

SSTD-8070-0002-CONFIG Revision F APRIL 2023

National Aeronautics and Space Administration

John C. Stennis Space Center Stennis Space Center, MS 39529-6000

COMPLIANCE IS MANDATORY

John C. Stennis Space Center DRAFTING MANUAL

Approved in DDMS By:

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Issued by	

ISSUED CEF	5-4-2023
Central Engineering Files	Date

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Document History Log

Status/ Change/	Date	Originator/ Phone	Description
Basic	4/18/01	J. Wolfenbarger X-2304	Initial Release – supersedes SSC STD 66-600, with editing and content changes to text and organization throughout the standard.
Admin	6/29/01	6/29/01J. Wolfenbarger X-2304Add Notice to cover page to info to access figure references.	
Admin	7/18/03	J. Kellar ext. 8-3043	Reset links for figure reference access to CAD drawings.
A	2/16/06	J. Hughes	5 year review. Change notice to reflect CEF Files Manager application. Changed titles for signatures per NASA SSC organization changes.
В	12/14/09	Scott Andres Ext. 8-2933	Rewrite per NASA mandate to conform to National CADD Standard
B-1	6/14/10	Scott Andres Ext. 8-2933	 Appendix A: Title block revised. Added: a. This is an example of SSTD-8070-0002-CONFIG's title block that is to be used site-wide. b. Implementation of this title block shall be completed within six (6) months of SSTD's issuance.
В-2	B-2 10/28/11 Scott Andres Ext. 8-2933		Added DDMS to Section 6.1. Appendix A: Added attributes to Title Block and removed "Implementation of this title block shall be completed within six (6) months of SSTD's issuance."

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C	06/10/15	Kelly King Ext. 8-2682	Five-year review. Revised cover sheet to reflect approval by CO PMD and E&TD. Updated references and acronyms. Replaced "FOSC" with "NASA or its designee" throughout document. 5.0 Drawing Requirements: Deleted 5.1.1 Back-up Requirements, which had outlined basic record retention protocol. 5.1.1.5.b Graphic Symbols: Reworked sentence to read "Any changes or revisions to an existing drawing shall use the latest NCS graphic symbols."
C-1	02.12.2016	R. Carol Wolfram 8-1146	Administrative change. Replaced "FOSC" and "NASA or its designee" with "SACOM" throughout document.
D	6.19.2020	Kelly King 8-2682	Five-year review. Updated references. Updated Appendix A, Title Block including revisions to the attributes list and title block font.
E	12.7.2022	Tessa Davis 8-3791	 "Facilities Engineering Test Complex Support" changed to "Facilities Engineering Services" on cover sheet and in Section 3.0-a. Updated references to add SSTD-8070-0140. Section 3.0: Added "e. All outside contractors shall adhere to this SSTD with specific regard to Appendices A and B." Section 5.1.1.1-c: Added "and B". Appendix A: Amended to clarify file fonts. Title Block image replaced. "Issue Date" and "Issued By" bullets deleted. Added Appendix B, SSC AutoCAD Drafting Standards Guide and Preferences.
F	4.28.2023	Angelle Reed X-2670	Document completely reworked to include Facility and Test Complex drafting requirements.

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1.0 INTRODUCTION

1.1 Purpose

This John C. Stennis Space Center (SSC) standard (SSTD) establishes requirements for creating and maintaining drawings/models and related technical documentation produced and maintained by means of computer-aided design and drafting (CADD) to define and document the configuration of facilities and test systems at SSC.

1.2 Applicability

This SSTD applies to all SSC National Aeronautics and Space Administration (NASA) organizations, resident agencies and contractors involved with design, implementation operation and documentation of configuration changes.

1.3 Document Control

This SSTD shall be controlled, maintained, and used in accordance with the requirements of SSTD-8070-0005-CONFIG.

1.4 Records and Forms

- a. Records and forms identified in this SSTD shall be maintained in accordance with SPR 1440.1. All records and forms are assumed to be the latest version unless otherwise indicated. Forms may be obtained from the <u>SSC electronic forms repository</u> or from the SSC Forms Management Officer.
- b. Forms for this SSTD are as follows:
 - SSC-151, Engineering Modification Instruction

2.0 **REFERENCES AND APPLICABLE DOCUMENTS**

References are assumed to be the latest edition, unless otherwise specified.

AISC 326, Detailing for Steel Construction ASME B1.1/B1.2/B1.20.1, Unified Inch Screw Threads (UN and UNR Thread Form) ASME B1.5, Acme Screw Threads ASME B1.20.3, Dryseal Pipe Threads (Inch) ASME B1.20.5, Gaging for Dryseal Pipe Threads (Inch) ASME B1.20.7, Hose Coupling Screw Threads (Inch)

