**MINETA SAN JOSE INTERNATIONAL AIRPORT**

# ELECTRONIC DOCUMENTATION DATA STANDARD COMPLIANCE QC/QA PROCEDURE


| Section | Title | Page |
|---|---|---|
| **1.** | **INTRODUCTION** | **2** |
| | 1.1 Scope | |
| | 1.2 Purpose | |
| **2.** | **OVERVIEW OF THE QUALITY ASSURANCE PROCESS** | **2** |
| | Figure 1- Overview of Document QC/QA Process | 3 |
| **3.** | **DOCUMENT SPECIFICATION CRITERIA** | **3** |
| **4.** | **DETAILED QUALITY ASSURANCE PROCEDURES** | **4** |
| | 4.1 Informal Review | 4 |
| | 4.2 QA Procedures | 4 |
| | 4.2.1 Subjective PASS/FAIL | 4 |
| | Table 1 – Document Submittal PASS/FAIL Criteria | 5 |
| | 4.3 Manual QA Procedures | 6 |
| | Figure 2 – Document Naming Convention | 7 |
| | Table 2 – Project Naming Example | 8 |
| | Table 3 – File Naming Example | 8 |
| | Table 4 – Scan Resolution Standards | 9 |
| **5.** | **REPORTING OF QUALITY ASSURANCE RESULTS** | **9** |
| **APPENDIX – A** | **Sample Form for Reporting of QA** | **10** |

## 1.0 INTRODUCTION

### 1.1 Scope

This document details the quality assurance (QA) procedures that are to be carried out on general electronic documents submitted to the Mineta San José International Airport (SJC). The data contained in these documents can support decisions about the design, construction, operation, maintenance of the SJC's infrastructure, but only if its quality can be relied upon by decision makers. QA is the process of reviewing data as it is submitted to assure the level of quality before it is accepted into the airport's central repository.

General electronic documents are defined for this QC/QA module as those documents required in the General Electronic Documentation Standards (SJC-ACM-AIMS-2010 and SJC-ACM-AIMS-2100) excluding AEC CAD drawings and GIS data. This module applies to but is not limited to reports, multi-page technical documents, scanned drawings, as well as other documents. The QA procedures outlined in this document will check all of the specifications of electronically submitted documents as defined in the General Electronic Documentation Standards.

### 1.2 Purpose

The purpose of this document is to detail QA procedures that can be applied to general document submittals. The document is written as an instruction manual for airport staff or 3rd parties tasked with reviewing drawing submittals. The procedures are not intended for data creators who should be following quality control procedures designed to make sure that data is collected or created to the specifications required by the airport.

