, major trends in several technology areas and business processes that are contributing to the rapid realization of this future are outlined.

Building Information Modeling (BIM)

BIM provides the base framework for integrating and relating pieces of information about the project. It starts with a CAD model of the structures and can add cost, schedule and other information tied to the model. Imagery from the as-built site can be automatically related to the BIM, providing 3D structure and organization to the photographic documentation. The “time” portions of the BIM model also support the automation describe above around project milestones and material requirements.

Drones & Ground Robotics

Drones are being deployed today to provide site survey, photography and inspection functions on the construction site. Autonomy functions are starting to appear, allowing drones to operate without training-intensive human operation. Fully autonomous drone flights will allow repeatable image capture and other site monitoring functions to be carried out with minimal labor from the construction staff. Mobile ground robots can be assistants to the crew to move materials around the site, saving time, and improving safety.

Internet of Things (IoT)

The Internet of Things (IoT) is a broad, often confusing technology trend that has to do with processing, sensors and communications moving more and more into everyday “objects.” In the context of construction automation, this is most easily seen in an application like asset tracking. Today’s asset tracking is largely centered on GPS systems being added to large, heavy equipment. But there are a number of technologies, such as Bluetooth Low Energy beacon, that will help take asset tracking down to the tool level. Having low-cost, ubiquitous location and tracking information on assets and materials on the site will have a large impact on construction work-



flow. The same technologies can be applied to the tracking of people and access to site locations. As these become more widespread, they will be applied to managing workflow and staff, materials handling and safety. Today, embedded sensors with communications are being used to automatically measure curing of concrete and shaving days and weeks off construction schedules while maintaining necessary safety parameters.

Augmented Reality

Augmented Reality (AR) is a set of technologies used for displaying digital information overlaid on the real world. AR will be particularly relevant for bridging CAD/BIM models of structures to the structure being built. It will streamline and simplify all construction tasks that involve “matching” the plan with where you currently are in the process. AR can make information retrieval as simple as standing and looking at a site location and having (only) relevant information appear.

Wireless and self-powered systems

Nowhere is wireless/battery powered capability more valuable than on a construction site where the landscape is, literally, continuously changing. Running wires or even having power is most often not an option. Trends in low-power electronics and high-bandwidth wireless communications such as LTE will continue to have a huge impact on construction by being able to bring the digital tools directly onto the construction site instead of staying locked in the trailer.

Video and Sensor Analytics

Video or sensor analytics is a suite of technologies for using algorithms to do detection and identification of events and patterns in digital data such as images. This technology will have a large impact in such construction areas as automatically recording project status (e.g., automatic identification of a material or asset type and location), implementing safety policies and site security. Companies are already starting to deliver applications that can analyze workers on a site to determine if they are wearing necessary safety gear.

Automated Site Monitoring

Automated site monitoring is a systems-level approach to weaving together many of these technologies into the “nervous system” of the construction site. Sensor data flows into the automated site monitoring system and is combined with BIM information, safety policies, work procedures, user information and more to generate alerts and information to simplify the project team’s jobs—in real-time. The automated site monitoring system is aimed at reducing costs, improving safety, managing schedules and improving quality.

The Future Starts Now

This is Sensera System’s vision for the future of construction automation. We have already begun delivering this future with the most advanced and affordable automated site monitoring solutions on the market. This has made us the fastest growing construction site camera vendor. The future starts now!

SOURCE: enr.com