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ASME Y14.38, Abbreviations and Acronyms for Use in Product Definition and Related Documents ASME Y14.5, Dimensioning and Tolerancing SORD DWG 53000-E001, Standard Electrical Symbols SORD DWG 53000-E002, Standard Symbols Instrumentation SORD DWG 54000-P001, Legend for Piping Schematics IEEE STD 315, Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Letters) NASA STD-10001, NASA Building Information Modeling Scope of Services and Requirements for Architects and Engineers NPD 8800.14, Policy for Real Estate Management NPR 8800.15, Real Estate Management Program SCWI-8823-0001, Engineering Design Process (EDP) SOI-8080-0007, SSC Test Site Drawings SOI-8080-0015, SSC Configuration Control of Technical Systems SOI-8080-0027, Engineering and Test Directorate Operations Work Control SPR 1440.1, Records Management Program Requirements SSTD-8070-0001-CONFIG, SSC Facilities Engineering Documentation Standard SSTD-8070-0004-CONFIG, SSC Preparation of Construction Specifications SSTD-8070-0005-CONFIG, Preparation, Review, Approval and Release of SSC Standards SSTD-8070-0006-CONFIG, Component Servicing Processes and Documentation SSTD-8070-0108-IDCODES, SSC Plate Conduit Identification SSTD-8070-0140, SSC Creo Model Based Computer-Aided Design Standard United States National CAD Standard

3.0 **RESPONSIBILITIES**

Responsibilities for the maintenance, control, use, and application of this SSTD are as follows:

- a. The NASA SSC Center Operations Facilities Engineering Services is primarily responsible for the content of this SSTD; however, the review, revision, and approval of all changes to this SSTD will be in accordance with SSTD-8070-0005-CONFIG.
- b. Synergy-Achieving Consolidated Operations and Maintenance (SACOM) Engineering Services Department (ESD) Technical Writing Team is responsible for the maintenance of this SSTD in accordance with SSTD-8070-0005-CONFIG.
- c. The development and standardization of drawings/models are the responsibility of the following:
 - 1. NASA SSC Center Operations Facilities Engineering Services shall be responsible for Facilities Drawings/Models.

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- 2. NASA SSC Engineering and Test Directorate (E&TD) Engineering Division shall be responsible for the design and analysis of the mechanical and electrical systems, as well as the development and standardization of the Test Site Drawings/Models.
- 3. The NASA site manager is responsible for contractor-operated test support facilities.
- 4. Contractors shall be responsible for adhering to this SSTD with specific regard to Appendix B, C, or D, respectively.

4.0 DRAWINGS/MODELS – GENERAL INFORMATION

All drawings/models shall be based on the format and procedures of SSC and NASA standards. If no standard exists, refer to the United States National CAD Standard (NCS). In instances where the requirements differ, the more stringent requirement will take precedence.

4.1 Documentation and Configuration Control

Documentation of all SSC engineering drawings/models related to configuration control including, but not limited to, numbering systems, documentation revisions and cancellations shall be handled in accordance with:

- a. SCWI-8823-0001 For new designs and design revisions.
- b. SSTD-8070-0001-CONFIG For changes to existing baseline drawing/model.
- c. SOI-8080-0015 and SCWI-8040-0001 For Test Complex drawing/model configuration changes.
- d. SSTD-8070-0002-CONFIG, Appendix B, C, and D– For additional outside contractor drafting requirements.
- e. SSTD-8070-0140 For Creo Model-based Computer Design requirements.

4.2 Drawing/Model General Requirements

The prime objective of drafting drawings/models is to convey to the user complete, accurate, concise, and clear information, with a minimum of drafting time. Proper planning, elimination of non-essentials, use of all available tools, and increased knowledge of the purpose of the drawings/models are the basis of functional drafting; when implemented properly, will reduce drafting time, and provide drawings/models that are easily interpreted. The drafter shall ensure that the drawing/model provides the amount of uniform detail required to convey the design and construction.

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- a. Drawing and model component libraries shall be developed and maintained. Typical industry details are to be used, when applicable.
- b. The title block referenced in Appendix A of this SSTD shall be used and the following rules applied.
 - 1. When using AutoCAD or Revit, the following applies:
 - i. The "SSC FORMAT" *(block)* shall be inserted into the paper space of the drawing when using AutoCAD. The "SSC FORMAT" title block *(family)* shall be used when creating sheets using Revit.
 - ii. The "SSC FORMAT" block/family shall not be renamed.
 - iii. The "SSC FORMAT" block/family shall not be exploded.
 - iv. Title blocks should be filled out correctly and completely including required hidden attribute fields (AutoCAD) or parameter data (Revit). (See Appendix B references below.)
 - v. Title blocks should be set to the "FORMAT" layer when using AutoCAD.
 - vi. Spell check the title block information.
 - 2. When using Creo, refer to SSTD-8070-0140.
- c. Drawing/model view delineation shall have a defined scale(s), with exceptions indicated as not to scale (NTS). Diagram drawings/models, certain pictorial drawings, and portions of other drawing/model views that are tabulated or contain break lines are exempt.
- d. Refer to the latest revision of ASME Y14.5 for dimensioning and tolerancing requirements.
- e. The differences (variables) between items defined by a drawing that have fixed (constant) characteristics should be depicted or stated only once in a tabulated drawing.
- f. Revisions shall be authorized before a drafter changes the drawing/model. Authorization includes, but is not limited to, the various forms of change request, i.e., Engineering Order (EO), Certificate of Completion (COC), Stennis Change Request (SCR), Engineering Change Request (ECR), and Engineering Modification Instruction (EMI).
- g. Any changes or revisions to an existing drawing shall use the latest graphic symbols. For symbol legends, refer to SSC DWG 54000-P001 and SSC DWG 53000-E001.
- h. The drawing sheets shall depict all interrelated elements, existing and new, that may affect the design and/or construction, i.e., pertinent services, construction obstacles, equipment, utilities, and other engineering features.
- i. Drawings shall be prepared on the SSC Engineering CADD system in the "F" (28" x 40") size format unless another format is specified.