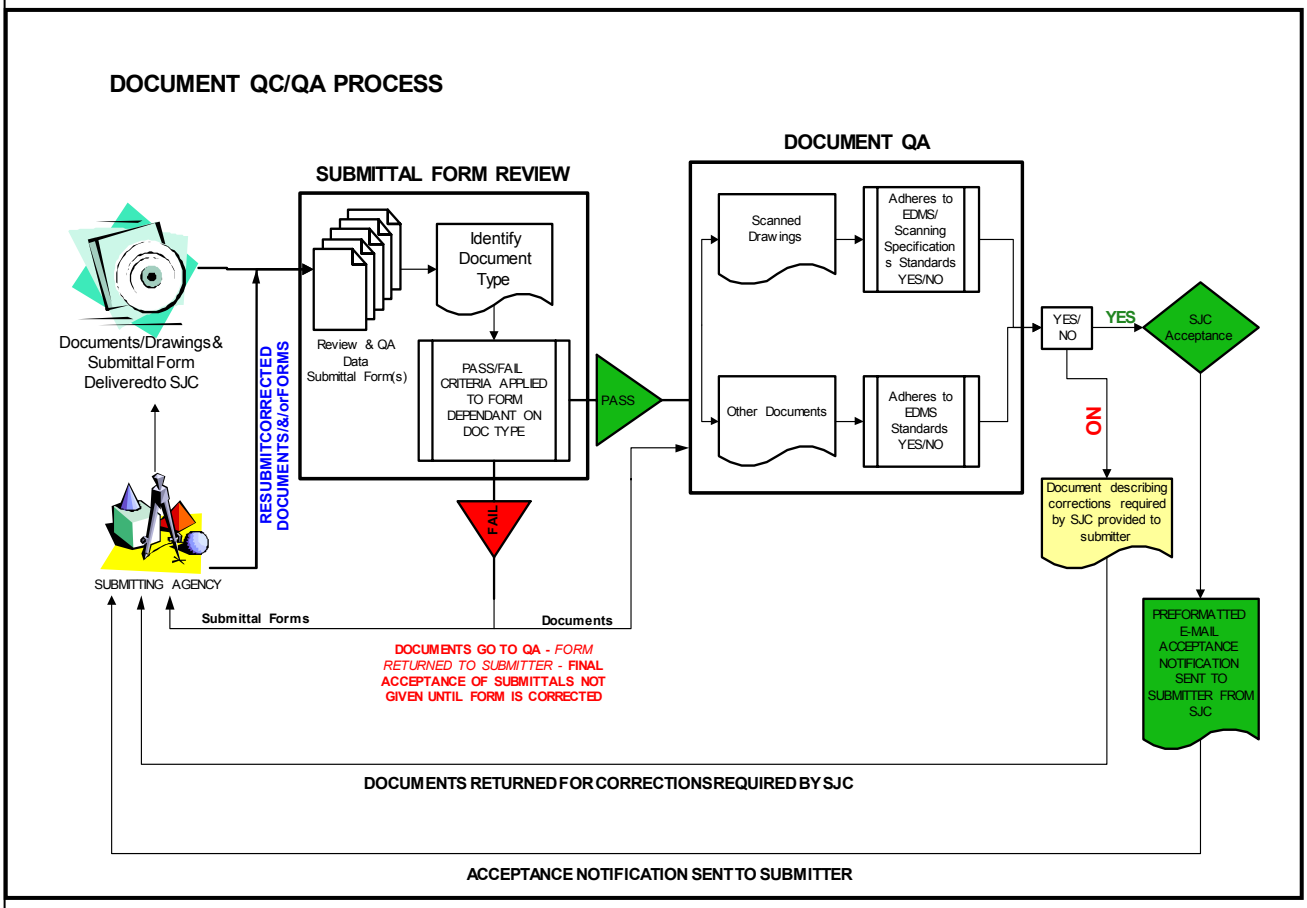
## 2.0 OVERVIEW OF THE QUALITY ASSURANCE PROCESS

Quality Assurance (QA) serves as a final check of the data, to catch any problems that may have been missed by Quality Control (QC) procedures carried out as the data is created. QA also serves as a regular test of whether or not the production and QC processes are producing data of the required quality. QC, on the other hand, occurs during the development of documents that will be submitted to the airport.

QA procedures will be performed on all documents submitted to SJC. The QA procedures for document submittals have been developed independently from any QC processes that have or will be developed by data creators and are based solely on the acceptance criteria for each product. QC procedures need to be developed by data creators as an integral part of each data production process. They should be administered using checklists on a daily basis by the staff and contractors hired to collect data.

Documents in which errors are found beyond an acceptable limit will be rejected and returned to the submitter for correction and re-submittal. All drawings that pass the acceptance criteria can be converted into the appropriate format and loaded into the data repository as specified in document SJC-ACM-AIMS-4140. The QC/QA Process diagram (see Figure 1) presents a generalized process for performing quality control (QC) and quality assurance (QA) on drawings.

**Figure 1**
**Overview of Document QC/QA Process**




## 3.0 DOCUMENT SPECIFICATION CRITERIA

The General Electronic Documentation Standards (SJC-ACM-AIMS-2100) defines the specifications and acceptance criteria for documents submitted to SJC. This document details the formatting standards, the document types, the acceptance criteria as well as the scanning specifications that document submittals must meet. In addition, a document submittal form will be delivered that adheres to the metadata requirements specified in the metadata standard (SJC-ACM-AIMS-2600).

## 4.0 DETAILED QUALITY ASSURACE PROCEDURES

4.1 Informal Review

An informal, cursory review of submitted documents is recommended prior to applying the rigor of the formal QA procedures. This cursory review should focus on obvious discrepancies between what was submitted and what was supposed to have been submitted. This should include checking the file naming convention to determine that it is correct; the submittal form should be reviewed to assess what has been described in the submittal form is what has actually been submitted to SJC.

