ATTACHMENT "A"

SCOPE OF WORK

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CAD Design Manual Update for 3D Design
Project No. PS21-05

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I.   SUMMARY

This Scope of Work requests professional services to identify functionality of computer-aided design (CAD) Applications and their benefits to the Orange County Sanitation District (OC SAN); develop a design standard for three-dimensional (3D) CAD; integrate the new standard into OC SAN's existing CAD Manual; and create quality assurance/quality control (QA/QC) processes and tools to verify 3D CAD compliance.

This project will develop 3D CAD Standards to set mandatory procedures for consultants and contractors to follow for the creation and delivery of all CAD drawings to OC SAN. The procedures will consider design, construction and archiving of CAD drawings and how CAD deliverables will be integrated with OC SAN's existing engineering, construction, operation and maintenance, and administration systems. In addition, this project will consider how the updated design standards could support other CAD technologies, such as a Digital Twin in the future, and how these technologies could be integrated with OC SAN's systems in the future.

II.   BACKGROUND, GENERAL PROJECT DESCRIPTION, AND OBJECTIVES

BACKGROUND

OC SAN's current CAD Standards Manual (CAD Manual), included as Exhibit 1, was originally developed in 2001 with minor updates last made in 2021. The CAD Manual outlines the CAD requirements that must be incorporated into all engineering design packages that are prepared for OC SAN projects. The CAD Manual ensures that CAD files are prepared consistently by OC SAN and outside consultants and can be imported into OC SAN's Geographic Information System (GIS) applications. The current CAD Manual, which is developed around two-dimensional (2D) design standards and older AutoCAD technology, works well for certain design projects, however, 3D design standards are needed to address complex design projects and future OC SAN needs.

As the industry moves towards 3D design, our current CAD Manual is no longer appropriate or applicable to all projects. Many current OC SAN projects are preparing 3D designs based on inconsistent standards. To ensure that various design consultant's deliverables and CAD files provide the same level of detail, are consistent, and are compatible with OC SAN's GIS applications and other systems, an updated OC SAN CAD Manual, addressing 3D design, is required. The updated CAD Manual will include data standards that represent the entire life cycle of facilities design thru operation within the OC SAN service area. The updated CAD Manual shall also consider how CAD files can be made compatible with other OC SAN software, databases, and processes in the now and in the future.

The Enterprise Information Management (EIM) group is part of OC SAN's Information Technology (IT) department and is responsible for updating and maintaining the OC SAN CAD Manual. This project will require coordination with EIM and other Project Stakeholders in design, construction, operations, and maintenance to develop the 3D design requirements and update the CAD Manual. This project will also define the types of projects where 3D design should be used, and projects that can be designed in 2D.

GENERAL PROJECT DESCRIPTION

This project will perform a comprehensive evaluation of CAD technologies to determine the most suitable way to adapt current technologies to OC SAN's existing processes. Based on the results of the evaluation, this project will develop a new CAD standard to be applied to 3D design, update OC SAN's existing CAD Manual, develop standards libraries in support of the new CAD standard and develop QA/QC procedures and tools to ensure compliance with the new standards.

PROJECT OBJECTIVES

- Identify functionality of 3D design software and applicability to OC SAN.

- Create 3D CAD Standards and integrate 3D CAD Standards into OC SAN's current CAD Manual.

- Create or modify supporting libraries and/or templates to meet the updated CAD Manual requirements for use with the selected software applications.

- Define QA processes and create QC Tools for 3D CAD compliance and train OC SAN staff on the implementation and use of tools.

III. PROJECT SCHEDULE

Table 1 lists the time frames associated with each major project deliverable and with OC SAN's review and approval of those deliverables. CONSULTANT shall comply with the deadlines indicated in that table.

Table 1 – Project Milestones and Deadlines

MILESTONE	DEADLINE
Kickoff Meeting	The kickoff meeting will be scheduled to coincide with the Project Notice to Proceed (NTP).
Submit draft Technical Memorandum 1 (TM 1)	55 workdays from the Project NTP.
OC SAN Review of draft TM 1	20 workdays from receipt of Draft TM 1
Submit Final TM1	15 workdays from receipt of OC SAN Comments on Draft TM1
Submit Draft Technical Memorandum 2 (TM 2)	45 workdays from receipt of Final TM 1.
OC SAN Review of Draft TM 2	20 workdays from receipt of Draft TM 2
Submit Final TM 2	15 workdays from receipt of OC SAN comments on Draft TM 2.

Table 1 – Project Milestones and Deadlines

MILESTONE	DEADLINE
Submit draft OC SAN CAD Manual	45 workdays from receipt of Final TM 2.
OC SAN Review of draft OC SAN CAD Manual	20 workdays from receipt of Draft OC SAN CAD Manual
Submit final OC SAN CAD Manual	15 workdays from receipt of OC SAN comments on draft OC SAN CAD Manual
OC SAN Review of Final OC SAN CAD Manual	10 workdays from receipt of final OC SAN CAD Manual
Submit Automated QC Tools	20 workdays from submittal final OC SAN CAD Manual
Complete Training of OC SAN Staff on QA/QC Procedures	10 workdays from receipt of automated QC tools
Submit Final training manuals and materials	10 workdays from completion of training.

OC SAN will consider an alternative CONSULTANT-proposed schedule provided it is consistent with OC SAN resources and schedule constraints and adds value to OC SAN.

IV.   PROJECT EXECUTION

TASK 1 – REVIEW OF EXISTING DOCUMENTATION AND 3D MODELS, AND EVALUATION OF 3D APPLICATIONS

TASK 1.1 REVIEW EXISTING DOCUMENTATION AND 3D MODELS

CONSULTANT shall review the below documentation to understand OC SAN's CAD standards and design deliverable intake processes. The review shall provide an overall understanding of project submittal and delivery requirements, CAD standards and data transfer to GIS and Operations systems (SCADA, Maximo, etc.) and shall identify file formats, document control, interoperability challenges, software, and other standards.

- Exhibit 1 - OC SAN's current 2D CAD standards

- Exhibit 2 – Orange County Sanitation District Business Process Assessment

- Exhibit 9 - AutoCAD P&ID Functionality Documentation

- Exhibit 10 - Equipment and Instrument Database (EID) Process

- Exhibit 11 - EID Guidelines

- Exhibit 12 - SAT Data Dictionary

- Exhibit 13 - Typical Design Submittal Requirements Matrix for a CIP Project

- OC SAN's standard software (see Section V)

- OC SAN CAD files provided to external users (https://www.ocsan.gov/education/reports-agency-information/-folder-1007)

CONSULTANT shall review 3D models from existing projects to determine suitability of content for integration into a common platform and identify inconsistencies that will be addressed by the CAD Manual update. The review shall address, at a minimum:

- Dimensional accuracy

- Geospatial locations

- Consistency with drawing information

- Unique identification of major equipment and pipelines

- Relationship of model components (equipment, valves, instrumentation) to P&IDs where appropriate

- Asset tags and object information.

- Identification of architectural and structural components

- Identification of underground utilities where appropriate

- Level of Detail

- Detail of space or floor definitions

- Assumption for level of effort: The CONSULTANT will review no less than four of the models from Exhibit 8, Partial List of OC SAN Projects using 3D Design.

In addition, the CONSULTANT shall conduct stakeholder meetings within eight weeks of project kickoff to better understand OC SAN's existing processes to recommend areas of improvement.

In addition, the CONSULTANT shall begin developing a sample 3D model that will illustrate key criteria of the new CAD Manual. This model will be delivered to OC San with Task 3.4

TASK 1.2 EVALUATION OF 3D APPLICATIONS

OC SAN has standardized on the use of Autodesk products, including AutoCAD, AutoCAD Plant 3D and AutoCAD Map 3D. To determine how 3D Design Environments will be applied to OC SAN projects, CONSULTANT shall review software and programs within the Autodesk suite, or compatible with the Autodesk suite, and provide recommendations for standardization on software for 3D design. Considerations for the following key features should be included in the evaluation:

- Functionality of software to support 3D Design, and review of 3D designs.

- Functionality of software to support OC SAN projects, including plant projects, pump stations and linear projects. The evaluation shall consider projects that construct new facilities as well as rehabilitation projects.

- Support for federated models in a 3D Design Environment.

- Ease of access to 3D models for key stakeholders.

- Support for integration with other existing systems (i.e. GIS, EID, SCADA Administration Tool (SAT)). See Exhibits 10 and 11 for EID processes and guidelines; see Exhibit 12 for SAT guidelines.

- Ability to identify major equipment, list commodity items, provide quantification of major structural components and provide interference/clash detection during design and review sessions.

- Cost of software, licensing, hosting, maintenance and support, as well as a projection of training costs as appropriate. Pricing information shall include initial costs and annual maintenance costs.

CONSULTANT shall recommend how 3D Designs will be incorporated into OC SAN's current review processes and recommend when a project should require the use of 2D or 3D CAD based on project type and size, and other considerations. Examples of different types of projects OC SAN completes are: large CIP projects, small projects, rehabilitation projects, and linear (collections) projects.

CONSULTANT shall recommend an environment to facilitate review of the 3D model and P&IDs, as applicable.

CONSULTANT shall conduct up to five 30-minute teleconferences to receive input from OC SAN stakeholders. The stakeholder input shall be reflected in TM-1.

CONSULTANT shall describe the relationship between the proposed 3D model, 2D construction drawings, P&IDs and existing processes.

CONSULTANT shall determine opportunities where outputs or publishing of the 3D Design Environment could be used for operations and maintenance (preventative maintenance, training, etc.), and/or asset management.

CONSULTANT shall prepare a technical memorandum (TM) which, at the minimum, includes the following:

- Document current processes and potential points of improvement or integration related to the use of the 3D model and recommended software, as well as opportunities for use of the model during Operations and Maintenance.

- Recommend standard software package(s) to be used in 3D models and other CAD applications.

- Describe how the 3D model will integrate with 2D construction drawings, P&IDs and existing processes.

- Recommend when 3D Design standards should apply to a new project.

- Identify functionality of P&ID applications and how they can support other OC SAN processes, specifically the SAT and the EID.

Deliverables:

TM-1 – Evaluation of 3D Applications and Related Workflows (Draft and Final).

TASK 2 – DEVELOP 3D CAD STANDARDS

CONSULTANT shall develop standalone 3D CAD Standards and a related model design review process and include appropriate model Level of Development (LOD) throughout all project phases from Project Design Submittals (Preliminary Design through Final Design) through Project Record phase. Provide additional documentation of OC SAN design review processes requiring updates as a result of implementation of a 3D CAD standard.

The 3D CAD standard shall include, at a minimum, file naming conventions, layer conventions, graphic/style standards, drawing set organization, deliverables and data exchange, CAD standards implementation tools, as well as space and graphical standards, 3D model structure, 3D model requirements. For additional information, refer to the National BIM Guide for Owners published by the National Institute of Building Sciences (https://www.nibs.org/files/pdfs/NIBS_BIMC_NationalBIMGuide.pdf).

CONSULTANT shall prepare a TM which, at the minimum, includes the following:

- Develop 3D CAD Standards based on the software package(s) selected in TM-1. The 3D CAD Standards shall consider OC SAN's existing CAD Standards for 2D, industry standards, and requirements to support other processes, such as exporting to other existing systems (i.e. GIS, EID, SAT), archiving and future use.

- Describe the intake process for 3D models relative to existing document control systems and a diagram demonstrating the relationship between the 3D models, related (2D) construction drawings and P&IDs.

- Recommend design review tool(s) for 3D Designs. OC SAN currently standardizes on Bluebeam Revu for reviewing and providing comments to PDF files, as described in Section V and Exhibit 7 - Bluebeam Designer User Training describing the existing design review processes.

- Include, as an appendix, the OC SAN CAD review process to confirm future projects comply with this new standard.

Deliverables:

TM-2 – 3D CAD Design Standards (Draft and Final)

TASK 3 – UPDATE CAD STANDARDS MANUAL FOR 3D DESIGN

CONSULTANT shall perform a comprehensive update of OC SAN's current CAD Manual to incorporate 3D CAD Standards.

TASK 3.1 INTEGRATE 3D CAD DESIGN STANDARDS INTO OC SAN'S CURRENT CAD MANUAL

CONSULTANT shall update OC SAN's current CAD Manual to incorporate the 3D CAD Standards developed in Task 2. The CAD Standards Manual update shall include 3D model requirements, LOD requirements at different design stages (Preliminary Design, Design Submittal (DS) 1, DS2, DS3, and Final Design Submittal) and the use of design review tools. The updated CAD Manual shall revise the existing 2D standards as needed so they are compatible with the 3D CAD Design Standards and do not require CAD re-work when exporting from 3D to 2D.

CONSULTANT shall also update all other sections of the existing CAD manual, as required by the approved recommendations of TM-1 and TM-2.

CONSULTANT shall prepare the CAD Manual such that it can be exported to PDF using the Bluebeam Add-on in Microsoft Word. Exported PDF shall have hyperlinks from the Table of Contents and any references throughout the file. PDF shall also have bookmarks for each chapter and appendix. The cover page of the Word document shall include instructions on exporting and other cleanup requirements, these instructions shall not be included on the exported PDF.

Deliverables:

OC SAN CAD Standards Manual (Draft and Final) in both Word and PDF Formats

TASK 3.2 DEVELOP LIBRARIES

CONSULTANT shall review OC SAN's existing libraries for 2D and shall update these existing libraries as appropriate to conform with the new CAD Manual.

CONSULTANT shall develop a series of new libraries and/or templates for use within the 3D modeling software as defined in the CAD Manual.

CONSUTANT shall develop new and revised libraries in the correct format to support the software selections to include standard 3D components and related 2D and annotation symbols for drawing production.

Deliverables:

Revised and new libraries and/or templates in native format.

TASK 3.3 CREATE AUTOMATED QC TOOLS FOR 3D CAD COMPLIANCE

CONSULTANT shall create automated Quality Control (QC) tools that OC SAN's EIM group will use to review design submittals and ensure compliance with the updated CAD Standards Manual. CONSULTANT shall also evaluate the existing QC tools for 2D design and the CAD

Standards Compliance Checklist (Appendix D of the CAD Manual) and shall update them as necessary or incorporate them in the new QC tools.

Deliverables:

Automated and updated QC tools

TASK 3.4 CREATE QA/QC PROCEDURES AND TRAINING

CONSULTANT shall develop Quality Assurance (QA) procedures, including consistent use of the QC Tools and recommended use of the QC tools at different design phases. The QA procedures shall be documented in a Training Manual.

CONSULTANT shall conduct Training Presentations to train OC SAN staff to use the CAD Manual, libraries and QC tools. All modules and formats shall be approved by OC SAN EIM team representative prior to providing training. CONSULTANT shall develop training materials that shall be repurposed for the training manual and multimedia training materials. Training Presentations shall be recorded and provided to OC SAN for future use.

CONSULTANT shall conduct a Training Workshop. The Training Workshop shall be held after the Training Presentations and shall provide hands-on use of software, QC tools and QA procedures. CONSULTANT shall provide hardware and software required to train five (5) OC SAN employees.

CONSULTANT shall develop a Training Manual for OC SAN's use with future staff. Training Manual shall provide guidance on how to use the tools, templates and libraries developed under this project. Training Manual shall be a searchable, hyperlinked, and bookmarked PDF per Exhibit 6.

CONSULTANT shall develop multimedia training materials to support the Training Manual. Multimedia training materials shall include either a single Microsoft PowerPoint presentation to train use of all the tools, templates and libraries, or multiple presentations to provide a modular training approach. The presentation shall include written and recorded narration (or use of transcript features) within the PowerPoint as appropriate per slide and include recorded narration embedded within the slides where appropriate. Alternative to the embedded narration a training video, with an instructor narrating over the slides, may be provided.

Deliverables:

Training Manual and multimedia training materials that include QA/QC procedures.

TASK 4 – PROJECT MANAGEMENT

CONSULTANT shall be responsible for managing CONSULTANT's project execution, schedule, budget, subconsultants. The CONSULTANT shall perform the project management requirements in accordance with Exhibit 3 - Project Management Requirements.

TASK 5 – MEETINGS AND WORKSHOPS

CONSULTANT shall hold meetings and workshops throughout the project to keep OC SAN apprised of the job, review work-in-progress, share information, discuss project submittals,

present findings of technical analyses, receive and resolve comments, and obtain decisions and direction from OC SAN staff. This task defines the major meetings and workshops to be held by the CONSULTANT. The Project Kickoff and all workshops will be held at the OC SAN offices in Fountain Valley and all other meetings will be held virtually via MS Teams.

Requirements for planning, agendas, and minutes of workshops and meetings shall be as specified in Exhibit 4 - Workshop and Meeting Requirements.

A series of workshops shall be held to review project progress and make key decisions. The workshop title and brief subjects to be covered in each workshop are discussed below.

Task	Number of Meetings/ Workshops	Proposed Topics
5	One 2-hr Project Kickoff	• Project background • Project scope • Project schedule • Roles and responsibilities • Project management procedures
1	One 1.5-hr Meeting	• Stakeholder Kickoff Meeting
1	Three 1-hr Focus Meetings	• Review alternatives • Stakeholder input • Decisions • Present available technologies
1	One 2-hr Workshop	• Draft TM-1 Presentation Workshop
1	One 2-hr Workshop	• Draft TM-1 Validation Workshop (within 1 week of receiving OC SAN comments)
2	Three 1-hr Focus Meetings	• Over the shoulder review • Stakeholder input • Decisions
2	One 2-hr Workshop	• Draft TM-2 Presentation Workshop (within 3 days of submitting TM-2 Draft)
2	One 2-hr Workshop	• Draft TM-2 Validation Workshop (within 1 week of receiving OC SAN comments)
3	Two 1-hr Focus Meetings	• Over the shoulder review • Stakeholder Input • Decisions
3	One 2-hr Workshop	• Draft CAD Manual Presentation Workshop (within 3 days of submitting Draft CAD Manual)
3	One 2-hr Workshop	• Draft CAD Manual Comment Validation Workshop (within 1 week of receiving OC SAN comments)
3	Four 1-hr Presentations	• Training Presentations
3	One 4-hr Workshop	• Training Workshop

Task	Number of Meetings/ Workshops	Proposed Topics
4	• Twelve (12) 1-hr Meetings	• Meet with OC SAN Project Manager monthly to review progress report and invoice prior to submission.
5	• Ten (10) 1-hr Meetings	• Technical Progress Meeting to review progress, issues and action items.
5	• Two 1-hr Trainings	• Bluebeam • PM Web

TASK 6 - QUALITY CONTROL

CONSULTANT shall be responsible for the technical adequacy and quality control of their work. Prior to the submittal to OC SAN, each portion of a submittal shall be thoroughly reviewed and corrected by a member of the CONSULTANT's QC Team, as outlined in Exhibit 5, Quality Control Requirements. The reviewer shall attest to their review in the form of a written affidavit outlining the submittal subject and identifying the corrected deficiencies.

V.   GENERAL REQUIREMENTS

GENERAL

WORKING HOURS

Meetings with OC SAN staff shall be scheduled from Monday through Thursday between the hours of 8:00 AM and 4:00 PM Pacific Time.

SOFTWARE

The CONSULTANT is expected to develop and provide the deliverables using the standard software currently approved for use by OC SAN.   The standard OC SAN software includes, but is not limited to, the following:

- Windows 10 Professional or higher
- Esri software 10.8.1 (ArcGIS Desktop, fGDB, pGDB or shapefile formats)
- Microsoft Edge (Chromium base) Version 101.0.1210.47 or higher
- AutoCAD Plant 3D version 2021 (for P&ID drawings only)
- Autodesk software version 2021 (AutoCAD, AutoCAD Map3D or compatible dwg file format)
- Microsoft Office 365
- Maximo 7.6.1.2
- Bluebeam Revu eXtreme version 2020.2.40
- Primavera P6 for scheduling
- Innovyze ICM Hydraulic Model version 9.0
- Database software as defined elsewhere in the project Scope of Work

Any software that the CONSULTANT needs to comply with these standards shall be purchased and maintained by the CONSULTANT at no additional cost to OC SAN. In the event OC SAN provides the CONSULTANT with access to OC SAN software and hardware at an OC SAN

facility in order to facilitate performance of their work, all software shall remain the property of OC SAN. Only software licensed to OC SAN shall be installed on OC SAN equipment. In addition, only OC SAN IT Department staff will perform the installation of this software.

SUBMITTAL REVIEW USING BLUEBEAM

All deliverables shall be submitted electronically, no hard copies are required.

OC SAN has standardized on the use of Bluebeam Revu for reviewing and providing comments to PDF files. Prior to submitting electronic PDF files, format them as indicated below (underlined text refers to commands or functions within the Bluebeam software). See "Exhibit 6 Designer Training for Submission" and "OC SAN CAD Standards Manual" prior to submission.

PDF files will be hosted in a Bluebeam cloud-based studio session for review. See "SOW Exhibit 7 Designer User Training" for a detailed explanation on how Bluebeam will be used to provide, validate, and close submittal review comments.

A one-hour training session on the use of Bluebeam and custom status menu will be provided by OC SAN. All Consultant team members responsible for quality control and reconciliation of submittal comments shall attend.

VI.   STAFF ASSISTANCE

OC SAN staff member or designee assigned to work with CONSULTANT on the design of this project is Valerie Ratto at (714) 593-7227, e-mail to: vratto@ocsan.gov.

EXHIBITS:

The following Exhibits to Attachment A Scope of Work are considered reference material and were previously provided as part of the Request for Proposal.

Exhibit 1 - OC SAN CAD Standards Manual

Exhibit 2 - Orange County Sanitation District Business Process Assessment

Exhibit 3 - Project Management Requirements

Exhibit 4 - Workshop and Meeting Requirements

Exhibit 5 - Quality Control Requirements

Exhibit 6 - Bluebeam Designer Training for Submission

Exhibit 7 - Bluebeam Designer User Training

Exhibit 8 - Partial List of OC SAN Projects using 3D Design

Exhibit 9 - AutoCAD P&ID Functionality Documentation

Exhibit 10 - Equipment and Instrument Database (EID) Process

Exhibit 11 - EID Guidelines

Exhibit 12 - SAT Data Dictionary

Exhibit 13 - Typical Design Submittal Requirements Matrix for a CIP Project

Exhibit 14 - Terminology

CF:sa