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- j. New drawing sheets shall be REV 0. Note: This requirement does not apply to models.
- k. All text shall meet the following requirements:
 - 1. All text shall be on a separate layer in the CADD database. **Note:** For Creo text requirements, see SSTD-8070-0140.
 - 2. All text shall be in CAPS no lower case with exceptions for sizing and special symbols or electrical (ex: 4mm; 4"x4"x1/4").
 - 3. General text height is 1/8" with exception of titles; drawing view title text height is 1/4". If smaller text is needed for special concerns, 3/32" is the minimum height allowed. Text width is set to 1.
 - 4. All text shall be either middle left (ML), middle right (MR) or middle center (MC) justified.
 - 5. All leader lines for callouts shall have landings and shall be projected from the ML or MR of text.
 - 6. The text of all list headings and drawing view titles shall be underlined.
 - 7. Calibri.ttf font shall be used for all text in AutoCAD and Revit designs. Arial.ttf font shall be used for all text in Creo designs.
 - 8. All text shall be spell checked.
- 1. "Zoom Extents" before saving each drawing file to ensure full drawing sheet is displayed for proper upload and viewing in NASA data management system.
- m. Drawing sheets shall be clearly marked with the 30%/60%/90% review stamp at the time of submittal. Drawing sheets for final submittal shall not contain a stamp unless specified otherwise.
- n. Dimensional units shall be in feet and inches and fractional form. Dimensions shall have clear points of contact and should leave no questions of their points of origin. Using phantom/center lines (as required) set to a gray layer is recommended to clear up any confusion. Make sure all dimensions and callouts are clearly visible, e.g., not covered by a part of the drawing content, not overlapping each other, and not condensed to the point they cannot be read clearly.

4.3 Facilities Drawings/Models

- a. Facilities drawings/models include, but are not limited to, architectural, civil, electrical, mechanical, structural, tabulated, technical systems, and vendor drawings/models. (See definitions for each drawing/model type.)
- b. AutoCAD and Revit drawing sheets and files shall have the same name.

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- c. Drawing layers shall meet the following requirements. See Appendix B, Drawing Layer Examples.
 - 1. Drawing layers shall follow NCS unless otherwise stated.
 - 2. All line types, colors, scales, weights, thicknesses, and materials shall be BYLAYER.
 - 3. The latest version of CTB (color dependent) plot styles shall be used.
 - 4. All text, including dimensions, shall be set to color 7 (white).
 - 5. Color 2 (yellow) and color 4 (cyan) shall not be used as options for drawing layer colors.
 - 6. Color 1 (red) and color 3 (green) are set to bold and shall be used for new objects.
 - 7. Grays (colors 8, 9, 250-255) are set to varying light shades and shall be used for existing objects. Color 8 is used most commonly.
 - 8. All other colors are set to default settings.
- d. EMI drawings/models establish the requirements for a modification to a structure or a system.
 - 1. EMIs shall completely define the modification to be made, with sufficient description of the existing structure or system to ensure continuity between the modified and unchanged areas.
 - 2. Form SSC-151 series is the primary modification document for EMIs and shall be prepared by the assigned Design Engineer.
 - 3. Refer to Appendix B references for EMI drawing sheet numbering.
 - 4. Differentiate between modified and existing structures and/or systems using the proper layer settings as stated above.
- e. The cover sheet of a package the Vicinity Plan, Fee Area, and Drawing Index (G-001) shall meet the following requirements:
 - 1. The vicinity map and its accompanying Fee Area map are located on the left side of the first drawing sheet and illustrate the SSC site, identifying the main structures on the site and delineating the structure's relationship to features of the surrounding area. It is not required for shop packages unless otherwise specified.
 - 2. The drawing index is a listing of each drawing sheet included in the set and is located to the right of the vicinity map. It is not required for shop packages unless otherwise specified.
 - 3. Vicinity Plan, Fee Area, and Drawing Index shall not be renamed or altered other than to add title block information, drawing index content, and project area.
- f. Building plan drawings/models shall be maintained to define the latest building configurations and space allocations (SPAN floor plans) for use by the NASA Real

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Property Department to track tenant data such as which organizations occupy the spaces. (Reference NPR 8800.15C, Appendix B).

- There are six (6) types of SPAN drawings; one (1) main SPAN Floor Plan (SP) drawing and five (5) supporting drawings. The supporting drawings include Building Gross (BG), Floor Gross (FG), Space Type (ST), Room Designation (RD) and Room Classification (RC). See definitions for more information.
- 2. SPAN drawings shall be maintained by the SACOM Syncom Space Services (S3) drafting department and configuration managed in DDMS.
- 3. SPAN drawings shall be displayed at 1/8" scale.

4.4 Test Site Drawings

Refer to SOI-8080-0007 and SSTD-8070-0140 for further requirements of test site drawings/models.