Since this check is informal and prompted by case specific requirements, it is not effective to outline a definitive procedure for this step. Instead, it is intended to be defined on a case-by-case basis by a trained technician or engineer who is familiar with the type and content of data being submitted. Such personnel are more likely to spot the obvious errors that this step is intended to identify. If such errors, are found the more time consuming and cost formal QA steps can be avoided. If no such errors are found, then QA can proceed as follows.

4.2 QA Procedures

QA procedures are required to validate the General Electronic Documentation Standards are adhered to. All documents (100%) as defined in this module should be checked for Quality Assurance. QA pass/fail criteria have been developed for each of the different document types that may be submitted. The document types and their related criteria can be found in Table 1. While some of the criteria are an absolute PASS/FAIL, other criteria are more subjective in nature.

4.2.1 Subjective PASS/FAIL

The general criteria for determining whether a submittal will be accepted or returned to the submitter is whether the drawing or document is legible across the entire document and can be clearly viewed through the EDMS. Illegible documents or drawings can often be created by a bad scan or oversights that occur during the save and storage process of a digital document. It is recommended that when drawings or documents are transferred from one media to another (i.e. creation of a CD-ROM for submittal), that they are viewed again from the newly created media. For scanned documents or drawings it is strongly recommended that prior to submittal the submitter review the image and if the image is illegible rescan at least once using different settings to try and obtain an optimum image. It is recognized that older or poor quality drawings or documents can only achieve a certain level of quality. This situation should be communicated as part of the submittal and will be taken into consideration during the quality assurance review. Describing the reasons for poor quality upon submittal, and/or rescanning the document prior to submittal could avoid delays in the document being accepted by SJC. Upon receipt of a document or drawing the SJC reviewer will make a determination based on his/her ability to legibly view the document or drawing and notify the submitter of the results if it is determined that the document does not meet the criteria. While the submitter will have the opportunity to either submit a new or higher quality document or describe to SJC the reasons that created a illegible submittal.

**Table 1 Document Submittal PASS/FAIL Criteria**

| DOCUMENT TYPE | CRITERIA | PASS | FAIL | ACTION TO BE TAKEN IF FAIL |
|---|---|---|---|---|
| All | Correct file format extension | YES | NO | If more than one document has incorrect extension type – Returned to submitter for correction |
| All | Document as described in data submittal form | YES | NO | Returned to submitter |
| All | Presence of digital artifacts, such as very regular, straight lines across picture | YES | NO | Returned to submitter for correction |
| Scanned Drawing Sets, Reports, Technical Documents, O&M Manuals | Document has a cover with title; date and project number noted it. | YES | NO | Returned to submitter for correction - Older scanned drawing sets may not have a cover – this is acceptable if noted upon submittal |
| Scanned documents only | Image is correct resolution for document type | YES | NO | Returned to submitter for correction |
| Scanned documents only | Loss of detail in highlight or shadows | SUBJECTIVE | SUBJECTIVE | See Section 5.1.2 |
| Scanned documents only | Excessive noise especially in dark areas or shadows | SUBJECTIVE | SUBJECTIVE | See Section 5.1.2 |
| Scanned documents only | Overall too light or too dark | SUBJECTIVE | SUBJECTIVE | See Section 5.1.2 |
| Scanned documents only | Lack of sharpness/Excessive sharpening | SUBJECTIVE | SUBJECTIVE | See Section 5.1.2 |
| Scanned documents only | Image dull | SUBJECTIVE | SUBJECTIVE | See Section 5.1.2 |

| DOCUMENT TYPE | CRITERIA | PASS | FAIL | ACTION TO BE TAKEN IF FAIL |
|---|---|---|---|---|
| Scanned documents only | Pixilated | SUBJECTIVE | SUBJECTIVE | See Section 5.1.2 |
| Scanned documents only | Moiré patterns (wavy lines or swirls, usually found in areas where there are repeated patterns) | SUBJECTIVE | SUBJECTIVE | See Section 5.1.2 |
| Scanned documents only | Images must aligned properly within the image environment as described in Section 3.4.2 | YES | NO | If more than one document has incorrect orientation - returned to submitter for correction |
| Scanned documents only | Images not skewed or distorted more than +/- 3 degrees | YES | NO | Returned to submitter for correction |

4.3 Manual QA Procedures

The following is a more detailed description to the procedures that should be followed to evaluate whether a document submittal adheres to the General Electronic Documentation Standards and specifications as defined. These procedures should be used by SJC staff to determine whether a document submittal is acceptable or should be returned to the submitting agency for corrections. Actions to be taken if certain criterion fails are described above in Table 1.

1) Review Document Submittal form to ensure that the required fields have been filled out and what is described in the form is what has actually been delivered. Refer to Document SJC-ACM-AIMS-2600 (Metadata Standards) for a list of the required fields by document types as well as allowed exceptions.

2) Check for Document Type specification adherence:

   All documentation, as required by the agreements with SJC, shall be delivered to SJC in the following formats:

   - All text documents shall be transferred in Microsoft Word 97 or higher (*.DOC files). All documents that include an executed signature shall also be provided as scanned images in Tagged Image File Format (TIFF) with Group 4 Compression.

- Large format drawings (B-size and above) shall never be bound as a multi-page TIFF. Other multiple page image documents shall generally be provided as multi-page TIFF files. In some cases, vendor documents and certified drawings require individual sheet numbers and shall not be electronically bound.

- Highly complex compound documents with extensive embedding and linking shall be submitted in Adobe PDF (Portable Document Format). The submitting agency shall supply the required information as described in the data submittal descriptive attributes section. Where appropriate, the submitting agency shall also supply SJC with the embedded and linked files as separate files in their native format.

- Documents that cannot be delivered in its native electronic form may be scanned and delivered per the scanning specification found in Section 3.3 of this document. Any newly developed documents or drawings for projects under contract with SJC must be submitted in its native format as described above. Scanning is to be used only for documents or drawings previously developed for projects completed in the past and when no current electronic version can be found or delivered.

3) Check for adherence to the File Naming Convention

The file naming convention (Figure 2) has three mandatory fields. Similar to the format for model file naming, all fields must be used and in the correct sequence.

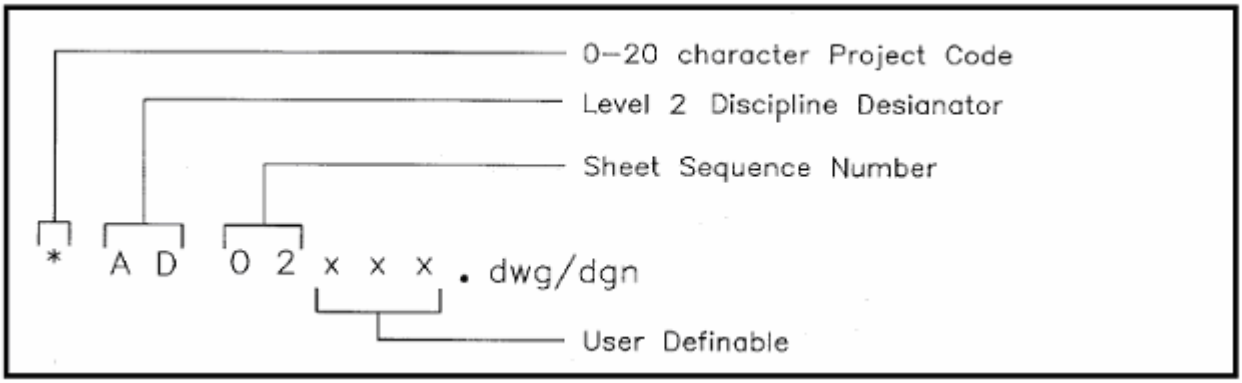



**Figure 2 Document naming convention**

Project Code: The first field is used for a 0 to 20-digit *Project Code*. Project codes are developed by SJC and are provided to the contractors for each project. A typical SJC project code is seven digits in length but can vary depending on the size and scope of the project. Use of Project Codes in file names is highly recommended, because it prevents the same file name from existing in different directories.

Example: The North Concourse project has been given the following project code.