- a. The mechanical design engineer develops test site drawings/models (i.e., MSKs and PSKs) through the design, analysis and drafting process, and is responsible for the overall content of the mechanical system's design and mechanical test site drawings/models. See SSC DWG 54000-P001 and SOI-8080-0007 for reference.
- b. The electrical design engineer develops the electrical, data acquisition, controls and ancillary system's designs (i.e., ESKs) through the design, analysis and drafting process, and is responsible for the overall content of the electrical system's design and electrical test site drawings/models. See SSC DWG 53000-E001 and SOI-8080-0007 for reference.
- c. New _SK (Mechanical Sketch [MSK], Piping Sketch [PSK], Electrical Sketch [ESK]) Sitewide Operation Repair Documentation (SORD) numbers are self-issued by searching DDMS and finding the next available sequence number.
- d. All line sizes shall be on top of and not below the line.
- e. Range on Pressure Indicators (PIs), Temperature Indicators (TIs), etc. shall be shown in paraphrases; ex. (0-600 PSIG).
- f. Pressure for Relief Valves (RVs) shall be preceded by "SET" unless special case and/or instructed otherwise by the engineer; ex. SET 275 PSIG.
- g. All drawing diagram content should be in Paper Space. There should be no drawing diagram content in Model Space unless it is drawn to scale.
- h. Reducer size shall not be called out. Ensure line sizes are shown on either side of the reducer

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symbol and add line size callouts where needed. The exceptions are reducers used on component inlets (valves, filters, etc.) which are called out.

- i. Boss symbols shall be removed from pipelines with branching lines to components (instruments, valves, etc.). Only show boss symbols for unused boss locations (remove plug if present). If a branching tube is removed from a pipeline, a boss symbol shall be indicated on the pipeline at the location of the branch, and the boss size and spare boss is to be noted. (Example: ¼" SPARE BOSS)
- j. Component symbols shall be layered/colored the same as the respective line. The color of text in symbols containing locator numbers shall be black. For example, the locator text in an instrumentation bubble.
- k. Electrical Instrument or Control Wiring lines (between instrument and Low Speed [LS], Control System [CS], control valves, etc.) shall be dashed/hidden line type and colored cyan.
- 1. Data Acquisition System (DAS)/CS bubbles and text shall be colored black.
- m. Not installed boxes shall be phantom1 (D-PHN1-NOT-INST) or phantom2 (D-PHN2-NOT-INST) as required. The text describing the not installed area shall be assigned to layer D-TEXT-NOT-INST. **Note:** These are colored magenta (AutoCAD color #6).
- n. Equipment or area boundary shall be phantom1 (D-PHN1) or phantom2 (D-PHN2) as required.
- o. Boxes surrounding block and bleed valves (indicating a single component) shall be dashed/hidden line type and colored black.
- p. Lines between purge gas components and fuel or oxidizer components (check valves, etc.) shall be layered/colored the same as the purge gas.
- q. All symbols shall be properly oriented (not upside down).
- r. PSKs shall have pressure break tags at the following locations:
 - 1. The "ins and outs" (continuation tags/match lines)
 - 2. Wherever there is a pressure change within (e.g., at RV, check valve, regulator, etc.).
- s. PSKs shall publish in color by setting the layout plot style table to acad_color.ctb.
- t. Line weights shall be color dependent and are defined in the CTB plot style file.

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5.0 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

Acronyms, Abbreviations 5.1

A/CAir-conditioningAISCAmerican Institute of Steel Construction	
AS Assignable Space	
ASME American Society of Mechanical Engineers	
BG Building Gross	
BMT Basement/Tunnel	
CADD Computer-Aided Design and Drafting	
CATV Cable Television	
CCB Configuration Control Board	
CNF Conference Room	
COC Certificate of Completion	
COM Communication	
COR Corridor	
CS Control System	
CUB Cubicle	
CUS Custodial	
DAS Data Acquisition System	
DDMS Data Design Management System	
DWG Drawing	
E&TD Engineering and Test Directorate	
ECR Engineering Change Request	
EDP Engineering Design Process	
ELE Elevator	
EMI Engineering Modification Instruction	
EO Engineering Order	
ESD Engineering Services Department	
ESK Electrical Sketch	
EXS Executive Offices	
FAR Federal Acquisition Regulation	
FG Floor Gross	
HVAC Heating, Ventilation, and Air-Conditioning	
" inch	
IEEE Institute of Electrical and Electronics Engineers	
KIT Kitchen	
LAB Laboratory	
LOZ Loading Zone	
LS Low Speed	
MC Middle Center	

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MEC	Mechanical
MLC	Middle Left
MR	Middle Right
MSC	Miscellaneous
MSC	Mechanical Sketch
NAS	Non-assignable Space
NASA	National Aeronautics and Space Administration
NCS	United States National CAD Standard
NPD	NASA Policy Directive
NPR	NASA Procedural Requirement
NTS	not to scale
OFF	Office
OTR	Other
P&ID	
PI	Piping and Instrumentation Drawing Pressure Indicator
PM DSLC	Project Manager
PSIG	Pounds per square inch gauge
PSK PC	Piping Sketch
RC	Room Classification
RD	Room Design Relief Valve
RV	
S3	Syncom Space Services
SACOM	Synergy-Achieving Consolidated Operations and Maintenance
SCB SCD	Stennis Configuration Board
SCR	Stennis Change Request
SCWI	Stennis Common Work Instruction
SHO	Shop
SK	Sketch
SOI	Stennis Organizational Instruction
SORD	Site-wide Operation Repair Documentation
SP	SPAN Floor Plan
SPR	Stennis Procedural Requirement
SSC	John C. Stennis Space Center
SSTD	Stennis Standard
ST	Space Type
STD	Standard
STE	Special Test Equipment
STO	Storage
STW	Stairwell
TI	Temperature Indicator
W/C	Water Closet

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5.2 Definitions

Architectural Drawing/Mo	del: Graphic display of the architectural requirements of buildings and other structures (including the magnitude, appearance, interior and exterior materials, and location) for construction details of walls, partitions, foundations, floors, etc.; for the location and/or details of equipment such as lockers, shelves, tables, etc. These drawings/ models depict the relationship of all components as well as all other nonstructural details, such as wall and roof materials and application, stair and handrail details, built-in counters, cabinets, and all other miscellaneous steel and iron work.
Baseline Drawing/Model:	Per SSTD-8070-0001-CONFIG, a baseline drawing/model is identified by SORD documentation and systems requiring configuration control as identified by the SCB and/or CCB responsible for the respective system. A baseline drawing/model is also known as an as-built drawing/model.
Building Gross (BG):	A BG drawing shows the sum of the floor included within the outside faces of exterior walls, also known as gross building area. This does not always extend to the edge of the foundation.
Building Plan/Model:	Defines the latest building configurations and space allocations (SPAN floor plans).
CADD:	Any computer-aided design and drafting software.
Civil Drawing/Model:	
	Graphic, symbolic representation of existing and/or planned surface features of a region, showing the necessary construction required to develop a site. Natural and manmade features or objects (e.g., hills, streams, buildings and structures, power transmission lines, and railroads) are shown, and their geometric configuration and physical relationship to other structures and boundary lines are indicated. Certain important imaginary lines (e.g., community, property, and zoning boundaries) are also indicated for record and reference purposes. In the general planning and layout of construction required to develop a site, civil drawings/models are included which depict structure location, grading, roads and paving, underground piping, yard structures, etc.

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Electrical Drawing/Model: Provides a basis for showing the general physical location and arrangement of the required wiring system and identifies the physical requirements for various types of materials needed to provide the electrical installation in building. See SSC DWG 53000-E001 for reference. Test Site electrical plan, panel arrangement, advanced schematic, **Electrical Sketch (ESK):** cabling diagram, wiring diagram, and wire termination sheet. **Facilities:** The term "Facilities" encompasses land, buildings, other structures, and other real property improvements, including utilities and collateral equipment. The term does not include operating materials, supplies, special tooling, technical systems, Special Test Equipment (STE), and non-capitalized equipment. Facilities include but are not limited to the following: Site Support Utilities - Electrical Power, Building Ground, • Natural Gas, Sewer, Potable Water, High Temperature and Chilled Water, Solar Systems, Fire Protection, Telecom Communications - Telephone, Fire, Local Area Networks, • Dedicated Data, Cable Television (CATV), Radio, Satellite Tracking Sensing and Alarms - Fire Alarm, Utility Monitor, Security • Alarm, Energy Management Control System Buildings – Includes all SSC buildings Marine Equipment – Tugs, J Boats, Work Barges Land Based - Fire Trucks, Cranes, Tractors, Autos Tool and Test Equipment • Hazard Monitor Wells Site Work - Roads and Parks, Railroads, Waterways, Utilities Distribution, Drainage, General Facility, Tunnels and Communication Ducts, Power System Distribution/Pole Lines, Benchmark and Contours Floor Gross (FG): An FG drawing shows the portion of the BG area excluding areas that cannot be put to use due to the presence of structural features (exterior wall thickness), also known as the FG area. The FG area is calculated from the inside face of the exterior wall and includes the area taken up by interior walls. Mechanical Drawing/Model: Mechanical flow diagram, instrument drawing, and pipe drawings/models graphically display piping to convey solids, liquids, or gases; construction detail for mechanical devices and air-

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	conditioning (A/C) installations; construction detail for tanks and fire protection systems. These drawings/models establish the requirements for construction and/or planning of interrelated elements of the design including pertinent services, equipment, and other features required to ensure the performance of the mechanical equipment. See SSC DWG 54000-P001 for reference.	
Mechanical Sketch (MSK):	Test Site mechanical fabrication drawing/model, piping, pipe support, and structural drawing/model.	
Modification Drawing/Model (EMI):	Shows the modification to be made with sufficient description of the existing structure to ensure continuity between the modified and unchanged areas.	
Piping Sketch (PSK):	Test Site process piping drawing, also referred to as Piping and Instrumentation Drawing (P&ID).	
Room Classification (RC):	 An RC drawing shows which category each area is classified. Classifications include: A/C Office/Conference/Auditorium Etc. A/C Shop/Industrial/Lab Non-A/C Warehouse/Pavilions 	
Room Designation (RD):	 An RD drawing delineates the function of each room. RDs include the following: BMT – Basement/Tunnel CNF – Conference Room COM – Technical/Comm – Electrical (ethernet cables, computer towers) COR – Corridor/Hall (entry into buildings/hallways along hard wall offices/rooms) CUB – Cubicle - Cubes Regardless of Use (office, storage, printers, etc.) (# Sequence "-#") CUS – Custodial ELE – Elevator EXS – Executive Office/Suites KIT – Kitchen (has sink, not just refrigerator) LAB – Laboratory LOZ – Loading Zone/Dock/Shipping Platforms (covered) MEC – Mechanical, such as Heating, Ventilation, Air-Conditioning (HVAC) and Piping 	

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		opy Room, Library, Cafeteria,
	 Auditorium, Pavilion, Patio, Etc. OFF – Office (also includes circulation space between workstations) 	
	 workstations) OTR – Other (unique space used by personnel other than aixil accurate) 	
	civil servants)SHO – Shop/Industrial	
	• STO – Storage	
	• STW – Stairwell	
	• $W/C - Restroom/(Water C)$	Closet)
Space Type (ST):	non-assignable space (NAS). T	ea by assignable space (AS) and The AS is the sum of all areas includes all levels (stories) of a
SPAN Floor Plan (SP):	room tag contains the room nu	s BG, FG, and Assignable/Non-
Special Test Equipment (S	test units engineered, designed accomplish special purpose test consists of items or assemblies foundations and similar improv STE, and standard or general p interconnected and interdepend functional entity for special test material, special tooling, real p	ngle- or multi-purpose integrated , fabricated, or modified to sting in performing a contract. It s of equipment, including wements necessary for installing purpose items or components that are dent so as to become a new sting process. STE does not include property, and equipment items used property that with relatively minor
Structural Drawing/Mode	barges, and many other structur construction. The size and place	splay such items as framing for he construction details for bridges, res to establish the basis for ement of beams, reinforcing steel, umns are described by the delineation hrough the use of symbols,

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Tabulated Drawing:	A drawing that has symbols or variables in place of dimensions which are added to a table on the drawing.
Technical System:	 Technical system drawings/models include, but are not limited to, advanced schematics, advanced schematics-instrumentation, block diagram, cable and wire schedules, conduit schedules, and installation and equipment drawings/models. They include, but are not limited to: Test Operations Communication Systems Data Acquisition and Processing Systems Control Systems Fire and Gas Detection Specialized Power Systems Specialized Mechanical and Distribution Systems that support test critical operations Propellant Systems (Cryogenics Facility, Barges and Distribution Systems, Run Systems, Fuel and Oxidizer Transfer, Bleed Lines, Discharge Lines) High Pressure Gas Distribution Systems (Air, Gaseous Hydrogen, Gaseous Nitrogen, Gaseous Helium) Power Back-Up Systems (Generator, Uninterruptable Power Systems) High Pressure Industrial Water Pumps and Distribution System
Tolerance:	The total amount by which a specific dimension may vary from design size.
Vendor Information Drawing/Model:	Supplied by a vendor to set forth the general requirements of a fabricated item. It is not necessary to repeat circuitry or other detail information on drawings/models when complete vendor drawings/models have been furnished. A vendor information drawing/model should show only the dimensions, contour, and design data necessary to meet design requirements.

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Appendix A: Title Block

Following is an example of SSTD-8070-0002-CONFIG title block that shall be used site-wide.

The title block font shall be:

- a. Calibri.ttf in AutoCAD and Revit, and
- b. Arial.ttf in Creo, per SSTD-8070-0140.

SYM ZONE		DESCRIPTION
		REVISIONS
SIGNATURES	DATE	NATIONAL A ERONAUTICS AND JOHN C. STENNIS
	DRAWN_DAT	SPACE CENTER
CHECKED_BY	CHECKED_DAT	E DESCRIPTION
ENGINEER ENGINEER1	ENGINEER_DAT	E1 TITLE1
ENGINEER ENGINEER2	ENGINEER_DAT	E2 TITLE2
		TAL_DATE3 TITLE3
STE MANAGER/FACILITY MANAGER	SITE_MANAGER_	
	CONCURRENCE_	ATE TITLE5
SUBMITTED SUBMITTED_BY	SUBMITTED_DA	TESZE DWG DR&WING NIIMRFR SHTNO. REV
SAFETY SAFETY	SAFETY_DAT	
APPROVED APPROVED	APPROVED_DA	

- SYSTEM
- SUBSYSTEM
- FACILITY
- BUILDING NUMBER
- PROJECT
- DRAWING TYPE
- AFSCODE
- RETENTIONSCHEDULE
- RECORDISPO
- DESCRIPTION
- DRAWING NUMBER
- AUTHORIZATION
- Signifies hidden attributes and will not be viewed or printed on final hardcopy drawing sheet. These are primarily being used for Design and Data Management System (DDMS) search capabilities.

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Appendix B: SSC AutoCAD Drafting/Modeling Standards Guide/Preferences for Outside Contractors

The following standards and preferences are to be adhered to during all phases of a project, unless otherwise specified. This applies to outside contractors performing designs for SSC.

Files to be sent to outside contractors shall be the latest versions of the following:

- SSC FORMAT.dwg (Block)
- SSC F SIZE FORMAT.dwt (Template)
- acad_black.ctb
- G-001 (Cover Sheet)
- SSTD-8070-0002-CONFIG

GENERAL:

- Final deliverable drawings submitted by outside contractors shall be in AutoCAD 2018 format (unless otherwise specified) and contain no proxy graphics. Any drawings containing proxy graphics must be sent back to the outside contractor for rework.
- Designs done in 3D software shall submit a model file along with fully converted AutoCAD 2018 files for each drawing sheet unless specified otherwise.
- Each drawing sheet shall be saved as an individual file.
- Signature and date fields for Drafter and Checker (engineer, if applicable) shall be filled in manually on final deliverable drawing sheets.
- Use "Page Setup Manager" to set the proper layout view and CTB plot style to acad black.ctb. **Note:** See section 4.4-s for specific setup of PSKs.
- All external reference drawings shall be "bound" within each drawing file, with the only exception to this requirement being plot stamps and/or images.
- No drawing information (charts, notes, content, etc.) shall be saved outside of the title block border within the "Layout" tab of an AutoCAD drawing. Any content outside of the title block border shall be saved in the Model Space of the drawing.
- Final design deliverable drawing/model package shall be submitted as Rev. 0.

TITLE BLOCK GUIDELINES:

• Company stamps and/or logos shall not be connected to or touching the "SSC FORMAT" title block. **Note:** See section 4.2-b for additional title block requirements.

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DRAWING LAYER EXAMPLES:

Note: See section 4.3-c for drawing layer requirements.

0 = "catch-all," color = black/white

G-CL1/CL2 = center line (center/center2), color = #8

G-DIM1 = dimensions, color = #7

G-Existing 1 = continuous line, color = #8 - To ref. existing structure, piping, etc.

G-Existing 2 = continuous line, color = #9 - Typically used for shading area but is not limited.

G-PHN1/PHN2 = phantom line (phantom/phantom2), color = #8 – Used to show adjacent

position of related parts or assemblies.

G-PHN3 = phantom line, color = red - Used to define the detail area.

FORMAT = format, rev block and drafting stamps, color = black/white

G-HID1/HID2 = hidden line (hidden/hidden2), color = #8

G-PRIM1 = primary object layer, color = red, (New Objects, Title Call-Outs, etc.)

G-PRIM2 = primary object layer, color = green, (New Objects where Prim1 is too thick or for Secondary Object layer)

G-TEXT = text, callouts, Detail Bubbles, Section Cuts, layer, color = white/black

G-VPRT = vport layer, color = yellow, (Set to not plot.)

G-NOTE = general notes and flag notes layer, color = white/black

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REFERENCE:

*See Appendix A for SSC FORMAT (Title Block) Information.

Example 1: Filled out SSC Title Block before signatures are added.

SYM 2	ZONE		DESCRIPTION										
STIVI	ZONE				DESCR								
						REVI	SIONS)					
	SIGNAT	URES	DATE			TIONAL RONAUT	ICS AND		\bigcirc	JOHN C. SPACE (STENNIS		
DRAWN						PACE DMINISTR	ATION		S I		39529-6000		
010010											_		
DIGINEER									GATION				
ENGINEER						Μ	ITER	GAT	E REHA	BILITA	ATION		
engneer/en	VIRONMENTA	L			LOWER GATE					А			
STE MANAGE	R/FACILITY MA	NAGER						ISON	1ETRIC V	/IEW			
CONCLERENC	i i												
SUBMITTED				SZTE	DWG						SHT NO.	REV	
SAFETY				F	NO.	EM	21B	395-	01		S-301	0	
APPROVED				ISUD				AUTHORITY	IAA# NNS19A	AOBO3A	SHEET		
3					2						1		

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Example 2: Enhanced Attribute Editor filled out for SSC Title Block including hidden attribute fields.

Block: SSC FORMAT		
Tag: RECORDDISPO		
bute Text Options Properti	es	
Tag	Prompt	Value
DESCRIPTION	FULL TITLE	NAVIGATION LOCK MITER GATE REHABILITATION - LOWER GATE AND GATE MONOLITHS ISOMETRIC VIEW
RAWING_NUMBER	DRAWING_NUMBER	EMI 21B395-01 S-301
TITLE1	Title 1	NAVIGATION LOCK
TITLE2	Title 2	MITER GATE REHABILITATION
TITLE3	Title 3	LOWER GATE
TITLE4	Title 4	GATE AND GATE MONOLITHS
TITLE5	Title 5	ISOMETRIC VIEW
DRAWING_NUM	Drawing No.	EMI 21B395-01
SHT	SHEET NUMBER	S-301
DRAWN_BY	Drawn by	
DRAWN_DATE	Drawn date	
CHECKED_BY	Checked by	
CHECKED_DATE	Checked date	
ENGINEER1	Engineered by	
ENGINEER_DATE1	Engineered date	
ENGINEER2	Engineered by	
ENGINEER_DATE2	Engineered date	
ENGINEER_ENVIRONME	Engineer/Environme	
ENGINEER_ENVIRONME	Engineer/Environme	
SITE_MANAGER	SITE FACILITY MN	
SITE_MANAGER_DATE	Site manager/Facility	
CONCURRENCE	CONCURRENCE	
CONCURRENCE_DATE	CONCURRENCE_D	
SUBMITTED_BY	Submitted by	
SUBMITTED_DATE	Submitted date	
SAFETY	Safety	
SAFETY_DATE	Safety date	
APPROVED	Approved by	
APPROVED_DATE	Approved date	
1_OF	Sheet No.	
REV	Revision	0
AUTHORITY_NAME	Authority	NNS19AA0B03A
AUTHORIZATION	AUTHORIZATION	
SSUED_CEF_DATE	ISSUED CEF DATE	
REF_INFO	REF INFO:	
SYSTEM	SYSTEM	
SUBSYSTEM	SUB-SYSTEM	
ACILITY	FACILITY	
BUILDING_NUMBER	BUILDING NUMBER	
PROJECT	PROJECT	
DRAWING_TYPE	DRAWING TYPE	
AFSCODE	AFS CODE	8820
RETENTIONSCHEDULE	RETENTION SCHE	SCH8 ITEM 53D
RECORDDISPO	RECORDS DEPOSI	PERMANENT

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EMI PROJECTS - DRAWING SHEET NUMBERING								
Discipline Designator \leftarrow Sheet Type Design	Sequential Number ator							
Discipline Designators:	Sheet Type Designators:							
 A - Architectural B - Geotechnical C - Civil D - Process E - Electrical F - Fire Protection G - General H - Hazardous Materials I - Interiors J - EMCS L - Landscape M - Mechanical O - Operations P - Plumbing Q - Equipment R - Resource S - Structural T - Telecommunications V - Survey/Mapping X - Other Disciplines 	 General (symbols legend, notes, etc.) Plans (horizontal views) Elevations (vertical views) Sections (sectional views, wall sections) Large-Scale Views (plans, elevations, stair sections, or sections that are not details) Details Schedules and Diagrams User Defined (for types that do not fall in other categories, including typical detail sheets) User Defined (for types that do not fall in other categories) JD Representations (isometrics, perspectives, photographs) 							

Per SORD DWG 54000-P001, Legend for Piping Schematics, Sheet 1

	COLOR NUMBER	RGB COLOR	EXAMPLE
FUEL (LH, GH, NG, RP, IPA, GM, LM, LNG)	#1 (RED)	255, 0, 0	
OXIDIZER (LO, GO)	#3 (GREEN)	0, 255, 0	
NITROGEN (LN, GN)	#150 (BLUE)	0, 127, 255	
HELIUM (HE)	#202 (PURPLE)	124, 0, 165	
OTHER (HA, PW, HD, CO, LU, ETC.)	#44 (BROWN)	127, 95, 0	
TEA-TEB (TT)	#30 (ORANGE)	255, 127, 0	

LINE COLORS FOR COMMODITIES ON P&IDS

This is an uncontrolled document when printed. Verify that the document is current before use.

Z - Contractors/Shop

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Appendix C: SSC Creo Drafting/Modeling Standards Guide/Preferences for Outside Contractors

The following standards and preferences are to be adhered to during all phases of a project, unless otherwise specified. This applies to outside contractors working on designs for SSC.

The Contractor shall obtain the following from the NASA Project Manager (PM):

- The latest revision of SSTD-8070-0140.
- Appropriate set-up files (Config, Templates, etc.).
- Common Parts to be used (bolts, nuts, piping elbows, piping flanges, etc.).
- The NASA PDLM Manager shall identify the current compatible version of Creo software being used at SSC. Software is to be obtained by the contractor unless otherwise specified.

All deliverables shall meet the following requirements:

- Compatible with Creo software used at SSC.
- Meet all requirements within SSTD-8070-0140.
- Achieve SSC Modelcheck Configuration verification with zero errors. Any deliverables containing errors per SSC Modelcheck Configuration shall be sent back to the Contractor for resolution.
- Drawing and model numbers coordinated with NASA to prevent duplication.

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Appendix D: SSC Revit Drafting/Modeling Standards Guide/Preferences for Outside Contractors

The following standards and preferences are to be adhered to during all phases of a project, unless otherwise specified. This applies to outside contractors working on designs for SSC.

The Contractor shall obtain the following from the NASA PM:

- The latest revision of NASA STD-10001.
- The appropriate set-up files (Template.rvt, Utility.rvt, Building.rvt, Topo.rvt, Site grid etc.).
- The Common Families to be used (pipe systems, valves, accessories, etc.).
- The NASA PDLM Manager shall identify the current compatible version of Revit software being used at SSC. Software is to be obtained by the contractor unless otherwise specified.

All deliverables shall meet the following requirements:

- Compatible with Revit software used at SSC.
- Meet NASA STD-10001 requirements.
- Drawing and model numbers coordinated with NASA to prevent duplication.
- Company stamps and/or logos shall not be connected to or touching the "SSC FORMAT" title block. **Note:** See section 4.2-b for additional title block requirements.
- Signature and date fields for Drafter and Checker (engineer, if applicable) shall be filled in manually on final deliverable drawing sheets.
- Final design deliverable drawing/model package shall be submitted as Rev. 0.