**Table 2 – Project Naming Example**

| **T.05.20.00** | |
|---|---|
| X | Type of Project (i.e. terminal, roadway, airfield, etc.) |
| XX | Master Plan Designator |
| XX | Project (i.e. N. Concourse, ACM Tenant Improvement, etc.) |
| XX | Bid Package Number |

Level 2 Discipline Designator: The next two-character field represents the *Sheet File Type* (See SJC-ACM-AIMS-2200, Table 2 of Appendix A). To reiterate, the sheet file is your map layout. The layout displays the actual design plan or blueprint for a project. The Level 2 Discipline Designator is always preceded and followed by a hyphen "-".

Sheet Sequence Number: The final three digits indicate the sheet number

**Example:** The Sheet file name for the North Concourse Project, Site Preparation & Excavation, Grading Plan could be:

**Table 3 – File Naming Example**

| **T052001-CG-001.dgn/dwg** | |
|---|---|
| T | Type of Project (i.e. terminal, roadway, airfield, etc.) |
| 05 | Master Plan Designator |
| 20 | Project (i.e. N. Concourse, ACM Tenant Improvement, etc.) |
| 01 | Bid Package Number |
| -CG- | Discipline Designator = **C**ivil / 2nd Level = **G**rading Plan |
| 001 | Sheet Number = 1 |

4) Check for adherence to the Scanning Specification

All documents which are project requirements, are not newly developed and cannot be delivered in a current native format (i.e. .dwg, .doc, etc) must be provided using electronic raster (scanned image) format. This could include, but not be limited to, photographs, vendor curves for equipment, and other project records. Scanned documents must meet the scanning specification outlined below.

**Scanning Specification**

The following guidelines are based on national standards (American National Standards Institute (ANSI) and the Association of Information and Image Management (AIIM)). These guidelines address Sheet sizes and types, scan orientation, scan resolution and grayscale, and scan file format and naming convention.

**Sheet Sizes and Types**
Drawings to be scanned can include a variety of sheet sizes and types. Sizes vary from A-size (8.5”x11”) up to E-size (48”x36”). Sheet types include bond prints, blue lines, blue prints, sepia, mylar, aerials, etc.

**Scan Orientation**
Drawing sheets are to be scanned in the same direction as the bound edge; bound edge is to be fed first into scanner to facilitate the scanner’s mechanical grab of the most even paper edge. Generally this provides for correct drawing orientation to the user.

**Scan Resolution and Grayscale**
When determining document-scanning resolution, one must consider data storage requirements; document scanning throughput rates, and the accurate reproduction of the image. A digitized image consists of black and white dots or picture elements (pixels) measured in dots per inch (dpi). In general, the higher the number of dpi, the higher the legibility of the reproduced image. A higher scanning density is appropriate for deteriorating documents, and documents with a visual element such as documents with a visual element such as, engineering drawings, maps, documents with background detail or documents that are going to have an Optical Character Recognition program performed on them. Gray scale or color imaging technology should be used when scanning continuous tone images, such as photographs, maps, and illustrations.

**TABLE 4 Scan Resolution Standards**

| Drawing Type | Resolution | Grayscale |
|---|---|---|
| Black Lines | 200 DPI | Monochrome (16 shades of gray) |
| Blue Lines (Good Quality | 200 DPI | Monochrome (16 shades of gray) |
| Blue Lines (Poor Quality) | 200 DPI | Full Grayscale (256 shades of Gray) |
| White Lines / Blue Back (Blue Prints) | 200 DPI | Monochrome (16 shades of gray) |
| Aerials | 200 DPI | Full Grayscale (256 shades of Gray) |
| Mylar / Clear Sepia | 200 DPI | Monochrome (16 shades of gray) |
| Report Documents | 200 DPI | Monochrome (16 shades of gray) |

## 5.0 REPORTING OF QA RESULTS

The results of each QA procedure should be recorded as a means to communicate identified errors to the individuals who will be converting data into the data repository, in the case of drawings that pass QA tests, and to contractors who will be required to correct drawings, in the case of drawings that fail. The results should identify the drawing set, sheet number, layer, location and nature of the error. The form shown in **APPENDIX – A** should be used for this purpose.

## APPENDIX – A
## Sample Form for Reporting of QA Results

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

# General Document Submittals Results of Quality Assurance

Document Name/Description _____

Submitted By _____

Date Submitted _____

QA Performed By _____

Date QA Performed _____

**Results**

☐ PASS

☐ FAIL

| Document Name | Document Type | Nature of Error | Notes |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |