

DEVELOPING DESIGN DELIVERABLES

Purpose:

This document assists in preparing consistent quality design deliverables, establishing checking and review requirements. It is intended for use in military program project deliverables but has application in other programs augmenting existing Engineering Division and Louisville District ISO business practices.

Quality can be measured by construction phase cost and time growth. By decreasing designer errors, reducing design deficiencies, and increasing interdisciplinary coordination, quality is improved. Designers, checkers, and reviewers are equally responsible for product quality and ultimately, for our internal and external customer satisfaction.

Document Dates:

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DESIGN GUIDANCE & CRITERIA

The following specific design guidance and criteria documents apply to design features and design processes when executing MILCON funded projects. Many of the documents have been identified, sorted, and hyperlinked at the [Louisville District Design Guide \(LDDG\)](http://www.lrl.usace.army.mil/) located on the internet page: <http://www.lrl.usace.army.mil/> .

General:

Guidance and criteria documents are intended to work in a collaborative fashion. However, due to document publication dates, some degree of conflict is not uncommon. In all cases:

1. The most recent published guidance shall apply.
2. Government guidance has precedence over non-government guidance.
3. In cases of conflict, the most stringent shall apply unless directed otherwise.

Priority: (in decreasing order)

1. Contract requirements
2. Louisville District Requirements (Intranet)
3. DOD/DIA/CIA Handbooks and Instructions
4. Unified Facility Guide Specifications (UFGS)
5. Unified Facilities Criteria (UFC's)
6. Using Service (Army, Air Force, etc.) Handbooks and Guidance
7. Installation/Local Guidance and Criteria
8. Customer Specific Guidance and Criteria
9. US Army Corps of Engineers Guidance and Criteria

USACE Guidance and Criteria: (in decreasing order)

1. Operational Order (OPORD)
2. Fragmentary Order (FRAGO)
3. Engineering Construction Bulletin (ECB)
4. Unified Facilities Criteria (UFC)
4. Unified Facility Guide Specifications (UFGS)
5. Engineering Technical Letter (ETL)

Customer Input:

Air Force: <http://www.afcee.af.mil/shared/media/document/AFD-070919-027.pdf>

Army MT Program:

1. HQ USACE MT guidance: (Wizard) instructions/criteria page 2 of 2.
2. COS facility specific guidance and criteria
3. Louisville District Contract Requirements
4. Installation / Project specific (preferences)

Army Reserve Program:

1. Contract requirements
2. Louisville District Requirements (Intranet)
3. Local municipal or installation Requirements

Simplified Design Criteria:

Beginning in FY 2010, Army project delivery is authorized to use simplified design criteria for COS standard designs and all other MILCON facility types. The design criteria table below has been made part of the COS delivery process and is exportable for other projects. Designers are encouraged to migrate toward industry standard design criteria and away from the Army and Corps of Engineers guidance and criteria resources.

Functional/Programmatic elements:	Criteria for A-B:
The following varies for each COS standard design facility:	A-B = Adapt-Build or Site Adapt COS projects
Standard design Program Spaces	Established by Army Standard/Standard design
Size/area requirements of standard design program Spaces	Established by A-B dwgs
Arrangement of standard design program spaces	Established by A-B dwgs
Vertical dimensions of spaces	Minimums established by A-B dwg sections
Loading Dock and equipment	Established by A-B dwgs/guide specs – dock must be at FFE
Rear service yard requirements	Dimensional information established by A-B concept site plan, may need to be adjusted for site conditions.
Exterior queuing structures	Established by A-B dwgs -may be detached from bldg.
Grease interceptor	Min 2000 gal capacity or per operational rqmts, whichever is greater. Provide vehicular access.
Parking	Provide minimum 1.5 x staff size. More depending on project requirements.
Site Force Protection features	Criteria dependent based on Site Conditions
Architectural / Interiors:	
Thermal envelope characteristics (ie materials and R values)	Code/Criteria Site conditions.
Roof System	Mod-Bit preferred-geographic dependent
Doors and Windows	Established by A-B specs. Adapt fenestration only (to meet theme)
Hardware	Function driven. Finish/aesthetic per site conditions
Exterior cladding	Any commercial grade matl. Brick preferred. Match theme
Exterior wall assembly	Any commercial grade system. Non-combustible preferred
Roof system	Any non-combustible, mod-bit low-slope. Mansard typical.
Interior Finishes	Minimum established by A-B finish schedule. See also TB MED
Interior partitions construction	Code/criteria dependent. Non-combustible preferred
Interior partitions acoustical characteristics	STC ratings established by A-B dwgs. Increase depending on site noise (ie airfield)
Interior theme	Match installation theme
Food service equipment layout	Established by A-B Dwgs. No deviation permitted
Food service equipment selection	Established by A-B guide specs. No deviation permitted
Furniture; table and chair layout	Established by A-B dwgs except in extreme cases.
Furniture specifications	Minimum established by A-B guide specs. May be tailored to STRUCTURAL INTERIOR DESIGN scheme.
HC Accessibility	Established by A-B dwgs; see DA narrative
Structural :	
Primary structural framing system	Open-bay column-free space is desired for maximum flexibility and future re-purpose.
Lateral resisting systems	Moment frame preferred to maximize window openings
Foundation	Site conditions
Seismic	

Table Cont'd	
Mechanical / Plumbing	
Kitchen Ventilation/humidification	Established in section 1 DA narrative
Building HVAC system	Site conditions. VAV system preferred.
Fuel source	Natural gas preferred for cooking
Heating system	Site conditions.
Domestic water heating	Site conditions. If geothermal than confirm can heat water sufficiently.
Electrical / Telecommunications:	
Power requirements	Site Conditions. See appendix for anticipated load
Fixture selection	No. Established by A-B dwgs/Specs
Data	Provide data to spaces described in DA
Life Safety / Fire Protection	
Automatic fire suppression	UFC 3-600-01 and IBC. May not be required depending on Code construction type and Installation requirements
Location of suppression equipment	Mechanical room preferred. Post may require access.
Wall assembly fire rating characteristics	Code dependent
Floor/ceiling assembly fire rating characteristics	Code dependent
Fire alarm system	Code dependent. Adapt to Installation reqm'ts

PROJECT AUTHORIZATION DELIVERY CODES

- Code 0:** Centrally funded Planning Charette - O&M funded master planning and initial 1391 development.)
- Code 1:** Project Initiation or Pre-design - Enter into negotiations and develop design team cost estimate/contract for design services, complete site/geotechnical/as-built validation/environmental/HTRW surveys and other investigation work.
- Code 2:** Concept Design - Used by exception (for unique facilities) where unit cost or function is not defined. Army Reserve sometimes uses this code when site is still unapproved. PDT completes by 1 Mar of design year. Design is >35% of the total design effort.
- Code 3:** Parametric Design - PDR Parametric Design represents 5-15% project design completion. A Design Charrette is authorized and the completed PD Report is sent forward.
[https://ff.cecer.army.mil/rfp_wizard/docs/refs/waiverProcess/refs/Instructions%20for%20Parametric%20Design%20\(Code3\)-final.doc](https://ff.cecer.army.mil/rfp_wizard/docs/refs/waiverProcess/refs/Instructions%20for%20Parametric%20Design%20(Code3)-final.doc)
- Code 4:** Design on hold pending a supplemental design directive. Stop work until further notice.
- Code 5:** Project Deferred - Project FY is delayed. Stop work until further notice.
- Code 6:** D-B-B Final Design - Produce Ready To Advertise (RTA) 100% complete drawings and specs for Design-Bid-Build (D-B-B) construction contract procurement. Customers/PM can elect to go through to final design complete without any interim reviews/stops. Or, they may elect some form of interim review (60%), either over-the shoulder or officially stopped design effort for the review period. The schedule and degree of completion of the contract P&S documents for interim reviews are somewhat subjective and should be delineated in the Project Management Plan (PMP). **Typically, Air Force and Army Reserve customers include this interim submittal request.**
- Code 7:** Develop D-B RFP - Produce RTA Request For Proposal (RFP) package for solicitation using 1-Step or 2-Phase procurement through Source Selection Evaluation Board (SSEB). For Army, the Wizard tool is required, for Army Reserve their RFP template is to be used. For all others, choose a past similar example. Technical design is limited to 30% complete state except with HQUSACE approval. There is seldom any interim stop or review of the RFP package. See the project execution and control flow chart on the intranet site:
https://ff.cecer.army.mil/rfp_wizard/docs/refs/waiverProcess/ProjectExecutionAndControl.html .
- Code T:** Adapt Build (A-B) – Applies to Army MILCON funded Center of Standardization (COS) facility types. Develop Design-Bid-Build package using the standards, BIM, and installation specific info provided from a previously designed/constructed project.

Code 8: Project cancelled. Formally stop work until further notice from the customer.

Code A: Project advertisement authorized, but not award. Funding is not yet available.

Code 9: Construction contract award is authorized.

BUILDING GROSS AREA CALCULATION METHODS

Building Area Calculations:

For vertical construction, facilities are limited in gross area to that identified on the project DD Form 1391. Facilities must also meet gross area and travel distance requirements contained in the building and fire codes. These two requirements are performed separately and require the designer to calculate gross area differently. It is critical to understand and apply the correct method and criteria for the purpose intended.

a. Gross Area Calculation for Scope and 1391 Compliance: Calculations are based on DOD mandated methods, and are used to validate congressional statutory compliance. The facility Gross Area calculations shall be as stated in [Engineering Construction Bulletin \(ECB\) 2008-29](#), and the [Appendix 1](#). sketch. This calculation method recognizes the relationship of building area and construction cost. Facility type “Unit Costs” are based on this calculation method. This evaluation recognizes different cost factors apply to roofs, overhangs, stairs, etc.. Thus, these areas are given a different value than enclosed/conditioned space. Exclusively use this calculation method when performing facility scope and square footage analysis of the project scope and area limitations.

b. Gross Area Calculation for Building and Life Safety Code Compliance: Calculations are based on latest version of the International Building Code (IBC), Section 502.1. Gross area begins at the interior face of exterior walls and firewalls. It excludes vents, shafts, and courts. The same definition is used in the NFPA 101, The Life Safety Code. This method is used to calculate the area limitations for construction types, occupancy types, and exit distances when completing the Fire Protection/Life Safety Code compliance worksheet.

PROJECT DELIVERY METHODS

Design-Bid-Build (D-B-B):

This delivery process is based on 100% complete construction drawings and specifications. In the design-bid-build process, the Government retains a high level of design control and receives a firm fixed price for the construction of a thoroughly defined product. Interim reviews of the design documents can be a part of the design development process and occur at the 35% to 65% design complete stage. Occasionally, additional “over the shoulder” reviews (typically at 65% design) will be part of the contract scope. A Design Analysis (DA) is also part of the contract package. Design funding is separate from construction funding.

1. Adapt-Build (A-B) Procurement:

This D-B-B method is a part of the Center of Standardization (COS) procurement process. Plans and specifications are based on available facility standard designs that are 60% to 90% complete at design start. The final 100% complete contract plans and specifications are issued using one of the D-B-B procurement methods or given to an IDIQ contractor. Design development of construction documents and construction contract procurement are the responsibilities of the COS, but can be completed by the Geographic District (GD) if requested.

2. Design-Bid-Build Procurement:

a. Low Bid:

The construction contractor is selected through a competitive bid process where the offeror with the lowest bid is usually awarded the contract. Construction contracts are awarded based upon low competitive bids and bonding is required as part of the Invitation for Bids (IFB). This delivery method provides management simplicity and a reasonable level of confidence in the estimated cost for construction since the estimate is based on a 100% design.

b. Lowest Priced Technically Acceptable (LPTA):

The construction contractor is selected through a competitive bid process where the offeror with the lowest bid and has qualifying credentials outlined in the contract is usually awarded the contract. This delivery method provides management simplicity and a reasonable level of confidence in the estimated cost for construction since the estimate is based on a 100% design.

Design Build / Request for Proposal (D-B/RFP):

This acquisition process provides another design tool to minimize design execution time and pre-award design cost. It is often used for late start Congressional inserted and supplemental projects. Drawings or sketches in the RFP are used to convey the design intent and are some degree less than 100% complete. Technical specifications are also not developed. This approach puts the final designer of record (DOR) and constructor under one contract after award. Drawings and

specifications are instruments between the contractor and his DOR to explain the design and do not form part of the D-B contract. Intent of the RFP package is to define the desired end product, leaving the construction details material and methods to the designer/contractor to develop. The available construction funding is fixed and identified within the RFP package. The designer and the construction contractor collaborate to provide the best balance between design, construction technology, and cost. Post award design effort is funded from available project construction dollars.

1. Bridging Design Build

The Bridging variation of the DB delivery method includes drawings and specs that delineate the desired finished product (facility) and/or features. The drawings/specs are called “bridging documents” and may utilize preliminary design drawing/spec package or some other degree of completion plans and technical specs up to 100%. The lower degree of completion provides the DB contractor with increased latitude in the final detailed development of the design and in the execution of working drawings. packages prepared using this method offers greater design control, but must thoroughly communicate all un-designed requirements.

2. Turnkey Design Build:

Another form of design-build is called Turnkey. A Turnkey project establishes a fixed price, usually based on a written RFP with no sketches or drawings. Instead, the RFP defines the minimum design requirements (usually in a narrative form), and the design-build teams submit design concepts along with price proposals and qualifications packages. This form of RFP is usually selected for repetitive type construction projects such as housing, temporary living facilities, etc. Turnkey construction may include a requirement for the offeror to complete land acquisition in order to achieve the final facilities.

The Turnkey variation of the DB delivery method involves an RFP that contains little more than a general description of the project requirements. Proposals are more technical and detailed. Functions other than design and construction are typically included, such as land acquisition, financing, and operations and maintenance (O&M). This type of delivery method should be utilized only when well established industry standards and materials are available and control after contract award is not desired. Potential vendors must be willing to risk higher costs to compete.

3. Fast Track:

The Fast Track delivery method is a form of design-build, in which construction begins before working drawings and specifications are complete, and work is based on multiple bid packages or multiple post-award design submittal packages. Disadvantages are that it is more complex and time consuming to administer, and requires greater construction management skills. There is also the potential for higher costs and construction completion schedule. The best application for the Fast Track delivery method is for bona fide emergency where time savings carries high premium. The work must also be divisible into discrete packages identified in the RFP.

4. Design Build+ (DB+):

DB+ is similar to Traditional Design Build allows for use of performance specs and a low level of design. It allows the flexibility of award to the contractor offering the “best value” instead of going to the low bidder. The construction delivery team, known as the DB+ contractor, is brought “on-board” during the advanced planning activities, the planning, site selection, and programming phase of effort and they remain on the team throughout construction and the project delivery effort. The construction industry today often refers to this process as either Construction Management at Risk or Design-Build at Risk. Key distinguishing features of DB+ are:

- Uses multi-award, IDIQ contracts to accomplish tasks
- DB+ construction team is “on-board” at design start - part of the team
- Is a *program* ceiling contract vice an *individual* ceiling contract for each contractor
- Program ceiling contract creates incentive for cadre members to perform great work in order to get more work

The winning DB+ construction team performs surveys and investigations during design and as such will be held accountable for their work during construction (differing/unforeseen site condition).

5. Design Build Procurement:

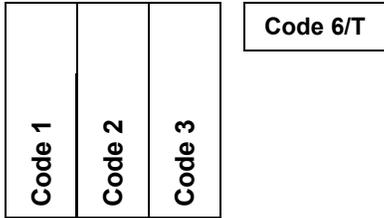
The method of procurement impacts the RFP package language concerning the evaluation process and timeframe but it does not impact the technical contents explaining the project design intent and functional requirements.

a. Two-Step Procurement:

The RFP describes the Contractual Process in detail and indicates the factors that will be used in selecting the successful design-construction team participants. Sometimes, as an incentive to the proposers a stipend may be used to help offset some of the proposal preparation costs. The final construction contractor selection takes two-steps: Step one evaluates qualifications and past performance of the design-build team in completing similar projects, and narrows the list of potential contractors to 3-5. Process step two evaluates the top 3-5 contractor technical proposals for quality and cost. Planning and Design (P&D) funds are the appropriate source for stipends.

b. One-Step Design Build

Selection using one-step procurement process uses the same RFP package development as above. The selection process is simplified after contractor submissions are received. With the One Step variation of the D-B delivery, the RFP is usually based on performance specifications and a general description. All contractor packages are reviewed by one review panel. Proposals are evaluated on both technical merit and cost by the selection committee. This type of delivery method should also be utilized only when well established industry standards and materials are available and control after contract award is not desired.



Design Deliverables

Design-Bid-Build Procurement:



A. **Design Analysis (DA):** Black filled square indicates information is required in the body of the DA of the submittal identified, if the submittal is part of the design scope of services.

Note: Blocks above indicate no information is required during Code 1 effort, but must be addressed in Code 2 (Concept document). The Final Design, 60% (Interim) submittal will provide more in-depth description/evaluation/discussion and Final Design (RTA) documents will address all aspects of the completed design.



B. **Contract Drawings:** Black filled squares indicate information is required on the construction drawings for the submittals identified.

Note: Blocks above indicate the Code 2 (Concept design) will address the basic requirements of design intent. It shows no Interim (60%) submittal is required and the final design is to be 100% finished including schedules, notes, etc



C. **Construction Specifications:** Black filled squares indicate the level of effort for the submittal identified.

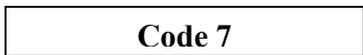


D. **Engineering Considerations and Instructions to Field Personnel**

This evaluation will be completed as part of the final design submittal and again with the RTA for all projects. Documents will be given to the field construction office official.



E. **Draft DD Form 1354**



Design-Build Procurement:

A. **Request For Proposal (RFP Package):** Black filled square indicates information is required. Also see _____



B. **Contract Drawings:** are not included. Sketches and drawings in the RFP provide functional relationships, requirements and design intent.



C. **Construction Specifications:** Technical specs are not included.



D. **Engineering Considerations and Instructions to Field Personnel:** This evaluation is required as part of the final RTA for all projects. Documents will be given to the construction field office.

Design Analysis (DA)

Design Analysis is a bound 8 1/2 X 11 inch document divided into 4 Parts:

(Note: Army Center of Standardization (COS) Projects use the facility specific Design Analysis available at the COS Website.)

(Part 1) General Description:

This part of the design analysis will state the purpose, authorization, applicable criteria and the project description. Identify all inadequate and additional utility requirements. Design assumptions and issues will be included as part of the Engineering Considerations and Instructions For Field Personnel, an Appendix.

(Part 2) Design Requirements and Provisions:

This part of the design analysis will include subparts for each major design discipline and basic project design requirements that should be addressed in the design analysis with justifications to validate the design decisions.

[Civil Design](#)

[Landscape Design](#)

[Structural Design](#)

[Architectural Design](#)

[Interior Design](#)

[Fire Protection and Life Safety Design](#)

[Mechanical Design](#)

[Electrical Design](#)

[Environmental Engineering Design](#)

(Part 3) Appendices:

(Part 4) FOUO Cost Estimate: (Bound Separately)

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Design Analysis (Part 1) General Description

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a. Introduction: This part of the design analysis will state the purpose, authorization, applicable criteria and the project description. Identify all inadequate and additional utility requirements. Include the DD Form 1391. For USAF projects, include AF Form 1158 – Facility Summary. If the design is a site adapt, adapt-build, or COS design, site the specific design project, number, year, location, designer, and other details to insure design traceability

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b. Purpose. A purpose section will be provided with a description of the project’s functional purpose and other supporting dialogue from project information prepared by the installation and the organization for which the project is to be designed.

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c. Authorization.

1. Directives. A synopsis of applicable design directives for the project will be included in this part of the design analysis

2. Scope of Work. A synopsis of the project authorized under the DD Form 1391 program, A106, FUDS work plan or ROD (record of decision) will be included in this part of the design analysis, to include the authorized project scope of work and programmed amount.

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d. Project Description.

1. Project Site. A synopsis will be provided that indicates the general site conditions, project siting requirements, existing utilities available to the site, topography, wetlands designated areas, unusual environmental characteristics to be impacted by the project, and conformance with the installation master plan.

2. Functional Objective. The basic functional objective or objectives of the proposed project and the estimated functional life will be described.

3. Personnel and Equipment. The number of civilian and military personnel and visitors, and the types of service and/or organizational equipment to be accommodated in the project will be described.

4. Engineering Considerations and Instructions to Field

Personnel. A required supplement to assist construction field staff by informing them of important considerations and critical features of the design or final product.

5. Constructability. The basic construction materials and systems selected, and the estimated life of the facilities will be described.

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e. Economic Summary. Economic factors affecting the project will be described, especially those factors influencing the choice of basic materials including:

1. Discussion of Life Cycle Cost Evaluations applied to the project.
2. Value Engineering study intent and (later) study results.

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions: Civil

■	■	□	■	■
□	■	□	■	■
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(Part 2) Design Requirements and Provisions:

a. Introduction: Describe the site of the project, its natural advantages and disadvantages relative to the proposed project, natural vegetation, trees and topography to be utilized in the enhancement of the completed project. Discuss source and data collection method of site survey, geotechnical boring collection and data evaluation.

b. Installation Compatibility: Briefly describe features in the immediate vicinity of the site having an impact on the design. Discuss the approach to achieving compatibility with nearby features and structures (both existing and future construction).

1. Describe installation/customer preferences and how these will be addressed.
2. Describe historical or other design criteria impacting design decisions.

c. Paved Roads, Driveways, Parking Areas and Walks: Describe general soil conditions, with a brief outline of soil exploration and testing performed. The type and volume of traffic, controlling wheel loads and types and/or classes of roads under consideration. Discuss the rationale used to determine selected pavement sections including identification of gross loading, number of passes, subgrade support and how each was determined. Address factors such as: cost, local conditions, construction schedule and methods, availability of materials, drainage, etc.

1. Description of the pavement sections, including the subsurface conditions and the method of analysis and design.

d. Water Supply:

1. Explanation of existing system, covering the type, capacity, condition, present water use and unsatisfactory elements of component parts for major extensions.
2. Statement of type of construction and materials for mains.
3. For distribution systems, statement of design domestic and fire flow, residual pressure, and elevation differentials (should include designer's estimate of pipe sizes).

e. Utilities and Services: Availability, underground and aboveground locations, sizes, and materials of project required features must be addressed in terms of adequacy and future expansion. Include natural gas, communications, data, A/V cable, etc.

f. Sewers and Sewage Disposal Systems:

1. Describe existing system, covering particularly the type, capacity, condition, present flow, and unsatisfactory elements of component parts for major extensions.

			Code 6/T	
Code 1	Code 2	Code 3	60%	90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions: Civil – cont'd

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2. Determination of degree of treatment necessary by effluent requirements and units necessary for treatment.

3. Statement of materials to be used for sewer systems and sewage treatment plants.

4. Describe any pump stations, etc. that result from the design.

g. Storm Drainage:

1. A statement defining state/local storm water management that applies to the project. Discuss security measures to be used for ditches or pipe larger than 10 inches which will pass beneath security fencing.

2. Explanation of the design approach to be taken, including materials selection.

h. Environmental Pollution Control: Include a statement explaining environmental pollution and the proposed method of control. Underground items such as tanks, pits, ordinance, etc.

i. Fencing: Describe types, height, clear zones, and justification for new fencing. Describe height and type of existing fence on or adjacent to the project site. Include a description of any special phasing required to maintain security during removal and installation of fencing.

j. Airfield Pavement:

1. Input by the Mandatory Center of Expertise shall be included in the justification and evaluation.

2. Alternate designs for both concrete and flexible pavement (contractor's option) for non-critical areas.

k. References: List guidance and criteria used in the design.

l. Calculations: Provide a statement describing general soil conditions with a brief outline of soil exploration and testing performed. Include all designer checked calculations for pavement and utility design.

m. Permits: Provide required utility or connection fees, environmental submittals or permits, fees, or applications.

Code 1	Code 2	Code 3
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Code 6/T

60%	90%-RTA
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Design Analysis

(Part 2) Design Requirements and Provisions:

Landscaping



a. Introduction: Describe the purpose of the project and extent of construction. Include and refer to supporting Appendices, which should include DD Form 1391 and design conference minutes. For USAF projects, include AF Form 1158 – Facility Summary.

b. Scope: Describe the site of the project, its natural advantages and disadvantages relative to the proposed project, natural vegetation, trees and topography to be utilized in the enhancement of the completed project. Outline the proposed landscaping and other site work necessary to complete the site development. Include physical security requirements and considerations.

Code 1	Code 2	Code 3	Code6/T	
			60%	90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions: Structural

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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a. Introduction: Include a brief statement describing the structural system, significant design parameters and any restrictions that may affect the project design.

1. Discuss the rationale used to determine the best foundation and structural systems. Careful attention shall be given to all factors such as criteria, cost, local conditions, construction schedule and methods, availability of materials, etc.

2. If the design is a site adapt, adapt-build, or COS design, include identification of the specific design project, number, year, location, designer, and other details to insure design traceability.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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b. The description of the foundation shall include the subsurface conditions, the method of analysis and design, and the allowable capacity and time/settlement curves for any differential/uniform settlement expected.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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c. The description of the structural system shall include the type of construction, method of analysis and design, all significant design criteria and loads, and all special features to be included on the drawings.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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d. The description of special contributing conditions:

1. Seismic design
2. ATEP applied to progressive collapse and design for exterior door and glazing frame resistance
3. Energy reduction EPACT 05, and other conservation features

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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e. Materials - Include all material to be used and their allowable stress limits or yield points. The list shall include material type and grade, class, allowable stress, yield and appropriate units of measure.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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f. References: List guidance and criteria used in the design. Include all criteria, accepted standards, manuals, codes, texts, papers, or other design information used in the analysis and design that is accepted in a public domain. All references shall be appropriately identified. Abbreviations such as AISC, ASTM, ACI, etc. are acceptable. Also, include computer program, (source and name), along with the version and date used for analysis and design. Where criteria is provided by a facility user and accepted, document the originator in the calculations.

Code 1	Code 2	Code 3	Code 6/T
			60%
			90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions:

Structural – cont'd



g. Calculations shall include the analysis and design of all (major cost contributing elements) beams, columns, walls, foundations, slabs, bracing, diaphragms, equipment supports, etc. and the connections to each other to provide a safe, stable, efficient and cost effective structural system. An adequate number of sketches with sufficient detail to make the designer's intentions clear, concise and easily understandable shall be provided. All assumptions and references to codes, standards, criteria, drawings and computer outputs shall be noted as necessary. Computer results shall include an output summary listing for maximum/minimum stresses/forces and deflections for each element and the structure reactions for each loading combination.

1. Loads - Include all loadings, forces, temperature changes, induced settlements, etc. that may affect the design of the structure. The list shall include the application/location, magnitude and units of measure for each load.
2. Restrictions - Include all limiting factors such as deflection limits, (horizontal and vertical), height restrictions, special tolerances for installing or operating equipment, or other special restrictions that may affect the design of the structure.



h. Permits: Identify and include required permits, fees, or applications.

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions:

Architectural

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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a. Introduction: Describe the purpose of the project and SOW of construction. If the design is a site adapt, adapt-build, or COS design, site the specific design project, number, year, location, designer, and other details to insure design traceability.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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b. Architectural Compatibility: Briefly describe scale, massing, and architectural style of buildings in the immediate vicinity of the site and other installation buildings. Discuss the approach to achieving architectural compatibility with nearby facilities (both existing and future construction).

1. Describe installation/customer preferences and how these will be addressed.
2. Describe historical requirements impacting appearance and material selections.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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c. Type of Construction: Describe type of construction chosen with reference to anticipated building life, i.e., permanent, temporary, etc..

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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d. Sustainability: Describe the expected LEED strategy and features. Refer to appendix having the LEED Checklist and explain the methodology to insure energy measures and construction compliance

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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e. Construction Materials and Finishes: Describe materials for all major items of construction including interior/exterior finishes, window and door types, etc.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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f. Discussion of ATFP and Electronic Security requirements including design criteria defining applicable requirements and design responses.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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g. Life-cycle Cost Comparison: Include discussion/data for selection of (a) exterior wall systems, (b) interior wall/partition systems, (c) roof system including membrane and configuration (slope and structural system), (d) floor systems/finishes, and (d) ceiling systems/ finishes. Concisely list advantages /disadvantages for each system and identify system chosen with reason for selection.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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h. Space Programming:

1. Provide gross area calculation.
2. Provide net area space calculations for each room indicating both the programmed area and the area as designed.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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i. Water and Moisture Proofing:

1. Identify roofing membrane materials.
2. Describe means for controlling water penetration and moisture migration through exterior walls.
3. Describe typical roof and wall sections.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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j. References: List guidance and criteria used in the design.
k. Calculations: Include all designer checked (initialed) calculations
l. Permits: Identify and include required permits, fees, or applications.

Code 1	Code 2	10-30%
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Code 6/T

60%	90%-RTA
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<h1>Design Analysis</h1> <p>(Part 2) Design Requirements and Provisions:</p> <h2>Interior Design</h2>



a. Introduction:

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions:
Fire Protection / Life Safety

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- a. Introduction:** Describe the purpose of the project and SOW of construction. If the design is a site adapt, adapt-build, or COS design, site the specific design project, number, year, location, designer, and other details to insure design traceability.
- b. LRL Fire Protection/Life Safety Code Submittal.** Complete and sign where indicated, and include in the Design Analysis.
- c. Fire Extinguishing System:** Identify the fire extinguishing system to be provided detailing design parameters and area to be protected listing criteria references. The specific hazard to be protected (i.e. light ordinary, extra, etc.) must be clearly outlined in addition to the density provided over the desired operating area.
- d. Fire Alarm and Detection Systems:** Clearly describe fire alarm and/or fire detection system to be provided. List all actuating devices and functions the system will perform including a sequence of operations. Any existing fire alarm equipment must be identified with special emphasis on the base wide fire reporting system.
- e. Calculations:** Provide field survey verified water supply data and calculations verifying that water flow is adequate to meet sprinkler demands are required.

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions: Mechanical



Introduction: The Basis of Design shall be a narrative presentation of facts which will clearly describe the project scope and systems design intent.

a. Plumbing Systems:

1. Number and types of plumbing fixtures
2. Required water pressure
3. Water heating method and fuel

b. Heating, Ventilation, and Air Conditioning:

1. Describe the selected HVAC systems, controls and energy sources.
2. Customer's preference for the HVAC and control system
3. Energy sources/utilities and rates, such as natural gas, steam from central heating plant, chilled water from central chiller plant, and equipment locations, etc.
4. Specialized temperature and humidity control requirements
5. Ventilation rates and humidity reduction measures
6. Any other HVAC design features such as industrial ventilation requirements, provisions for future heating/cooling plant additions, etc.

c. Energy Compliance: Identify applicable initiatives.

1. LEED Strategies and design intent, Checklists, USGBC certification ID, etc.
2. EPACT 05 and EISA and lifecycle cost reduction measures/evaluations

c. Refrigeration (Cold Storage): Describe refrigeration/cold storage requirements, proposed equipment, types of refrigerants, etc.

d. Bulk and Retail Petroleum Fuel Distribution and Storage: Discuss storage, distribution, leak detection, containment, overfill protection, etc.

e. Miscellaneous Mechanical Systems:

Describe any special mechanical systems such as compressed air, hydraulic, nitrogen, etc.

f. Calculations: Air conditioning and heating calculations shall be in accordance with the latest edition of ASHRAE guidance. At a minimum, calculations shall include source documentation for all design values used:

1. Tabulation of inside and outside design temperatures and relative humidity(s). Include tolerance values for inside conditions.
2. Building and roof section(s) U-value calculations
3. HVAC calculations including tabulation of process/electronic loads
4. Psychometric plots showing all state points for each air handling unit.
5. Plumbing calculations including water heating and storage requirements and pump head calculations.
6. Compressed air and industrial gases including demand tabulation.

Code 1	Code 2	Code 3
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Code 6/T

Design Analysis

(Part 2) Design Requirements and Provisions:

Mechanical – cont'd

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g. References and Manufacturer's catalogue cuts: documenting equipment selection points.

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h. Permits: Required utility or connection fees and applications.

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions: Electrical



Introduction: The Basis of Design shall be a narrative presentation of facts which will clearly describe the project scope and systems design intent. If the design is a site adapt, adapt-build, or COS design, site the specific design project, number, year, location, designer, and other details to insure design traceability.

a. Primary Distribution:

1. Describe the primary source of power.
2. Available power and where the source is located and adequacy of the primary supply at the point of takeoff.
4. Electrical characteristics of power supply to station, or portion involved, including circuit interrupting and voltage regulation requirements.
5. Total connected load and resulting KVA demand load by applying demand (state operating assumptions) and diversity factors.
6. Basis for selection of secondary voltage.
7. Distribution, overhead or underground.
8. Type of conductors, such as copper or aluminum.
9. Type of conduit or duct if used.

b. Describe the Primary Service Transformation to Secondary Service:

1. Primary and secondary voltage rating.
2. Describe the transformer or unit substation electrical characteristics.
3. Describe the primary and secondary switchgear.
4. Describe the primary and secondary protection devices.

c. Describe the Electrical Systems including the following:

1. Lighting systems
2. Power systems
3. Emergency lighting
4. Emergency power
5. Grounding system(s)
6. Telephone system(s)
7. Other systems such as television, paging, data, etc.
8. Physical and electronic security features such as IDS, SCIF, tempest, lighting access control, etc.

d. Calculations: Include all designer checked calculations

e. References: List guidance and criteria used in the design such as voltage regulation, lighting intensities, and types of lighting fixtures.

f. Permits: Required utility or connection fees and applications.

Code 1	Code 2	Code 3	Code 6/T
			60%
			90%-RTA

Design Analysis

(Part 2) Design Requirements and Provisions: Environmental

Introduction: Give the maintenance and enhancement of environmental quality full consideration early in the design process. This is especially important when considering Sustainable Design Development (SDD) strategies such as LEED and energy reduction. Also ensure the project is designed in full compliance with all environmental regulations. Topics of concern include:

1. Air Quality
2. Water Quality
3. Noise Control
4. Solid Waste Disposal
5. Hazardous Substances and Abatement
6. Historic Preservation
7. Archaeological Resources
8. Threatened and Endangered Species



a. Permits: List all applicable permits, licenses and other authorizations required to construct and operate the project. Projects that do not require any environmental permitting or licenses shall be identified by an Engineer's letter certifying their conclusions. For each permit required, provide the following information:

1. Permitting authority (Federal, State and/or local)
2. Type of Permit/authorization
3. P.O.C's, addresses, telephone, etc.
4. Procedures, reviews, and durations necessary to process permits
5. Fee Schedule – to include filing/application fees, charges for submittal reviews, actual emissions and fees relative to testing of abatement equipment toward insuring compliance with requirements.



b. Final Permit Submittals: Provide completed applications prepared for the COE signature and any other required documents for all permits, licenses and/or authorizations required for construction/operation of the facility. This includes all supporting material required for the application including emission surveys, diagrams, pollutant load calculations, etc. Furnish copies of all correspondence from permitting agencies. This information shall be attached to the [Engineering Considerations and Instructions to Field Personnel](#). Items include but are not limited to the following:

Code 1		
	60%	90%-RTA

Code 6/T

Design Analysis
(Part 2) Design Requirements and Provisions:
Environmental – cont'd

b. Cont'd.

1. Solid Waste Disposal
2. Sanitary Landfill
3. Toxic and Hazardous Waste Storage, transportation and disposal
4. Wastewater discharge
5. High BTU consuming boiler/equipment discharge permit
6. Open burning
7. Incineration
8. Locating, construction and operating related facilities
9. Stationary Source operation
10. Noise generation
11. Cultural Resource disturbance
12. Biological Resource disturbance
13. Visual Resource disturbance



c. Storm Water Pollution Prevention Plan. Develop and provide a plan to control erosion and sediment in the storm water runoff coming from the drainage area in and around the construction site and any related disturbed areas. Plan requirements shall be documented in the project plans and specifications and made part of the contract requirements. This includes clearing, grubbing, grading, excavating, or filling activities related to site disturbance.

1. The plan is part of the contract requirements and the contractor will be required to obtain the permit and sign a contractor compliance statement.
2. Contract documents shall specify the contractor is responsible for field level quality control and shall inspect all erosion and sediment controls on the site at least once every seven calendar days and within 24 hours after any storm event greater than 0.5 inches of rain per 24 hour period.

Code 1		
	60%	90%-RTA

Code6/T

Design Analysis

(Part 3) Appendices



(Part 3) Appendices:

a. Support documents included in the DA for Construction Division field Engineer use in understanding project background and design intent:

- Appendix A: DD1391
- Appendix B: MT/COS Waiver documentation (if applies)
- Appendix C: Geotechnical Data
- Appendix D: Fire Flow Data
- Appendix E: Life Safety/Code Analysis
- Appendix F: LEED checklist
- Appendix G: Design Calculations
- Appendix H: Value Engineering Study
- Appendix I: Epact Energy Analysis
- Appendix J: BIM requirements
- Appendix K: Project Correspondence

b. Support documents included in the DA and delivered to the Construction Division field Engineer for use in meeting contract requirements: As design progresses the design shall update the Engineering Considerations to indicate permits, approvals, and provide all notifications which are required for the project by Federal, State and local agencies.

Appendix L: **Engineering Considerations and Instructions to Field Personnel (With Attachments)**

Appendix M: **Draft DD Form 1354**

Appendix N: **Permits**

The designer shall prepare and include a list and status of all required permits. Obtaining permits, shall be the designer's responsibility. Permit applications shall be signed and sealed in accordance with current Engineering Regulations and policies at the time the applications are made and not later than the 100% submittal. At conclusion of design, copies of permit applications shall be submitted to the PE/A.

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Drawings General



Introduction

a. Refer to Intranet located Regional Business Processes (RBP) for general CAD development guidance for:

Louisville District Policy for CADD Standardization (doc.350)

Technical Product Identification (doc. 363)

Technical Product Identification (doc.363)

Design Team Instructions for In-House Designs (doc. 366)

b. [Notes On Drawings](#)

c. **Construction Sequence:** Provide plans, details and schedules of phasing and sequencing of new work. For projects having complex phasing requirements, consider the use of CPM or other network system to graphically portray Interface and Phasing Requirements. Identify items of work and constraints of each phase. Show temporary roads, detour routes, temporary marking, and special traffic control requirements. Coordinate all work with the Activity's (station's) operations, security, fire protection, and safety personnel through the station's Public Works Officer

d. **Discipline Specific Requirements:**

Cover Sheet and General requirements:

[Civil Drawings](#)

[Landscape Drawings](#)

[Structural Drawings](#)

[Architectural Drawings](#)

[Interior Design Drawings](#)

[Plumbing / Mechanical Design Drawings](#)

[Electrical Drawings](#)

[Fire Protection Reference Drawings](#)

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Drawings

Civil



a. Location Plan: Show project location in relation to **MAJOR installation** landmarks / features. Show the proximity to related facilities/features that will influence project construction operations.

b. Existing Site Survey and Demolition Plan:

1) **Bench mark/GIS references.** Provide a complete and accurate survey of the site and infrastructure, showing existing contours and spot elevations, all topographic features. North is to the top of the sheet. All control points shall be clearly referenced and described. Show locations of borings and legend to define all symbols used.

2) Details, where necessary, of items to be removed

3) Depth and dimension of affected pipelines and foundations.

c. Site Plan: Show new aboveground site features, complete with dimensions, traffic flow patterns, parking layout, striping, and handicapped parking requirements. Location of new facilities should be referenced to existing surface features or survey control points.

1) All necessary layout dimensions

2) Street profiles

3) Pavement sections and joint layout and details

4) Handicapped provisions details

5) Parking and other pavement marking

6) Curb and gutter details

7) Walk details

8) Pavement repair details (i.e. utility crossings)

9) Guard post details

10) Fencing and gates location and details including security barriers for openings beneath fences and gates

11) Wheel stop details

12) Construction limits (if critical)

13) Street sign details

d. Soil Boring Logs: Convey the project geotechnical characteristics.

e. Grading and Storm Drainage Plans and Detail Drawings:

1) Existing and finish contours / existing and finish spot elevations

2) Ditch profiles and sections

3) Erosion protection

4) Storm drainage piping layout, new and existing including security barriers. Class or gauge of pipe

5) Storm drainage structure details including security barriers

6) Slopes and inverts of all pipes and profiles where necessary

7) Inverts and top elevations of all structures

8) Frames, grates and covers details

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Drawings

Civil – cont'd



f. Utility Plans and Detail Drawings

1. Show existing and new above and belowground infrastructure and services. Rough details of pump stations, and other special structures should be provided. Show storm drainage lines; include line sizes and material type, slopes and appurtenances.
2. Show points of utility connections and invert elevations at the five foot line.
- 3) Overall layout of mechanical and electrical systems
- 4) New and existing systems shown, showing line sizes
- 5) Valve and fire hydrant locations and details
- 6) Sizes of all components of systems indicated
- 7) Building services coordinated with building plumbing drawings
- 8) Separation of water and sewer lines
- 9) Backflow preventers
- 10) Manhole spacing and details (including top and invert elevations)
- 11) Cleanout types and locations
- 12) Pipeline profiles (gravity sewers normally, plus force main when required by State Permitting Agency)
- 13) Manhole, frames and cover details
- 14) Pump station location and details
- 15) Air release valves location and details
- 16) Locations coordinated with existing and other utilities



g. Paving Plan and Details

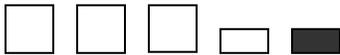
- 1) Identify each type of pavement
- 2) Provide sectional details and/or schedules to show each type of pavement structure.
- 3) For new flexible pavements, identify wearing course, binder course, tack coat, prime coat, base course, subbase course, and subgrade.
- 4) For new rigid pavements, identify PCC paving reinforcement where required, base course, and subgrade.
- 5) For flexible overlay construction, identify wearing course, binder course, leveling course, tack coats, seal coats, surface treatments, existing pavement preparation, geotextile interlayers, and other details as appropriate.
- 6) For rigid overlay construction, identify PC concrete, bond breaking interlays, bonding requirements, existing pavement preparation, and other details as appropriate.
- 7) Quantity of pavement cracks to be sealed.
- 8) Graphic scale and north arrow
- 9) Applicable notes, sections and details necessary for construction.

Code 1	Code 2	10-30%	Code 6/T	
			60%	90%-RTA

Drawings Civil – cont'd

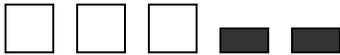
10) Joint Layout Details:

- a) Plan layout of joints including butt and keyed construction joints, weakened planes and other control joints, thickened edge and doweled expansion joints.
- b) Rigid/flexible pavement juncture details
- c) Joint, sealer and groove details
- d) Paving structural transition details
- e) Featuring and keying details
- f) Reinforcing and dowel details
- g) Mooring eye location plans and tails



h) Marking Plan and Details:

- 1) Road and parking area markings and details
- 2) Temporally closed facility markings



i) Signage details and schedules.

Code 1	Code 2	Code 3
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Code 6/T

60%	90%-RTA
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Drawings Landscaping



- a. **Landscape Site Plan:**
 Clearing and grubbing limits
 12) Grassing limits

Code 1	Code 2	10-30%	Code 6/T	
			60%	90%-RTA

Drawings Structural



a. General Notes and Conditions:

- 1) Design criteria for loads, materials, and references,
- 2) General notes for the project. (Do not restate items covered in the specifications.)
- 3) Material notes such as structural steel, concrete, masonry, etc.,
- 4) Bid information such as pile/caisson lengths,
- 5) Special load test requirements,
- 6) Special construction sequencing,
- 7) Other information/instructions to contractor,
- 8) Abbreviations and symbols used for structural drawings.



b. Foundation Plans:

- 1) Layout of foundation support systems showing all dimensions and elevations necessary for construction,
- 2) Size or schedule references for all foundation features such as footings, grade beams, piles, caissons, pile/caisson caps, etc.,
- 3) Control/expansion joints in floor slab and foundation walls,
- 4) Trenches, pits, openings, depressed/ thickened slabs,
- 6) Test pile/caisson location,
- 7) Special construction features - de-watering, excavation, bracing, under-pinning, etc.,



c. Framing Plans:

- 1) Layout of horizontal framing elements showing all dimensions, orientation and elevations necessary for construction
- 2) Size or schedule references for all horizontal framing elements such as beams, joists, slabs, decks, grating, etc.,
- 3) Slab control/expansion joints,
- 4) Openings requiring special framing or reinforcing,
- 5) Location of splices, brackets, penetrations, sleeves, embedments, bracing, weldments, etc.,
- 6) Special temporary bracing, shoring or forming,
- 7) Other special requirements, such as equipment clearances, travel distances for hoists and cranes, etc.,
- 8) North arrow, Graphic scales.



d. Elevations:

- 1) Layout of vertical framing elements showing all dimensions, orientations and elevations necessary for construction,
- 2) Size or schedule references for all vertical framing elements such as column, walls, piers, beams, bracing, etc.,
- 3) Wall control/expansion joints,
- 4) Openings requiring special framing or reinforcing

Code 1	Code 2	Code 3	Code 6/T
			60%
			90%-RTA

Drawings

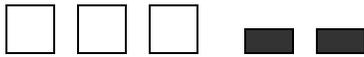
Structural – cont'd

- 5) Location of splices, brackets, penetrations, sleeves, embedments, bracing, weldments, etc.,
- 6) Special temporary bracing, shoring or forming,
- 7) Other special requirements such as equipment, clearances, travel distances for hoists and cranes, etc.,
- 8) Notes and Graphic scales.



e. Sections and Details:

- 1) Layout of all sections and details showing all parts, shapes, sizes, materials, dimensions, elevations, arrangement and orientation necessary for construction,
- 2) Standard connections or schedule references for forces, fasteners, welds, plates, clips, ties stirrups, pins, etc.,
- 3) All special connections completely detailed to a point where no further engineering is necessary,
- 4) Concrete/masonry wall reinforcement details showing size, clearances, placement, shape, etc.,
- 5) Lintel details or schedule references for loads, sizes, materials, arrangement, etc.,
- 6) Anchor bolts, base plates, bearing plates, or schedule reference for materials, size, thickness, welds, embedments, threaded parts, projections, etc.,
- 7) Diaphragm deck type, gauge, yield strength, minimum number of spans or length, fastener type and pattern,
- 8) Applicable special notes and instructions and Graphic scales.



f. Standard Seismic and CMU detail sheets



g. Schedules:

- 1) Provide all information/instructions for fabrications, forming, placement, erection, installation, etc. necessary for construction.
- 2) Schedules for beams, lintels, joist, trusses, frames, piles, caissons, footings, pile/caisson caps, grade beams, slabs, etc.
- 3) Calculated column loads, beam shear/reaction and moments, footing pressures, pile/caisson capacities/loads (vertical and horizontal) etc.
- 4) Special instructions, materials, process, etc.



h. Other Drawings:

- 1) Layout of structural systems for special fabrications and construction such as space trusses/frames, long span trusses, vierendeel trusses, shells, towers, fabric structures, etc.
- 2) Temporary structures to be dismantled/relocated.

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Drawings Architectural



a. Architectural Floor Plans:

- 1) Complete dimensions.
- 2) Spaces labeled with doors and windows numbered and door swings indicated.
- 3) Wall and partition thickness, secure area partition type, partitions that extend to overhead structure, fire and acoustical rated partitions (show rating). Reference symbols for each related section/detail.
- 4) Fixed equipment: Water coolers, janitor sinks, floor drains, fire extinguisher cabinets, access ladders and hatches, "walk-off" mats in exterior entrances, public phones, signage directories, and built-in shelving and equipment.
- 5) Wall and floor expansion/crack control joints.
- 6) Boundaries of floor finish material changes and floor level transitions.
- 7) Ramps, steps, and stairs.
- 8) Detail type and size and show locations of fire extinguishers to be provided.
- 9) Net SF Area Tabulation Table and Diagram by functional area and room (locate near title block for each floor plan sheet and show note "NOT TO BE USED FOR BIDDING PURPOSES").
- 10) Necessary notes graphic scales and North arrow.
- 11) Key Plans when an entire floor is not shown on a single sheet. (Exterior Elevation reference symbols may be shown on Key Plan.)



b. Reflected Ceiling Plans at same scale as floor plans showing:

- 1) Ceiling types (identified by note or legend) and acoustical ceiling tile grid(s).
- 2) Junctions of different ceiling finishes and ceiling level changes.
- 3) All partitions with fire walls and security/acoustical partitions which extend to structure above noted.
- 4) HVAC diffusers and returns.
- 5) Light fixtures.
- 6) Access Panels.
- 7) Ceiling mounted signage.
- 8) Necessary notes graphic scales and North arrow..



c. Roof Plans:

- 1) Roof layout with all pertinent dimensions.
- 2) Parapet walls, expansion joints, crickets, overflow scuppers, roof drains, gutters, and downspouts.
- 3) Direction of roof slope and amount of slope (minimum 1/2" per foot minimum desired -- 1/4" per foot absolute minimum for reroofing). All valleys shall have positive slope to drain.

Code 1	Code 2	10-30%	Code6/T	
			60%	90%-RTA

Drawings

Architectural – cont'd

- 4) All roof mounted equipment (coordinated with structural, mechanical, and electrical drawings). Mount air terminals (lighting rods) on parapet terminals.
- 5) All roof penetrations, vents, exhausts, skylights, monitors, and access hatches.
- 6) Reference symbols for wall sections, building sections, and details.
- 7) Necessary notes graphic scales and North arrow.



d. Enlarged Floor Plans:

- 1) Enlarged toilet plans with toilet fixtures (handicapped accessible and regular types) and toilet accessories labeled and special handicapped access clearances indicated.
- 2) Kitchen layout with dimensions and equipment., built-in equipment
- 3) Stairs with runs and widths, landings, and railings dimensioned.
- 4) Necessary notes graphic scales and North arrow.



e. Architectural Elevations:

- 1) All sides of building with vertical dimensions and floor level elevations.
- 2) All finish materials and special requirements labeled.
- 3) Expansion and crack control joints.
- 4) Exterior doors.
- 5) Windows with operating sash indicated.
- 6) Exhaust fans, louvers, and grills.
- 7) Gutters, downspouts, splash blocks, and overflow scuppers.
- 8) Roof mounted equipment, exhaust stacks, and antennas.
- 9) Reference symbols for section and detail cuts.
- 10) Necessary notes graphic scales and North arrow.



f. Building Sections (same scale as Architectural Floor Plans, when practical)



g. Wall sections / Interior Partitions and wall types:

- 1) Exterior walls showing Materials, finishes, and heights and thermal performance.
rating.rating of walls must be clearly shown and detailed along with the particular Clearly indicate the specific hourly fire rating on plan and identify the partition/wall wall types.
- 2) Interior partition/wall materials, finishes, and top/base anchorage. Underwriters' Laboratories listing number stated (obtained from the U.L. Fire Resistance Directory). Smoke and fire ratings and barrier closure materials shall be clearly shown.



h. Door and window frame details “head, jamb, and sill” details. Also astragals, weatherstripping, thresholds, floor level changes (such as at entrances), and physical security features.

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Drawings

Architectural – cont'd



i. Standard CMU/masonry Joint Detail Sheets. Expansion joints, crack control joints for stucco, brick, cmu, concrete, ceramic tile, plaster, and joints between different finish materials.



j. Stair/Balcony Details. railings and mounting brackets, wall-mounted doorstop bracing, vanity bracing, locker/ weapons rack mounts, curtain wall/large window protective railings, and partition corner/corridor wall bumpers.



k. Signage Plan: Signage locations and types. Signage schedule with frame, mounting, letter style and height, finish, color, text, and location information.



l. Schedules showing:

- 1) Doors and frames with fire and acoustical rating, physical security feature notes, and detail reference numbers.
- 2) Windows with frame material, glazing type, fire and acoustical rating, physical security feature notes, and detail reference numbers.
- 3) Louvers and vents with frame, vane operation, fire rating, physical security feature notes, and detail reference numbers.
- 4) Finishes for floor, base, walls, wainscot and ceiling with ceiling height. Also include built-in cabinet finishes, window blinds, toilet partitions, bulletin boards and any other visible item attached to the building interior. Finishes for Systems Furniture shall be included. Also include exterior finish materials and color.
- 6) Equipment.



m. Other drawings as necessary.

- 1) Calculations, Handicap Checklist, and Equipment Lists.
- 2) Toilet partitions, shower pan, floor/roof/ balcony drains, and waterproofing details.

Code 1
Code 2
Code 3

Code 6/T

60%
90%-RTA

Drawings Interior Design



a. Introduction

Code 1	Code 2	Code 3
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Code 6/T

60%	90%-RTA
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Drawings

Plumbing/Mechanical

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	a. Plumbing Floor Plans showing potable water, DWV, compressed air, etc.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	b. HVAC Floor Plans showing the location of major equipment and ductwork. All ductwork shall be shown double line, to scale. Basic HVAC system and riser diagrams.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	c HVAC and plumbing equipment schedules , not necessarily complete but at least showing sizes of major equipment. HVAC Design Conditions Schedule including tolerances of inside temperatures and relative humidities.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	d. HVAC control diagrams and written sequence of control.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	e. Exterior piping including chilled/hot water, condenser water, plumbing/ sanitary, steam, fuel, compressed air and gas piping, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	f. Fuel storage Plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	g. Roof Equipment Plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	h. Large Scale Plans
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	i. Elevations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	j. Sections
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	k. Details
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	l. Schedules
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	m. Control Diagrams
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	n. Sequence of control
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	o. Piping Schematics
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	p. Riser Diagrams
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	r. Plumbing Fixture Schedules
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	s. Other Details as required

Code 1	Code 2	Code 3
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Code 6/T

60%	90%-RTA
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Drawings Electrical

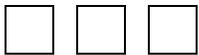


a. Existing Site and Demolition Plan:



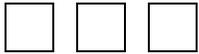
b. Site Plan and Details: all new and existing aboveground and underground features

1. Primary and secondary electrical lines
2. Fire alarm and communications lines
3. Transformer or substation (located by dimensions from the building or other prominent feature)
4. Streets, parking area and other floodlighting
5. All other exterior electrical equipment, such as M.G. sets, A/C units, etc.
6. Congested area profile of duct line profiles

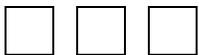


c. Lighting Plans and Details

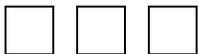
1. Lighting Fixture Details



d. Power Plans and Details

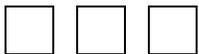


e. Switchboards and Motor Control Center Schedules

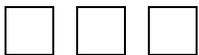


f. Communications Plans

1. Telephone/data Riser Diagrams
2. Other Riser Diagrams for Television, Paging, IDS, etc.
3. Fire Protection notification and annunciation Systems
4. SCIF
5. Electronic Security Systems (ESS),



g. Panel Schedules



h. Lightning Protection Plan and details

Code 1	Code 2	Code 3	Code6/T
			60%
			90%-RTA

Drawings

Fire Protection/Life Safety

a. **General Note Shall be Added to these sheets:**
“The Fire Protection/Life Safety Drawings is provided for reference only and presents an accumulation of information contained on discipline specific drawings and contract specifications.”



- b. **Site Drawing(s)**
1. Show new and existing valve and fire hydrant location
 2. New valve and fire hydrants (details on civil sheets.)
 3. Sprinkler Pit (layout and details as required by the installation or municipality on civil sheets).
 4. The water line supplying the sprinkler riser (connection details on mechanical sheets)
 5. Any required fire pump or water storage tank shall be shown.
 6. Handicap features.



- c. **Floor Plans:** Contract Fire protection requirements are shown as part of the disciplines except for more complex fire protection systems.
1. All data contained in the Fire Protection /Life Safety Code Submittal shall be placed on the drawing.
 2. Depict compliance with all requirements and features that form a part of the Fire Protection /Life Safety Code Submittal.
 3. Architectural: Location and hourly fire and/or rating of smoke and fire barriers along with the particular Underwriters' Laboratories listing number stated (Fire and smoke wall construction details and penetration details and fire stopping details shown on architectural sheets). Type and size and show locations of fire extinguishers to be shown. The class and hour rating of fire doors shall be provided on the door schedule.
 4. Mechanical Features: Locations of fire or smoke dampers shall be shown. The sprinkler riser shall be located on the plans. Suppressions entry points and any areas to be protected by sprinklers, CO2 or other automatic extinguishing system shall be clearly identified.
 5. Electrical Features: Show the location of fire alarm reporting stations alarm zones, detection devices and the point of connection of equipment to the base fire alarm system. Include manual pull stations, automatic detectors, control panels, and audible alarms. The location of exit lights and emergency lights shall be shown. Mass notification system features shall be shown. (Details shall be in the electrical drawing sheets)

Code 1	Code 2	Code 3	Code 6/T	
			60%	90%-RTA

Specifications

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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a. General Conditions/Requirements: The general provisions or “Front End” of the project specifications are created in collaboration with Construction and Contracting Input.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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b. Develop a project specific list of UFGS technical specification sections. Include the list in the Design Analysis. For sections for which there is no Guide, show an appropriate 5-digit number, title, followed by: "Designer will prepare section without a Guide."

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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c. Update the technical specs list in the Design Analysis. Review all project specs to ensure terminology alignment between specs and drawings. Incorporate notes to designers indicating what must be shown on the drawings for proper coordination. Add standard details on the drawings when indicated by the specs.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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d. Tailor and assemble the project specifications general and technical provisions and index. Complete the Submittal Register in coordination with the project construction field engineer. Submit package for review.

PROPER USE OF NOTES ON DRAWINGS.

The intent is for these to be general rules in drafting notes and varying from them should be a conscious decision and not habit.

1. Be consistent with grammar used in notes on drawings. Wherever possible use imperative statements to describe work to be accomplished by Contractor. For example, instead of using “Contractor shall provide,” use “provide.” It is understood that the notes are written for the Contractor’s action.
2. If work is to be accomplished by Government, for example, say “Government will remove storage building prior to start of construction.” Do not use “to be” for describing work that will be accomplished by the Contractor. “To be” implies that someone will accomplish the work other than the Contractor, such as the Government or another Contractor.
3. When the Contractor is to furnish and install equipment and materials, say “furnish and install.” Do not use “install” for work that is to be accomplished by the Contractor because it means the Government or others will furnish equipment or materials and the Contractor will only install it. “Furnish” means Contractor shall only furnish; Government or others will install. Use “furnish and install.”
4. Do not use “proposed” for new construction. “Proposed” means future work by others or work not in this contract.
5. Do not use “new” for work in the contract. All work shown on the drawings is considered new, unless indicated otherwise. Inconsistent use of “new” throughout the drawings could mean that only some of the work is required. In renovation projects for example there may be a need to distinguish between existing and new, otherwise avoid the term.
6. Do not use ambiguous statements that cannot be enforced by the inspector during construction. For example: “grade to drain;” “hand excavate carefully;” “provide materials in good condition.”
7. Be careful with statements like “remove and replace,” which means to remove old item or material and replace that item or material when work is completed. This statement would be appropriate for work in a pump station where pumps were removed prior to the work and those same pumps replaced after the work is completed. On the contrary, if a portion of a concrete walk is cracked and requires replacement, say “remove then furnish and install concrete walk.”

8. When referring to requirement for coordination between Contractor and Government agency, for example, use “coordinate utility connection with Contracting Officer;” do not use words such as “PWD” or “Government Agency.”

9. No need to indicate, “see specifications” as a note on the drawings. The drawings and the specifications form a complete construction package.

10. Minimize the use of “all” or “any”.

11. Do not use words that have multiple meanings, requiring opinions, or judgmental decisions, such as “provide,” “timely,” “nearly,” “good-condition,” “suitable,” “well-balanced,” “suitable for intended use,” “reasonable,” “approximately,” “reliable,” “proper,” “usable,” “appropriate,” “adequate,” or “qualified.” But, in D/B with all the unknowns related to the contractor’s design, it may be hard to not use some of these terms in the RFP.

12. Avoid terms that are not biddable by the Contractor nor enforceable by the Government, such as “recondition,” “as directed,” “equal to,” “as required,” “similar to,” “as necessary,” “as close as possible,” “repair,” “match existing,” or “refurbish.”

13. Some terms are only enforceable if quantities are shown on the drawings or included in the specifications, such as “as indicated,” “as shown,” “specified herein,” and “as noted.”

14. Use care when employing the word, “typical,” especially if there are any exceptions to the detail.

DESIGN-BUILD (REQUEST FOR PROPOSAL)

The RFP Package: A bound 8 1/2 X 11 inch sheet-size document:

Standardized format and layout exists. Sketches may be bound-in or as a fold-out. There may be multiple volumes of the package. Drawings can be standard drawing sheet size, bound as a separate volume and referenced in the body of the RFP text.

RFP Package development:

Use customer specific models or templates when available:

- a. Army COS:
 1. Use the Internet based Wizard
 2. Include the appropriate Installation specific Paragraph 6 and facility type requirements

- b. Army MCA/MILCON funded Code 7:
 1. Use the Internet based Wizard
 2. Include the appropriate Installation specific Paragraph 6 or generate one.

- c. Army Reserve:
 1. Use the AR template RFP.

- d. Air Force:
 1. There is no template. Use a previous project RFP that was successful and did not generate cost or time growth.

- e. Other Customers and Civil Works:
 1. There is no template. Use a previous project RFP that was successful and did not generate cost or time growth.

ENGINEERING CONSIDERATIONS & INSTRUCTIONS TO FIELD PERSONNEL

ENGINEERING CONSIDERATIONS AND INSTRUCTIONS FOR FIELD PERSONNEL

1.0 Purpose: This spreadsheet [“Engineering Considerations and Instructions for Field Personnel”](#) report provides a standard format to address items that increase the chances for construction modifications and add risk for cost and time growth during the construction process. The completed form transmits special design concepts, assumptions, and site conditions to construction field personnel who oversee construction progress. The information provides a bridge between designers and construction personnel as part of the initiative to improve post-award handoff between engineering and construction.

2.0 Report Format and Content: A completed document is required by Engineering Regulations and USACE policy documents for all Design-Build (DB/RFP) packages and Design-Bid-Build (D-B-B) projects. The RFP Preparer or D-B-B Designer of Record (DOR) shall provide input for all 3 sections. If an item does not apply to a specific project, then it is to be annotated as such.

- a. Part 1, requests general project identification information and high risk execution variables.
- b. Part 2A, requests design discipline specific information, data and evaluation.
- c. Part 2B, requests environmental related information, data and evaluation.

3.0 Final Report Delivery: The final completed report will be delivered to the PE/A, who will transfer the information to the PM, who forwards the package to the project Construction Field Engineer. A copy shall also be included as an appendix within the [Design Analysis](#), Part 3.

4.0 Attachments: Supply additional documentation to explain, clarify or resolve annotations and comments. Attach the supplemental info at the end of the report.

5.0 Easements, Permits and Fees: Provide copies of easements and permits to the Corps design POC who will forward the documents and records to the project PM and Construction field engineer. This includes information about requirements and about applications made, approvals received or requested, and fee requirements or fees paid. A copy of this information should be attached as part of the Engineering Considerations submission.

PRODUCT QUALITY CONTROL

Quality Control Processes.

a. General. Quality Control (QC) is that part of quality management focused on fulfilling project quality requirements. Quality control of products and services consists of a number of processes and procedures to ensure quality products are realized. It includes those processes used to ensure:

1. Performance meets agreed upon customer requirements that are consistent with law, regulations, policies, sound technical criteria, schedules, and budget.
2. Deliverables are not defective and contain errors, omissions, and design deficiencies that contribute to construction cost and time growth.

b. Quality Control Tools. A thorough Quality Control Plan provides seamless quality checks and reviews, that maintain excellent design performance while producing accurate and complete construction contract documents. This effort requires teamwork and dedication to continual improvement. Successful completion of specific internal processes are necessary to insure quality products are generated and customer expectations are met or exceeded. These include the following:

1. Quality Control Plan (QCP). The QCP is required for all projects. It is a written plan that defines how quality control will be executed for products. The initial QCP is Prepared during the project planning efforts and is implemented throughout the project Design development and construction execution. The project QCP may be updated as required during project execution.

- a) At a minimum the QCP will describe how Independent Technical Review (ITR) will be performed (formal stops or ongoing as design progresses); list the PDT and ITR Team members and their review responsibilities.
- b) A minimal treatment or generic QCP may be used for small scope or repetitive products. Parameters affecting this decision may include: potential for loss of life, health and safety; potential for significant property damage; complexity of the project; construction costs; costs of design and potential redesign; environmental impacts or a critical schedule.

2. Project Coordination. Regular coordination among the PDT members; other Districts, government agencies, Checkers, ITR members; and customer or is essential for quality process execution. Coordination is necessary to ensure that the quality objectives are being achieved, to make adjustments as needed, and to keep everyone informed of progress and issues. The coordination includes frequent in-person, telephonic, written and email communications, as well as design conferences. Scheduled design team progress meetings are an essential and required part of all in-house design effort.

3. Quality Checks and Reviews. Quality checks and reviews are technical checks and reviews occurring seamlessly during the design development process, not after it's done. Quality checks must be carried out as routine management practice. Such review includes senior-level checking basic design assumptions, correct application of execution methods, adequacy of basic data, correctness of calculations (error free), completeness of documentation, compliance with guidance and standards, etc. Quality checks may be performed by supervisors, work leaders, team leaders, senior staff, or other qualified personnel. Checks are performed prior to ITR of the deliverable. Checked calculations should be initialed by the checker prior to ITR and provided to the reviewer for compliance. The team must interact and perform "Over the Shoulder" reviews to insure drawings and specifications are coordinated between disciplines

4. Design Review Checklists. These guides assist both the designers and checkers to investigate specific items and repetitive design issues. These are found in [Appendix 4:](#)

- a) General Design Checklists
- b) Civil/Landscape Design Checklist
- c) Structural Design Checklist
- d) Architectural Design Checklist
- e) Interior Design Checklist
- f) Mechanical/Plumbing Design Checklist
- g) Electrical Design Checklist

5. Project Delivery Team Reviews. The PDT normally includes a variety of Stakeholders and interests, each with his/her own important interest and area of emphasis. PDT reviews should include a comprehensive evaluation of project features and considerations.

- a) Major commands personnel focus on space allocation and compliance with project construction cost and delivery parameters (functional).
- b) Installation—DPW and BCE—focus on operability/maintainability
- c) Using Agency Users and Civil Works Sponsors focus on function
- d) Special Interests Personnel (i.e., Chief of Chaplains, food service, Health Facilities Office, COS, centers of expertise, etc.) ensure their particular specialty is properly designed.
- e) Fire Marshall checks for compliance with locally established fire protection requirements.
- f) Provost Marshall checks for security measures and requirements.
- g) The Project Manager (PM) focused on progress in accordance scope, schedule and cost commitments.
- h) Office of Counsel focused on legal sufficiency and identifying legal issues.

3-8. Independent Technical Review (ITR). All decision and implementation documents for a project will be subjected to an ITR. ITR procedures are addressed in Chapter 4.

6. Biddability, Constructability, Operability and Environmental (BCOE) Review. All Final Design Phase construction documents are submitted to Construction for the BCOE review prior to construction contract advertisement.

7. Independent Technical Review (ITR): All projects require an ITR review that is a holistic, comprehensive review of the completed project deliverables. While ITR is a

critical component of quality control, does not replace checks or other quality control processes. This review is conducted by senior level in-house team not involved in the day-to-day production of a project/product, for the purpose of confirming proper coordination among deliverables and confirms their status is ready for advertisement. ITR primary objectives of ITR are to ensure that:

- a. The project meets the customer's scope, intent and quality objectives.
- b. Design is consistent with applicable regulations and guidance.
- c. Concepts and project costs are valid feasible and will be safe, functional, constructible,
- d. Design is environmentally sustainable and complies with current LEED and energy requirements.
- e. All relevant engineering and architectural disciplines have been effectively integrated and coordinated.
- f. Appropriate computer models and methods of analysis were used and basic assumptions are valid and used for the intended purpose.
- g. The source, amount, and level of detail of the data are appropriate for the complexity of the project.
- h. The project complies with accepted practice within USACE.
- i. Project documentation content is complete and provides an adequate basis for construction phase.

c. Seamless Review Process. The internal design review process shall be a continual process minimizing unproductive design effort and rework. Review and checker team members will be available and willing to offer guidance as major issues arise throughout the product delivery process through informal venues such as over-the-shoulder discussions etc.

1. Comments will be structured to give a clear statement of the concern, the basis of the concern and, when appropriate, the actions necessary to resolve the concern. Designers will evaluate and respond to each comment. Design team responses will clearly state concurrence or non-concurrence with the comment.
 - a. Concurrences shall include the specific corrective action taken and where and when it will be done.
 - b. Non-concurrences shall include an explanation or proposed alternative action.
2. Editorial Comments. Some comments and suggestions are about minor issues, while valid, may best be made informally, in parallel with but internal to official comments. Examples of comments best handled informally include:
 - a. Spelling, grammar, format or language in the report.
 - b. Minor numerical errors, which do not affect validity of the results.
 - c. Other issues that will not contribute towards a safer, more functional, or more economical project.
 - d. Repetitive comments on same subject where one comment is adequate.

DESIGN ANALYSIS APPENDICES

Appendix 1. [Gross Area Calculations](#) (Sketch)

Appendix 2: [Design Cost Calculations](#)

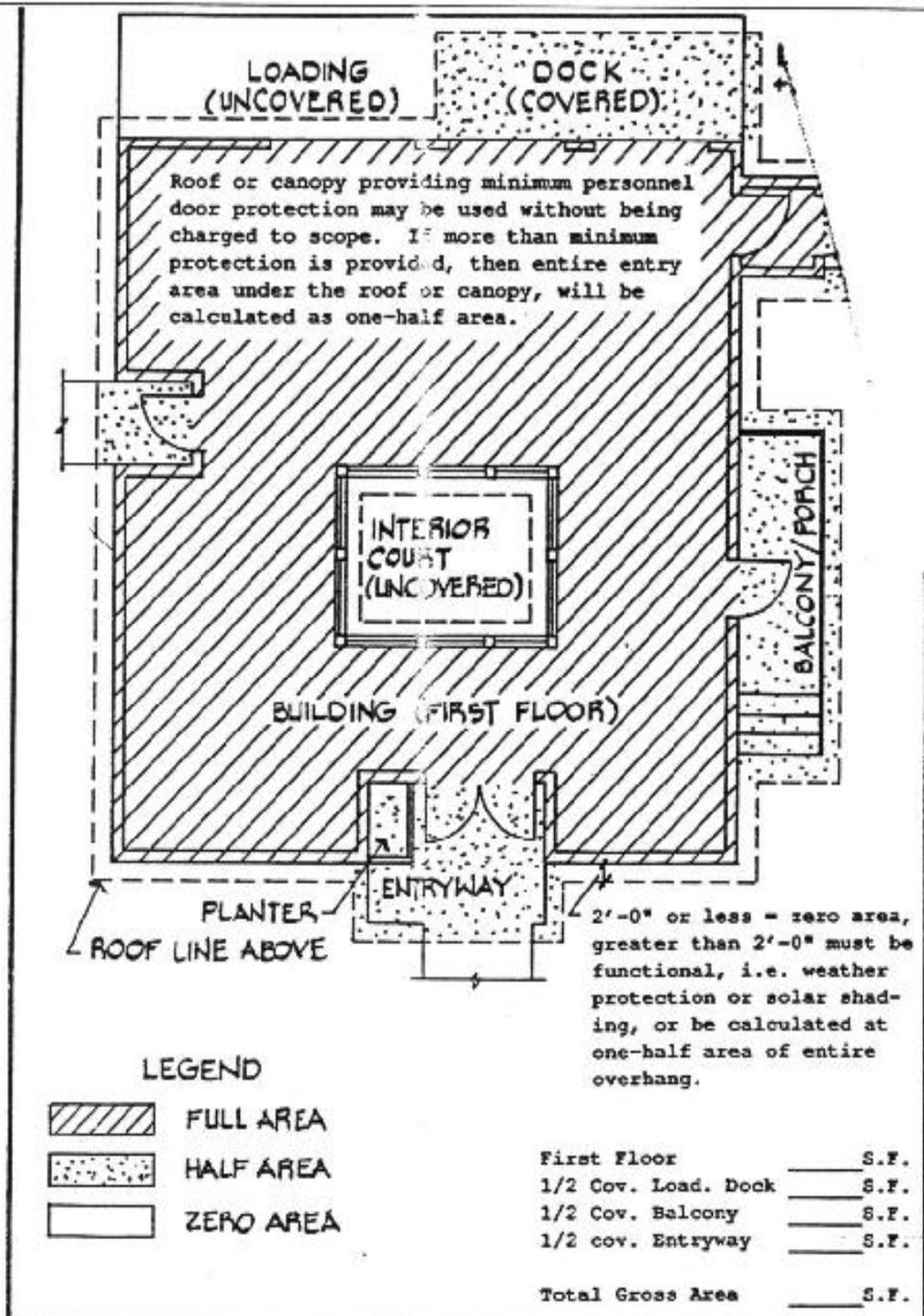
Appendix 3: [Draft 1354 Preparation](#)

Appendix 4: [Design Quality Control Checklists](#)



US Army Corps
of Engineers
Louisville District

INSTRUCTIONS FOR COMPLETING GROSS AREA TAKEOFF



Appendix 2. Design Budget Calculations

a. Statement of Work. A thorough SOW is the basis for negotiating a fair and reasonable price, successful performance, and fair and effective administration of a design contract or task order. A SOW will typically include the following topic, and tools are available to develop and present this data:

1. General responsibilities of the design team.
2. Project description, including estimated construction cost (ECC), if relevant.
3. Scope of services.
4. Schedule and deliverables.
5. Reviews and conferences.
6. Technical criteria and standards, including Government-furnished information.
7. Administrative instructions.
8. General provisions.

b. Pre-proposal Conference.

1. When appropriate, a pre-design conference(s) may be held between the design team and pertinent Government representatives to discuss and resolve questions concerning the contract requirements, SOW, and instructions. The project site may also be inspected if appropriate. An in-house design team's costs for preparing proposals and attending pre-proposal conference are project funded. An A-E is not compensated for attending a pre-proposal conference unless the firm performs work of tangible benefit to the Government in connection with the conference, and the work is properly authorized in advance by the KO.
2. Contract Requirements. At the pre-design conference or at some other time early in the negotiation period, the Government will discuss the contract requirements.

c. Fact-Finding Sessions. The purpose of fact-finding is to obtain information to better understand the proposal and its assumptions, and to clarify any ambiguities, omissions or uncertainties in the RFPP and SOW apparent after review of the proposal. After fact-finding, a revised proposal may be requested.

d. Developing the Cost estimate. All cost estimates shall be supervisor reviewed/approved (initialed) prior to submittal to the PM for evaluation.

1. By statutory limitations in the EFARS, total design cost is limited to 6% of the estimated construction cost (ECC). However, the limitation only applies to "producing and delivering designs, plans, drawings and specifications (and cost estimate)."
2. Many costs to prepare design drawings and specifications are outside the 6% limitation, and not integral part of the preparation of design, plans, drawings, and specifications. These can be excluded from consideration in evaluating compliance with the statute.
 - **Field surveys** such as topographic, property, boundary, utility, and right of way/easements.
 - **Subsurface explorations and borings;** soils and materials testing and resultant reports
 - **Utilities verifications,** flow/pressure gauging or testing
 - **Preparation or Verification of as-built drawings**
 - **Studies:** Feasibility, functional, and economic
 - **Analyses:** Energy studies and life cycle cost analysis of systems
 - **Fees and Permits:** reviews, applications, easements, approvals, by municipal or regulatory bodies.

- **DD Form 1354:** prepare (Draft) document
- Environmental Impact assessments, statements, and supporting data.
- **Environmental surveys,** hazardous materials evaluations and study results preparation.
- **Reproduction** of documents for review.
- **Presentations:** Renderings and Photos
- **Plan in Hand** on-site meeting/review
- **Project related Travel/per diem and site visits.** The schedule of negotiated contract rates will include unit costs for all anticipated travel items such as vehicle cost per mile or day and per diem for certain locations of work.
- **Other Direct Costs.** A unit cost or price can be negotiated for all anticipated supplies (such as survey monuments) or support services (such as soils tests or computer use). Unit costs or prices may also be negotiated for specific types of services, such as a survey crew or per acre rate for a topographic survey.
- **PE/A labor costs**
- **Pre-award Construction Visit/Survey.** Preaward Survey of Prospective Contractors. The pre-award survey can be initiated after selection approval to avoid delaying award of a contract. The main emphasis of the visit is to explain the contract intent and answer bidder questions.
- Post award construction phase services.

d. Cost Evaluation/Negotiations. After a proposal has been received by the PM and analyzed, the pertinent negotiation issues and the cost objectives will be discussed. These may be organized by phase of work, task, discipline, or other appropriate manner.

1. Construction Cost. The ECC must be included in the SOW. For a contract involving design, agreement must be reached on the ECC of the project because it directly impacts compliance with the 6 percent statutory limitation and the Design within Funding Limitation clause.
2. Price. Bottom-line price agreement is the primary negotiation objective after there is a common understanding of the SOW. The team, should be prepared to explain and support its proposal and to offer appropriate revisions. Significant elements in price negotiation are discussed below.
 - a) Labor and Overhead Costs evaluated for reasonableness. When assessing reasonableness, costs should be compared to efficient, competitive A-E firms in the same class
 - b) Statutory Limitation. The portion of the contract price for A-E services for the preparation of designs, plans, drawings and specifications may not exceed 6 percent of the project's ECC. This limitation is statutory (10 U.S.C. 4540(b).
 - c) Some types of services may be excluded, however, preparation of the construction cost estimate is not excluded.
3. Reductions to the project design cost proposal requires supervisor approval.

Appendix 3: Draft 1354 Preparation:

a. General: The DD Form 1354 Data Sheets contain a summary of project information that is used in completing the official form upon completion of construction and transfer of the facility to the owner agency. The Design Analysis, cost estimate, plans and specs are used in completing the majority of information on the data sheets. Additional specific instructions are contained on the Data Sheets themselves. Questions should be directed to the PE/A or PM. The completed draft document is a separate deliverable of the Final Design submittal.

b. Special Requirements: Each installation and customer has a unique way of presenting the information. Designers completing the draft 1354 must use the locally preferred format and narrative description on the form. Before beginning the effort to create the draft version, request a customer/installation specific example to follow.

c. Instructions to the Designer: The information on the draft 1354 will aid the construction field office in completing the final facility transfer 1354 document, which is part of the turnover and project closeout process. Prepare the draft document based on an example obtained from the customer for a prior project that is requested through the PM or field office. The data sheet is divided into two parts; Facility and Features Within the 5' Line, and Features Outside the 5' Line. If more than one building or facility is involved, fill out a separate data sheet for each. If additive bid items are involved, clearly identify which items are additives or fill out a separate data sheet for each. If projects involve alterations, or additions to an existing facility, include description of features/building parts being demolished and describe and upgrade to existing materials in item 10., "Description of Project" below.

Complete the items below for all projects:

(Note: The highlighted block numbers that appear in parentheses on this instruction sheet refer to specific DD Form 1354 block numbers.)

- FACILITY AND FEATURES WITHIN THE 5' LINE:
 1. Facility Category Code (from the DD Form 1391) (Block #18):
 2. Facility Title (Project Title) (Block #19):
 3. Location (Block #9): (i.e., Scott AFB, IL; Ft. Knox, KY)
 4. Drawing File Number (Block #25):
 5. Building Occupancy Capacity:
 6. Number of Unit (Block #20): 1
(Note: This number will always be "1" unless more than one of the same type of building/facility is included in the project)
 7. Type of Construction (Block #21): P (Permanent [P], Semi-Permanent [S], Temporary [T] (Note: If type of construction is other than "permanent", change the designation accordingly based on the DD Form 1391)
 8. Total Building Area (sf) (Blocks #22 and #23):
(Note: this analysis is based on the area resulting from the [DOD mandated calculation method](#))
 9. Total Project Cost (Block #24):

10. Description of Project (Block #26): (taken from the design analysis or design directive narrative)
11. No. of Useable Floors (Block #26):
12. Construction Materials Used (Block #26):
 - a. Foundation: (concrete, masonry, etc.)
 - b. Floors: (wood, concrete, etc.)
 - c. Exterior Walls: (concrete, masonry, brick, brick veneer, etc.)
 - d. Roof: (built-up, standing seam metal, membrane, strip shingles, etc.)
13. [Building systems:](#)
14. [Supplemental Features List \(Sample\) attached to the draft document:](#)

- FEATURES OUTSIDE THE 5' LINE:

1. [Pavement](#)
2. [Utilities](#)
3. [Miscellaneous](#)

BUILDING SYSTEMS WITHIN THE 5'

a. HVAC

Cat. Code	Facility	Unit of Measure
890-126	A/C Window Units	Tn or SF
890-125	A/C Plant Less than 5 Ton	Tn or SF
890-121	A/C Plant 5 to 25 Ton	Tn
826-122	A/C Plant 25 to 100 Ton	Tn

b. Fire Protection

Cat. Code	Facility	Unit of Measure
826-123	A/C Plant Over 100 Ton	Tn
821-115	Heating plant 750 to 3500 MB	MB
821-116	Heating Plant Over 3500 MB	MB
880-211	Closed Head Auto. Sprinklers	SF or Head
880-212	Open Head Deluge System	SF or Head
880-231	C02 System	EA
880-232	Foam System	EA
880-234	Halon 1301 System	EA
880-233	Other Fire Suppression System	EA
880-222	Manual Fire Alarm System	EA
880-221	Auto. Fire Detection System	SF or EA

c. Security Systems

Cat. Code	Facility	Unit of Measure
872-841	Security Alarm System	EA

d. Emergency Power Systems

Cat. Code	Facility	Unit of Measure
811-147	Electric Emergency Power Generator	KW

Sample:

Cat. Code (Block #18): 880-222 Facility (Block #19): Man Fire Alm Sys.
 No. of Units (Block #20): 1
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22): EA
 Total Quantity (Block #23): 10 Pull Stations Cost (Block #24): 12,764
 Percent * : 1%
 Remarks (Describe per instructions above) (Block #26): System is manually operated by pull stations which are tied into alarm bells and the fire alarm panels. There are ten pull stations, 3 alarm bells, 2 fire alarm panels and associated wiring.

Cat. Code (Block #18): Facility (Block #19):
 No. of Units (Block #20):
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22):
 Total Quantity (Block #23): Cost (Block #24):
 Percent * :
 Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

* Insert percentage that represents the percent of this item as related to the total project cost shown in item 9 above. This figure will be used by the COE Construction Resident Office for prorating costs when actual cost data is known.

FEATURES OUTSIDE THE 5' LINE

1. Pavements. From the list below, select those pavement types which apply to your project and complete the package of information required for each pavement type in the spaces provided below. Restate the Category Code number, Facility and Unit of Measure provided. The "No. of Units" defines the number of occurrences of the "Facility." For example, if the "Facility" is a runway, and the project includes two runways, the "No. of Units" = 2. In the "Remarks" area, completely describe the pavement section from finish grade through the compacted subgrade including pavement type, thickness and types of base materials and length and width of features. Also, provide quantity breakdown by differing thicknesses of pavement surface. (Provide total quantity in the "Quantity" space.) A completed sample is provided as a guide. If the project has pavement types other than those listed below, complete all information except the Category Code in the spaces provided.

Cat. Code	Facility	Unit of Measure
111-111	Runway	SY
112-211	Taxiway	SY
113-321	Apron	SY
116-642	Shoulder, Paved	SY
132-133	Pad, Equipment	SY/EA
851-142	Road, Bridge	LF
851-145	Driveway	SY
851-147	Road	SY/LF
852-262	Vehicle Parking	SY

Sample:

Cat. Code (Block #18): 851-147 Facility (Block #19): Road
 No. of Units (Block #20): 1
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22): SY
 Total Quantity (Block #23): 10,691 SY Cost (Block #24): 63,066
 Percent * : 5%
 Remarks (Describe per instructions above) (Block #26): Consists of 2" bituminous surface course over 6" stabilized aggregate base course over 6" compacted subgrade.

Cat. Code (Block #18): Facility (Block #19):
 No. of Units (Block #20):
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22):
 Total Quantity (Block #23): Cost (Block #24):
 Percent * :
 Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
 No. of Units (Block #20):
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22):
 Total Quantity (Block #23): Cost (Block #24):
 Percent * :
 Remarks (Describe per instructions above) (Block #26):

2. Utilities. From the list below, select those utility systems or features which apply to your project and complete the package of information required for each system/feature in the spaces provided. Restate the Category Code number, Facility and Unit of Measure Provided. The "No. of Units" = 1. In the "Remarks" area provide quantity breakdown by size/type of wire, pipe, etc. as appropriate. (Provide total quantity in "Quantity" space.) Also describe ancillary features such as numbers of manholes, handholes, etc. A completed sample is provided as a guide. If the project has utility systems/features other than those listed below, complete all information except the Category in the spaces provided.

Cat. Code	Facility	Unit of Measure
135-583	Telephone Duct	LF
135-586	Telephone Pole	LF
136-661	Light, Approach	LF
136-664	Light, Runway	LF
136-666	Light, Airfield	EA
136-667	Light, Taxiway	LF
812-223	Prim dist Line OH	LF
812-224	Sec Dist Line OH	LF
-	Power Poles	LF
812-225	Prim Dist Line UG	LF
812-226	Sec Dist Line UG	LF
890-187	Utility Vault	
	(4 or more XFMRs)	SF
812-926	Ext Area Lighting	EA
813-231	Elec Substation	KV
822-245	Hot Water Mains	LF
822-248	Hot Water Pump Stations	SF
822-265	Steam Heat Mains	LF
822-268	Cond Pump Station	SF
824-464	Gas Mains	LF
831-169	Sewer Specific Tank	KG
832-255	Ind Waste Main	LF
832-266	San Sewer Main	LF
832-267	San Sewer Pump Station	SF
841-166	Water Well	KG
842-245	Water Dist Mains	LF
842-249	Water Pump Station	SF
843-315	Fire Hydrants	EA
871-183	Storm Drain	LF
871-185	Stm Drain Pump Station	SF
890-144	Compressed Air Dist	LF
890-269	Cathodic Protection Sys	EA
890-272	EMCS Field Equip	EA
890-273	EMCS Data Link	EA

Samples:

Cat. Code (Block #18): 832-266 Facility (Block #19): San Sewer Main
 No. of Units (block #20): 1
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22): LF
 Total Quantity (Block #23): 2805 LF Cost (Block #24): 59,500
 Percent * : 25%
 Remarks (Describe per instructions above) (Block #26): Consists of 1595 LF of 8" VCP connected to existing main. Includes 12 manholes and 2 cleanouts.

* Insert percentage that represents the percent of this item as related to the total project cost shown in item 9 above. This figure will be used by the COE Construction Resident Office for prorating costs when actual cost data is known.

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

* Insert percentage that represents the percent of this item as related to the total project cost shown in item 9 above. This figure will be used by the COE Construction Resident Office for prorating costs when actual cost data is known.

3. Miscellaneous. From the list below, select those items which apply to your project and complete the package of information for each item in the spaces provided. Restate the Category Code number, Facility and unit of Measure provided. The "No of Units" defines the number of occurrences of the "Facility." For example, if the "Facility" is Curbs and Gutters and the project has one set of Curbs and Gutters, then the "No. of Units" = 1. If the "Facility" is Retaining Wall and the project has two distinct Retaining Walls, then the "No. of Units" = 2. In the "Remarks" area, using the key words from the Remarks column below, provide a complete description of the item. A completed sample is provided as a guide. If the project has miscellaneous items other than those listed below, complete all information except the Category Code in the spaces provided.

Cat. Code	Facility	Unit of Measure	Remarks Include the Following
851-143	Curbs and Gutters	LF	Type, Size, Mat'l, Length
852-289	Sidewalk	SY	Mat'l, Width, Length, Subgrade Mat'l
860-617	Railroad Track	LF	lb. Rail, Length, Turnouts, etc.
871-187	Retaining Wall	SY/LF	Mat'l, Width, Height, Length
872-247	Fence, Security	LF	Type, Height, Length, Gates
872-248	Fence, Interior	LF	Type, Height, Length, Gates
932-681	Site Preparation	SY	Landscaping, Sprinkler Sys
934-277	Erosion Control	CY	Type
821-112	Htg Fuel Stor Tank	EA	Type, Size, Fuel
-	Other Stor Tanks	EA	Type, Size, Mat'l Stored
890-158	Load and Unload Platform	SF	Type, Mat'l Dimensions

Cat. Code (Block #18): 852-289 Facility (Block #19): Sidewalk
 No. of Units (Block #20): 1
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22): SY
 Total Quantity (Block #23): 7560 SY Cost (Block #24): 55,000
 Percent * : 5%
 Remarks (Describe per instructions above) (Block #26): Consists of 17,010 LF of 4" thick class "A" Portland Cement Concrete over 6" compact subgrade.

Cat. Code (Block #18): Facility (Block #19):
 No. of Units (Block #20):
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22):
 Total Quantity (Block #23): Cost (Block #24):
 Percent * :
 Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
 No. of Units (Block #20):
 Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
 Unit of Measure (Block #22):
 Total Quantity (Block #23): Cost (Block #24):
 Percent * :

Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

* Insert percentage that represents the percent of this item as related to the total project cost shown in item 9 above. This figure will be used by the COE Construction Resident Office for prorating costs when actual cost data is known.

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):

Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

Cat. Code (Block #18): Facility (Block #19):
No. of Units (Block #20):
Type (Permanent [P], Semi-Permanent [S], Temporary [T]) (Block #21): P
Unit of Measure (Block #22):
Total Quantity (Block #23): Cost (Block #24):
Percent * :
Remarks (Describe per instructions above) (Block #26):

* Insert percentage that represents the percent of this item as related to the total project cost shown in item 9 above. This figure will be used by the COE Construction Resident Office for prorating costs when actual cost data is known.

Attachment to
USARC TOLEDO, OH
DD Form 1354

Item No. 1 - Training Center All work to 5 feet from the building excluding work listed in item 4.

Item No. 1a - Kitchen Equipment All fixed kitchen equipment not listed in item 4.

Item No. 1b - Rifle Range Equipment Range bullet trap and target system excluding the room and structural finishes.

Item No. 1c. - Mechanical All HVAC and plumbing work for the training center building.

Item No. 1d. - Electrical All electrical and telephone work for the training center including the emergency generator.

Item No. 2 - AMSA/OMS Shop All work to 5 feet from the building excluding work listed in item 4.

Item No. 2a - Crane 10-ton bridge crane in the AMSA work bays.

Item 2b. - Lubrication system Vehicle lubrication system with 4 reel banks each in the AMSA and OMS work bays.

Item No. 2c. - Mechanical All HVAC and plumbing work for the AMSA/OMS Shop building.

Item No. 2d. - Electrical All electrical and telephone work for the AMSA/OMS Shop building.

Item No. 3 - Site Work All work beyond 5 feet from the buildings.

Item No. 3a - Earth work All grading and earth work.

Item No. 3b. - Demolition Includes clearing and grubbing and removal of minor on-site structures such as entrance culverts.

Item No. 3c. - Storm Drainage Includes all storm drainage work.

Item No. 3d. - Sanitary Sewer Includes all sanitary sewer work and connection to the public main.

Item No. 3e. - Water/Fire Lines Includes all water lines, fire hydrants and connection to the public main.

Item No. 3f. - Gas Lines Includes all gas lines and connection to the public main.

Item No. 3g. - 7" Concrete paving Includes concrete paving in the MEP area.

Item No. 3h. - 6" Concrete paving area. Includes concrete paving outside the MEP area.

Item No. 3i. - Aggregate paving area. Includes all aggregate paving in the MEP area.

Item No. 3j. - Asphalt paving Includes all asphalt paving.

Item No. 3k. - Curbs, Walks ramps and pavement markings. Includes all concrete curbs, gutters, sidewalks, ramps and pavement markings.

Item No. 3l. - Landscaping covers. Includes all turf seeding, trees, shrubs and ground covers.

Item No. 3m. - Fencing Includes all chain link fencing, gates barbed wire and razor ribbon fabric at the MEP and the emergency generator.

Item No. 3n. - Miscellaneous Sitework Includes all over site work not included in previous categories.

Item No. 3o. - Site Electrical Includes all electrical service and site lighting beyond 5 feet from the buildings and the emergency generator.

Item No. 3p. - Special Construction Funds Includes all exterior telephone work.

Item No. 4 - OMAR Funded Items Include all items listed below.

Item No. 4a - Lockers 290 wall lockers in corridor of the training center.

Item No. 4b - Unit Storage Caging Wire mesh partitions in the unit storage area.

Item No. 4c - Unit Storage Shelving Metal shelving in the unit storage cages.

Item No. 4d - Dehumidifier One dehumidifier in the arms vault.

Item No. 4e - Arms Vault caging Wire mesh partitions in the arms vault.

Item No. 4f - Metal Shelving All other metal shelving not included in 4c including tool and parts storage shelving, and battery room shelving.

Item No. 4g - Kitchen Equipment All loose kitchen equipment not included in 1A.

Appendix 4: Design Quality Control Checklists:

1. **General Design Reviews**
 - [Part One](#)
 - [Part Two](#)
2. [Civil and Landscaping Design Checklist](#)
3. [Structural Design Checklist](#)
4. [Architectural Design Checklist](#)
5. [Mechanical Design Checklist](#)
6. [Electrical Design Checklist](#)

DESIGN QUALITY CONTROL CHECKLIST

Project:

Location:

A-E:

GENERAL ITEMS	INITIALS
1. Work "by others" and "work this contract" are clearly differentiated and interface points identified.	_____
2. All known existing features and improvements are properly and completely delineated and dimensioned.	_____
3. Orientation, horizontal coordinate systems, elevations, and vertical datum are properly shown and referenced.	_____
4. Adequate subsurface investigations of the site have been made and logs and notes thereof are clearly shown on plans and referred to in specifications.	_____
5. The recommendations of COE Geotechnical branch have been considered in establishment of control elevations, foundation treatment and assignment of bearing values for footing design.	_____
6. Adequate provisions have been made in the specifications for protection and maintenance of, access to, and utility services for existing facilities.	_____
7. All documents have been logically ordered and a table of contents provided.	_____
8. All documents have been signed and dated.	_____
9. The scale and orientation of the drawings are consistent throughout the complete set of drawings.	_____
10. SOW shown in the design submission has been checked against the official 1391 and current design directive.	_____
11. All real estate planning reports have been reviewed to identify real estate constraints.	_____
12. Appropriate District Elements have been notified of any additional real estate requirements.	_____
13. Schedules and budgets are IAW the PMP.	_____

14. Annotated, approved comments from previous reviews, as well as correspondence and meeting minutes, are included in the Design Analysis.

FUNCTIONAL ADEQUACY AND TECHNICAL FEASIBILITY OF DESIGN

15. The functional and technical design requirements are in full accord with current applicable criteria and design directions. The applicable written guidance has been referenced in the D.A. (Space allocations for buildings, per capita quantities for utilities, load capacities for floor or pavements, areas for hardstands, widths and lengths of runways, flow rate for fueling systems, etc.)

16. All reasonably possible conditions of grading, loading, operations, utilities and combinations thereof have been considered in the design and evidenced by D.A. narrative and calculations.

17. The design is based on use of economical and proven materials and equipment throughout.

SUFFICIENCY OF PLANS AND SPECIFICATIONS AS CONTRACT DOCUMENTS

18. All necessary details, notes, schedules, and dimensions are shown on the drawings and are fully consistent throughout.

19. For unit-price contracts, payment items and quantities are clearly defined, and unit price bid schedules arranged to allow flexibility in award of contract.

20. Title blocks, drawing titles, drawing scales, and specification subtitles and section identification markings are shown and referenced IAW the A-E Guide.

21. Requirements for installation of Government-furnished equipment are clearly delineated.

22. Ample space allowances are available for installation and servicing of equipment.

23. The terminology used on the drawings agrees with that used in the specifications and does not repeat requirements stated in the specifications.

24. Publications not referenced in the specifications have been deleted from paragraph, "Applicable Publications." All publications referenced in the specifications are listed in paragraph, "Applicable Publications."

25. Finish and color schedules have been coordinated with drawings.

INITIALS

26. When drawings are printed at full size, all lettering, dimensions, symbols, and wiring and piping runs etc. are clear and distinct.

27. The drawings and specifications for all disciplines have been properly reviewed and coordinated to preclude conflicts.

28. Complete legends for each discipline, including all symbols, are shown on the plans.

29. North arrow and graphic/bar scales are shown correctly on all Site Plans.

General Design Quality Control Review – Part 2

Jim Martin

APPENDIX G
EXAMPLE MILITARY CHECKLIST

This checklist is intended to serve only as a guide in checking or reviewing design documents for errors and omissions. It cannot substitute for the exercise of sound engineering judgement by reviewers. Professionals must maintain control of their decisions, understand the technical basis for those decisions, and independently evaluate significant data upon which the design decisions are based. The main usefulness of a checklist such as this is to provide a "minimum" check of consistency between disciplines, and compatibility of drawings to specifications. It is expected that it will be modified by each USACE command to fit specific requirements. Each item in the checklist must be checked off to indicate that the item has been reviewed, or marked "NA" to indicate it is not applicable.

Verify:

A. GENERAL:

- 1. That all documents have been logically ordered and a table of contents provided. _____
- 2. That all documents have been signed and dated. _____
- 3. That the scale and orientation of the drawings are consistent throughout the complete set of drawings. _____
- 4. That SOW shown in the design submission has been checked against the official 1391 and current design directive. _____
- 5. That all real estate planning reports have been reviewed to identify real estate constraints. _____
- 6. That appropriate elements have been notified of any additional real estate requirements. _____
- 7. Schedules and budgets are in accordance with the PMP. _____

B. CIVIL:

- 1. Existing and proposed grades. _____
- 2. That haul routes, disposal/borrow sites, construction contractor's storage area, construction limits, and construction staging area are shown. _____
- 3. Existing utilities. _____
- 4. That new underground utilities have been checked for conflicts against the site plans. _____

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- 5. That utility tie-in locations agree with mechanical stub out plan. _____
- 6. That profile sheets show underground utilities and avoid conflicts _____
- 7. That property lines and limits of clearing, grading, turbing, or mulch have been shown and are consistent with architectural and/or landscaping plans. _____
- 8. That fire hydrant and power/telephone pole locations correspond with electrical and architectural drawings. _____
- 9. That basis of horizontal and vertical control is given and the control points are located properly with pertinent data shown: i.e., elevations, coordinates, stationing, and/or start of construction. _____
- 10. That valve boxes and manholes match final finished grades or pavement, swales or sidewalks. _____
- 11. That boring locations, soil classifications, water table, and depth of rock are shown on the plans. _____
- 12. That rigid pavement joint plans are shown with reasonable spacing. _____
- 13. That foundation coordinates are shown on the foundation plan and coordinated with architectural drawings. _____
- 14. That finished floor elevations match on architectural and structural drawings. _____
- 15. That civil specifications are coordinated with plans. _____
- 16. That storm and sewage drains from the facility have adequate capacity. _____
- 17. That directions to contractors are not duplicated in plan notes and in the specifications. _____

C. LANDSCAPE:

- 1. That the sprinklers, lighting, hardscape, etc., correspond with the site limits, including the building and civil plans. _____
- 2. That maintenance of landscape has been provided for in the design documents. _____

D. STRUCTURAL:

- 1. That the design load conditions meet or exceed the Building codes and the Design Standards. _____

2. That the column orientation and grid lines on the structural and the architectural drawings match. _____
3. That the load-bearing walls and the column locations match with architectural drawings. _____
4. That the slab elevations match the architectural drawings. _____
5. That the depressed or raised slabs are indicated and match the architectural drawings. _____
6. That the limits of slabs on the structural drawings match the architectural drawings. _____
7. That the expansion joints through the structural drawings match the architectural drawings. _____
8. The footing depths and coverage with the existing and final grades. _____
9. That the foundation piers, footings, grade beams are coordinated with schedules. _____
10. The footing and pier locations with the new and existing utilities, trenches and tanks. _____
11. That the foundation wall elevations are the same as on the architectural drawings. _____
12. That the location of floor and roof framing column lines and column orientation match the foundation plan column lines and column orientation. _____
13. That the structural perimeter floor and roof lines match the architectural drawings. _____
14. That the section and detail call outs are proper and cross-referenced. _____
15. That the columns, beams, and slabs are listed in schedules and are coordinated. _____
16. That the column length, beam, and joist depths match with the architectural drawings. _____
17. That the structural dimensions match the architectural drawings. _____
18. That the drawing notes do not conflict with specifications. _____
19. That the architectural construction and rustication joints are correct. _____
20. The structural openings with the architectural, mechanical, electrical, and plumbing drawings. _____

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- 21. The structural joist and beam location with water closets, floor urinals, floor drains and chases. _____
- 22. The structural design roof and floors for the superimposed loads, including the HVAC equipment, boilers, glass walls, etc. _____
- 23. Cambers, drifts, and deflections with the architectural drawings. _____
- 24. That the concentrated load points on joists do not conflict with design by other disciplines; i.e., large water lines or fire main lines. _____
- 25. That horizontal and vertical bracing, ladders, stairs and framing do not interfere with doorways, piping, duct work, electrical, equipment, etc. _____
- 26. That the structural fire proofing requirements are coordinated with the architectural requirements. _____
- 27. That the rock excavation is a base bid or a unit price. _____

E. ARCHITECTURAL:

- 1. That site property lines and existing conditions match with survey or civil drawings. _____
- 2. That building location meets all setback requirements, zoning codes, and deed restrictions. _____
- 3. That building limits match with civil, plumbing, and electrical on-site plans. _____
- 4. That locations of columns, bearing walls, grid lines and overall building dimensions match structural. _____
- 5. That locations of expansion joints, all floors, match with structural drawings. _____
- 6. That demolition instructions are clear on what to remove and what is to remain, and are coordinated with design documents. _____
- 7. That building elevations match floor plans and have the same scale. _____
- 8. That building sections match elevations, plans, and structural drawings. _____
- 9. Building plan match lines are consistent on structural, mechanical, plumbing, and electrical drawings. _____
- 10. Structural member locations are commensurate architecturally. _____
- 11. That elevation points match with structural drawings. _____

- 12. That chases match on structural, mechanical, plumbing, and electrical drawings _____
- 13. That section and detail call outs are proper and cross-referenced. _____
- 14. That large-scale plans and sections match small scale plans and sections. _____
- 15. Reflected architectural ceiling plans with mechanical, and electrical plans. _____
- 16. That columns, beams, and slabs are listed on elevations and sections. _____
- 17. That door schedule information matches plans, elevations, fire rating, and project manual. _____
- 18. That cabinets or millwork will fit in available space. _____
- 19. That flashing through the wall and weep holes are provided where moisture may penetrate the outer material. _____
- 20. Flashing materials and gauges. _____
- 21. Fire ratings of walls, ceilings, fire and smoke dampers. _____
- 22. That miscellaneous metals are detailed, noted, and coordinated with the Project Manual. _____
- 23. That equipment room or areas are commensurate with mechanical, electrical, and plumbing. _____
- 24. The limits, types, and details of waterproofing and coordination with design documents. _____
- 25. The limits, types, and details of insulation and coordination with design documents. _____
- 26. The limits, types, and details of roofing and coordination with design documents. _____
- 27. Skylight structures compatibility with structural design. _____
- 28. That piping loads hang from the roof or floors, are coordinated with the mechanical and structural drawings, and proper inserts are called for on the drawings. _____
- 29. That all mechanical and electrical equipment is properly supported and that all architectural features are adequately framed and connected. _____
- 30. That all drawings showing monorails, hoists, and similar items have support details, notes, and that the locations are coordinated with the architectural, structural, mechanical, and electrical drawings. _____

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- 31. That walls, partitions, and window walls are not inadvertently loaded through deflection. _____
- 32. That all window walls, expansions, and weeps are provided. _____
- 33. That all handicapped requirements are coordinated with plumbing and electrical. _____
- 34. That architectural space requirements are commensurate with duct work, conduit, piping, light fixtures, and other recesses. _____
- 35. That architectural space requirements are commensurate with elevators, escalators, and other equipment. _____
- 36. Dew point in walls, roof, and terraces; and that vapor barrier has been provided as required. _____
- 37. That concealed gutters are properly detailed, drained, waterproofed, and expansion provided for. _____
- 38. Compatibility of grading around perimeter of building with civil drawings. _____
- 39. That color finish schedules are on drawings. _____
- 40. That interior valleys for buildings having large flat roofs are provided with saddles or crickets to eliminate formation of bird baths. _____

F. MECHANICAL:

- 1. That mechanical plans match architectural and reflected ceiling plans. _____
- 2. That HVAC ducts are commensurate with architectural space and are not in conflict with conduit, piping, etc. _____
- 3. That mechanical equipment fits architectural space with room for access, safety, and maintenance. _____
- 4. That mechanical openings match architectural and structural drawings. _____
- 5. That mechanical motor sizes match electrical schedules. _____
- 6. That thermostat locations are not placed over dimmer controls. _____
- 7. That equipment schedules correspond to manufacturer's specifications and design documents. _____

8. Mechanical requirements for special equipment; i.e., kitchen, elevator, telephone, transformers, etc. _____

9. Fire damper location in ceiling and fire walls. _____

10. That all structural supports required for mechanical equipment are indicated on structural drawings. _____

11. That all roof penetrations are shown on roof plans. _____

12. That seismic bracing details are provided for all platforms which support overhead equipment and that seismic flexible coupling locations and details are shown. _____

G. FIRE PROTECTION:

1. Conduct waterflow testing for all new sprinkler systems. Indicate waterflow test data on drawings or in specifications. _____

2. Provide detailed hydraulic calculations that verifies that the water supply is sufficient to meet the fire protection system demand. _____

3. Ensure that a complete riser diagram is shown. _____

4. Ensure that all piping from the point of connection to the existing, to the top of the sprinkler riser(s) is shown on the drawings. _____

5. Ensure that all valves, fire department connections, and inspector's test connections are indicated on drawings. _____

6. Ensure that sprinkler main drain piping and discharge point are shown and detailed. Main drains should discharge directly to the outside. _____

7. Ensure that the extent or limit of each type of sprinkler system, each design density, each type and temperature rating of sprinkler heads, and location of concealed piping is clearly specified or shown. _____

8. Ensure that water-filled sprinkler piping is not subject to freezing. _____

9. Provide detail of the sprinkler piping entry into the building, and include details of anchoring and restraints. _____

10. Ensure that aesthetics considerations are incorporated in the design of the sprinkler system, e.g. sprinkler piping is concealed in finished areas and recessed chrome-plated pendent sprinkler heads are used in finished area. _____

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- 11. Ensure that paddle-type waterflow switches are only used in wet-pipe sprinkler systems. The other sprinkler systems shall use pressure-type flow switches. _____
- 12. Ensure that the main sprinkler control valves are accessible from the outside. _____
- 13. Ensure that fire rating of fire-rated walls, partitions, floors, shafts, and doors are indicated. _____
- 14. Ensure that if spray-applied fire proofing is specified that the fire rating of the steel structural members are indicated. _____
- 15. Ensure that the location of required fire dampers are shown. _____
- 16. Ensure that the location of all fire alarm indicating devices, pull stations, waterflow switches, detectors and other fire alarm and supervisory devices are indicated on the drawings. _____
- 17. Ensure that the connection of the fire alarm and detection system to the base-wide fire alarm system is clearly shown and detailed. _____

H. PLUMBING:

- 1. That plumbing plans match architectural, mechanical, and structural drawings. _____
- 2. That plumbing fixtures match plumbing schedules and architectural locations. _____
- 3. Compatibility of site piping limits interfaces with building piping. _____
- 4. Roof drain locations with roof plan. _____
- 5. That subsurface drains are located and detailed. _____
- 6. That roof drain overflows are provided. _____
- 7. That piping chase locations matches architectural and structural drawings. _____
- 8. That all hot and cold water piping is insulated in accordance with the contractor's approved piping insulation display sample. _____
- 9. That piping is commensurate with architectural space and not in conflict with conduit, duct, and structure. _____
- 10. That piping openings match architectural and structural drawings. _____
- 11. That structural design is compatible with plumbing equipment and piping requirements. _____

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12. That plumbing equipment schedules correspond to manufacturers' specifications and design documents. _____

13. That floor drains match architectural and kitchen equipment plans. _____

14. That site utilities have been accurately verified, and that site water and gas service requirements are met by supply utilities. _____

15. That floor openings, i.e., drains, water closets, etc., do not conflict with structural beams, joists, or trusses. _____

16. Limits and confines where piping may be run. _____

17. That seismic bracing details are provided and that seismic flexible coupling locations are shown. _____

18. That roof drain details are coordinated with other trades to show the installation of sump pans in ribbed sheet metal decks, and the placement of roof insulation in and around the drainage fitting. _____

I. ELECTRICAL:

1. That electrical plans match architectural, mechanical, plumbing and structural. _____

2. That location of light fixtures, speakers, etc., match with reflected ceiling plans. _____

3. That electrical connections are shown for equipment, i.e., mechanical motors, heat strips, etc., architectural, overhead doors, stoves, dishwashers, etc. _____

4. That locations of panel boards, transformers, are shown on architectural, mechanical, and plumbing plans. _____

5. That conduit chase locations match with architectural and structural drawings. _____

6. Compatibility of conduit and light fixtures with architectural space and that no conflicts exist with duct, piping, or structure. _____

7. That electrical equipment structural requirements are met. _____

8. That electrical equipment room fits architectural space, with clearance for safety and maintenance. _____

9. That electrical horsepower, voltage, phasing for all motors match on mechanical and architectural designs. _____

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- 10. That fixtures, speakers, clocks, etc., schedules correspond to a manufacturer's description and design documents. _____
- 11. Light fixture spacing and location to eliminate dark spots. _____
- 12. Location of duplex outlets, telephone, fire alarms clock outlets, etc., with architectural millwork and finishes. _____
- 13. The limits and confines where conduits may be run. _____
- 14. Site electrical and telephone service requirements with supply utility. _____
- 15. That seismic bracing details are provided and that seismic flexible coupling locations are shown. _____

J. SPECIFICATIONS:

- 1. That bid and additive items are coordinated with drawings. _____
- 2. That the measurement and payment section is present, when appropriate. _____
- 3. That construction phasing is clear. _____
- 4. That cross-referenced specifications and drawings are numbered correctly. _____
- 5. That all finish materials listed in architectural finish schedule are specified. _____
- 6. That thicknesses and quantities of materials shown on plans agree with specifications. _____
- 7. That all items of material or equipment are covered by adequate specifications, including those not covered by CEGS. _____
- 8. That all shop drawings and material certifications to be submitted are listed in the submittal register. _____
- 9. That provider of utilities during construction is indicated in specifications. _____
- 10. That asbestos abatement and quantities are included in specs and on bid schedule. _____
- 11. That Government-furnished materials are identified. _____
- 12. That security requirements for employees are included. _____
- 13. That references to test methods, material specs, or other manuals are consistent with civil or military designations, as applicable. _____

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- 14. That traffic control during construction is indicated. _____
- 15. That temporary dust control measures are outlined. _____
- 16. That proper warranties are called for in the specifications. _____

Civil/Landscape Design Checklist

CIVIL/SITE DESIGN CHECKLIST

A. CIVIL DESIGN:

INITIALS

- 1. Existing and finished grades are shown. _____
- 2. Haul routes, disposal/borrow sites, construction contractor's storage area, construction limits, and construction staging area are shown. _____
- 3. Existing utilities, sizes, and materials (if known) are shown. _____
- 4. New underground utilities have been checked for conflicts against the site plans. _____
- 5. Utility tie-in locations agree with mechanical stub-out plan. _____
- 6. Profile sheets show underground utilities and avoid conflicts between new and existing. _____
- 7. Property lines and limits of clearing, grading, turfing, or mulch have been shown and are consistent with architectural and/or landscaping plans. _____
- 8. Fire hydrant and power/telephone pole locations correspond with electrical and architectural drawings. _____
- 9. Basis of horizontal and vertical control is given and the control points are located properly with pertinent data shown: i.e., BM's/TBM's elevations, coordinates, stationing, and/or start of construction. _____
- 10. Top of valve boxes and manholes match finished grades, pavement, swales or sidewalks. _____
- 11. Boring locations, soil classifications, water table, and depth of rock are shown on the plans. _____
- 12. Rigid pavement joint plans are shown with reasonable spacing. _____
- 13. Foundation coordinates are shown on the foundation plan and coordinated with architectural drawings. _____
- 14. Finished floor elevations match on architectural and structural drawings. _____
- 15. Civil specifications are coordinated with plans. _____
- 16. Storm and sewage drains from the facility have adequate capacity. _____
- 17. Directions to contractors are not duplicated in plan notes and in the specifications. _____
- 18. Removal, Demolition Plan(s) is (are) complete. _____

19. Construction limit line is shown, including removal of existing pavements when required.

20. Sufficient attention has been given to preserving the natural terrain an tree cover.

21. Sufficient General Notes, dimensions, and elevations are shown for proper construction layout, including construction base line (B/L) on "Layout Plan", and finish grade spot elevations are indicated on graded earth areas and along pavements on "Grading and Paving Plan".

22. Slopes of paved surfaces and graded earth areas are satisfactory and within criteria of maximum and minimum grades to prevent ponding and assure positive drainage to the desired surface inlet or drainage outlet.

23. Typical full and partial sections through site are sufficiently detailed to show relationship of finished floor elevation of building(s) to outside finished grades of both grassed and paved areas.

24. The following typical sections are provided and adequately dimensioned:

- (1) Concrete Pavement
- (2) Bituminous Pavement
- (3) Sidewalks, entrance drives, and roads
- (4) Other sections, as required

25. All applicable detail sketches and construction notes are shown for curb and gutter, storm drain inlets, manholes, headwalls, painting pavement markings, riprap, erosion control measures and other required items of sitework. Appropriate specification sections are referenced when applicable.

26. If design includes portland cement concrete (PCC) pavement, then the following are shown:

- (1) Concrete Joint Layout Plan
- (2) Concrete Joint Details, using applicable portion(s) of District's Standard Joint Details based on OCE Standard Drawing(s).
- (3) Type of joint material, as per specifications.

(4) Special details for reinforced concrete slab around storm drain inlets, when required.

(5) Reinforcement of odd shaped slabs, as per applicable TM/AFM.

(6) Tie-down anchors, when required (for airfield pavements only).

(7) Other details, as required.

27. "Storm Drainage Pipe Structures Schedule" shown in drawing detail(s) agrees with the drainage plan, drainage design analysis, and pipe profile(s) regarding inlet numbers, invert elevations, etc.

28. Plant list agrees with the landscape plans.

29. Locations of all soil borings, test pits, etc. correctly shown on the Grading Plan, and appropriate symbols included in legend.

30. Projects require "new" chain link fence modification(s) to "existing" fence, type and height of "existing" fence is noted and is District's Standard Fencing Detail included to cover requirement for "new" fence to match "existing" fence.

B. STORM DRAINAGE DESIGN ANALYSIS:

1. Analysis contains an introductory page giving a brief description of the general terrain and/or site soil conditions, drainage patterns, basis of technical requirements and other pertinent data affecting the proposed storm drainage system (formulae, appropriate rainfall and runoff criteria, etc.).

2. Drainage area map is complete, with sub areas outlined, including possible "offsite" drainage, and all necessary "existing" and "new" drainage pipe and structures are indicated.

3. Drainage tabulation forms are complete, and calculations are included for: ditch flow and culverts, when required; capacity and spacing of inlet openings; and correct pipe strength(s) (Gauges/D-Loads).

C. PAVEMENT DESIGN ANALYSIS:

1. Discussion of site conditions, etc., indicates that borings logs have been reviewed to assure there are no unsuitable soils (heavy clays/organic soils) which would require removal and replacement in areas to be paved or in other critical areas. If these conditions exist, then provisions have been made for removal of same, and limits are shown on the drawings.

2. Classifications of road usage, vehicle category, CBR/K values, and method of determining required pavement thickness and depths of compaction are satisfactory.

3. For airfield pavements, characteristics of the subgrade and correct aircraft classification and wheel load are given, as well as other pertinent data necessary for determining the required pavement thickness.

4. The assumptions used in the pavement foundation analysis are consistent with the CBR/K values specified in the final foundation report.

D. LANDSCAPE DESIGN:

1. The sprinklers, lighting, hardscape, etc., correspond with the site limits, including the building and civil plans.

2. Maintenance of landscape has been provided for in the design documents.

3. Where applicable, appropriate "General Notes" are provided on the drawing(s) indicating trees to remain within the designated grading limits.

4. All required plant items are included, and shrubs, etc. comply with approved plant list in the applicable Installation Design Guide (IDG).

5. Planting details are provided.

CIVIL/SANITARY DESIGN CHECKLIST

A. SANITARY SEWERS:

INITIALS

1. Utility plan(s) show all existing and new sanitary sewers including manholes and cleanout locations. _____
2. Sizes of sanitary sewers are shown and all work can be located in the field from established BM's or baselines. _____
3. Sanitary sewers are profiled, including building connections, and show pertinent data (existing and final grades, top and invert elevations, size, length, pipe crossing). _____
4. Building connection have been coordinated with interior plumbing size, inlet elevations and locations. _____
5. Sanitary sewers do not conflict with other underground utilities. _____
6. Sewers are laid at sufficient slope to provide minimum velocity of 2 fps when flowing full. _____
7. Minimum size sewer lines shown (150 mm (6 in) dia. for building sewers and 200 mm (8 in) for mains). _____
8. Adequate cover for frost protection has been provided. _____
9. Determination made to maintain flow in existing sewer system during construction of new sewers. _____
10. Abandoned sewers are shown as plugged or removed. _____
11. Sanitary sewer appurtenance details are provided. _____

B. WATER

1. Pipe size adequate for domestic water demand. _____
2. Gate valves and valve boxes properly located. _____
3. Pipe size adequate for fire flow demand. _____
4. Number and location of new and existing fire hydrants sufficient for adequate fire protection. _____
5. Fire line entering building agrees with interior sprinkler plan. P.I.V. shown. _____

C. Design Analysis:

1. Domestic water line(s) sized on correct fixture unit basis.

2. Velocity and head loss computed.

D. SPECIFICATIONS:

1. Sanitary and Waterline specifications include all items, sizes, and work shown on the contract drawings. Inapplicable paragraphs indicated as "Not Used" and inapplicable reference publications have been deleted from paragraph "APPLICABLE PUBLICATIONS".

2. All allowed pipe material options have been retained and correct strength of pipe has been selected.

3. Special construction requirements shown on details are properly covered in the specifications.

Structural Design Checklist

STRUCTURAL DESIGN CHECKLIST

INITIALS

1. The design load conditions meet or exceed the Building codes and the Design Standards. _____
2. The column orientation and grid lines on the structural and the architectural drawings match. _____
3. The load-bearing walls and the building column foundation locations match with architectural drawings. _____
4. The slab elevations match the architectural drawings. _____
5. The depressed or raised slabs are indicated and match the architectural drawings. _____
6. The limits of slabs on the structural drawings match the architectural drawings. _____
7. The expansion joints on the structural drawings match the architectural drawings. _____
8. The footing depth and cover is shown with the existing and final grades. _____
9. The foundation piers, footings, grade beams are coordinated with schedules. _____
10. The footing and pier locations do not interfere with new and existing utilities, trenches and tanks. _____
11. The foundation wall elevations are the same as on the architectural drawings. _____
12. The location of floor and roof framing column lines and column orientation match the foundation plan column lines and column orientation. _____
13. The structural perimeter floor and roof lines match the architectural drawings. _____
14. The section and detail call-outs are proper and cross-referenced. _____
15. The columns, beams, and slabs are listed in schedules and are coordinated. _____
16. The column length, beam, and joist depths match with the architectural drawings. _____
17. The structural dimensions match the architectural drawings. _____
18. The drawing notes do not conflict with specifications. _____
19. The architectural construction and rustication joints are correct. _____
20. The structural openings are coordinated with the architectural, mechanical, electrical, and plumbing drawings. _____

INITIALS

21. The structural joist and beam locations do not interfere with water closets, floor urinals, floor drains and chases.

22. The structural design of roof and floors considered the superimposed loads, including the HVAC equipment, boilers, glass walls, etc.

23. Cambers, drifts, and deflections have been coordinated with the architectural drawings.

24. The concentrated load points on joists do not conflict with design by other disciplines; i.e., large water lines or fire main lines.

25. Horizontal and vertical bracing, ladders, stairs and framing do not interfere with doorways, piping, duct work, electrical, equipment, etc.

26. The structural fire proofing requirements are coordinated with the architectural requirements.

27. Rock excavation is a base bid or a unit price.

Architectural Design Checklist

ARCHITECTURAL DESIGN CHECKLIST

INITIALS

1. Site property lines and existing conditions match with survey or civil drawings. _____
2. Building location meets all setback requirements, zoning codes, and deed restrictions. _____
3. Building limits match with civil, plumbing, and electrical on-site plans. _____
4. Locations of columns, bearing walls, grid lines and overall building dimensions match structural. _____
5. Locations of expansion joints, all floors, match with structural drawings. _____
6. Demolition instructions are clear on what to remove and what is to remain, and are coordinated with design documents. _____
7. Building elevations match floor plans and have the same scale. _____
8. Building sections match elevations, plans, and structural drawings. _____
9. Building plan match lines are consistent on structural, mechanical, plumbing, and electrical drawings. _____
10. Structural member locations are commensurate architecturally. _____
11. Elevation points match with structural drawings. _____
12. Chases match on structural, mechanical, plumbing, and electrical drawings. _____
13. Section and detail call-outs are proper and cross-referenced. _____
14. Large-scale plans and sections match small scale plans and sections. _____
15. Reflected architectural ceiling plans coordinated with mechanical and electrical plans. _____
16. Columns, beams, and slabs are listed on elevations and sections. _____
17. Door schedule information matches plans, elevations, fire rating, and project manual. _____
18. Cabinets or millwork will fit in available space. _____
19. Flashing through the wall and weep holes are provided where moisture may penetrate the outer material. _____

INITIALS

- 20. Flashing materials and gauges are indicated or specified. _____
- 21. Fire ratings of walls, ceilings, fire and smoke dampers are indicated or specified. _____
- 22. Miscellaneous metals are detailed, noted, and coordinated with the Project Manual. _____
- 23. Equipment room or areas are commensurate with mechanical, electrical, and plumbing. _____
- 24. Limits, types, and details of waterproofing are coordinated with design documents. _____
- 25. Limits, types, and details of insulation are coordinated with design documents. _____
- 26. Limits, types, and details of roofing are coordinated with design documents. _____
- 27. Skylight structures are compatible with structural design. _____
- 28. Piping loads hang from the roof or floors, and are coordinated with the mechanical and structural drawings, and proper inserts are called for on the drawings. _____
- 29. Mechanical and electrical equipment is properly supported and all architectural features are adequately framed and connected. _____
- 30. All drawings showing monorails, hoists, and similar items have support details, notes, and the locations are coordinated with the architectural, structural, mechanical, and electrical drawings. _____
- 31. Walls, partitions, and window walls are not inadvertently loaded through deflection. _____
- 32. All window walls, expansions, and weeps are provided. _____
- 33. All physically disabled requirements are coordinated with plumbing and electrical plans. _____
- 34. Architectural space requirements are commensurate with duct work, conduit, piping, light fixtures, and other recesses. _____
- 35. Architectural space requirements are commensurate with elevators, escalators, and other equipment. _____
- 36. Dew point in walls, roof, and terraces; and vapor barrier has been provided as required. _____
- 37. Concealed gutters are properly detailed, drained, waterproofed, and expansion provided for. _____

INITIALS

38. Compatibility of grading around perimeter of building with civil drawings. _____

39. Color finish schedules are on drawings. _____

40. Interior valleys for buildings having large flat roofs are provided with saddles or crickets to eliminate formation of bird baths. _____

Mechanical Design Checklist

MECHANICAL DESIGN CHECKLIST

A. MECHANICAL DESIGN:

INITIALS

1. Mechanical plans match architectural and reflected ceiling plans. _____
2. HVAC ducts are commensurate with architectural space and are not in conflict with conduit, piping, etc. _____
3. Mechanical equipment fits architectural space with room for access, safety, and maintenance. _____
4. Mechanical openings match architectural and structural drawings. _____
5. Mechanical motor sizes match electrical schedules. _____
6. Thermostat locations are not placed over dimmer controls. _____
7. Equipment schedules correspond to manufacturer's specifications and design documents. _____
8. Mechanical requirements for special equipment; i.e., kitchen, elevator, telephone, transformers, etc. _____
9. Fire damper located in ceiling and fire walls. _____
10. All structural supports required for mechanical equipment are indicated on structural drawings. _____
11. All roof penetrations are shown on roof plans. _____
12. Seismic bracing details are provided for all platforms which support overhead equipment and that seismic flexible coupling locations and details are shown. _____

B. FIRE PROTECTION DESIGN:

1. Waterflow testing for all new sprinkler systems conducted and waterflow test data indicated on drawings or in specifications. _____
2. Detailed hydraulic calculations provided verifying that water supply is sufficient to meet fire protection system demand. _____
3. Complete riser diagram is shown. _____
4. All piping from the point of connection to the existing, to the top of the sprinkler riser(s) is shown on the drawings. _____

5. All valves, fire department connections, and inspector's test connections are indicated on the drawings. _____
6. Sprinkler main drain piping and discharge point are shown and detailed, and main drains discharge directly to the outside. _____
7. The extent or limit of each type of sprinkler system, each design density, each type and temperature rating of sprinkler heads, and location of concealed piping is clearly specified or shown. _____
8. Water-filled sprinkler piping is not subject to freezing. _____
9. Detail of the sprinkler piping entry into the building is provided, and includes details of anchoring and restraints. _____
10. Aesthetics considerations are incorporated in the design of the sprinkler system, e.g. sprinkler piping is concealed in finished areas and recessed chrome-plated pendent sprinkler heads are used in finished area. _____
11. Paddle-type waterflow switches are only used in wet-pipe sprinkler systems. The other sprinkler systems use pressure-type flow switches. _____
12. The main sprinkler control valves are accessible from the outside. _____
13. Fire rating of fire-rated walls, partitions, floors, shafts, and doors are indicated. _____
14. If spray-applied fire proofing is specified, the fire rating of the steel structural members are indicated. _____
15. Location of required fire dampers are shown. _____
16. Location of all fire alarm indicating devices, pull stations, waterflow switches, detectors and other fire alarm and supervisory devices are indicated on the drawings. _____
17. The connection of the fire alarm and detection system to the installation-wide fire alarm system is clearly shown and detailed. _____
- C. PLUMBING DESIGN:**
1. Plumbing plans match architectural, mechanical, and structural drawings. _____
2. Plumbing fixtures match plumbing schedules and architectural locations. _____
3. Compatibility of site piping limits interfaces with building piping. _____

INITIALS

- 4. Roof drain locations coordinated with roof plan. _____
- 5. Subsurface drains are located and detailed. _____
- 6. Roof drain overflows are provided. _____
- 7. Piping chase locations matches architectural and structural drawings. _____
- 8. All hot and cold water piping is insulated IAW the contractor's approved piping insulation display sample. _____
- 9. Piping is commensurate with architectural space and not in conflict with conduit, duct, and structure. _____
- 10. Piping openings match architectural and structural drawings. _____
- 11. Structural design is compatible with plumbing equipment and piping requirements. _____
- 12. Plumbing equipment schedules correspond to manufacturers' specifications and design documents. _____
- 13. Floor drains match architectural and kitchen equipment plans. _____
- 14. Site utilities have been accurately verified and site water and gas service requirements are met by supply utilities. _____
- 15. Floor openings, i.e., drains, water closets, etc., do not conflict with structural beams, joists, or trusses. _____
- 16. Limits and confines where piping may be run are shown. _____
- 17. Seismic bracing details are provided and seismic flexible coupling locations are shown. _____
- 18. Roof drain details are coordinated with other trades to show the installation of sump pans in ribbed sheet metal decks, and the placement of roof insulation in and around the drainage fitting. _____

Electrical Design Checklist

ELECTRICAL DESIGN CHECKLIST

	INITIALS
1. Electrical plans match architectural, mechanical, plumbing and structural.	_____
2. Location of light fixtures, speakers, etc., match with reflected ceiling plans.	_____
3. Electrical connections are shown for equipment, i.e., mechanical motors, heat strips, etc., architectural, overhead doors, stoves, dishwashers, etc.	_____
4. Locations of panel boards, transformers, are shown on architectural, mechanical, and plumbing plans.	_____
5. Conduit chase locations match with architectural and structural drawings.	_____
6. Compatibility of conduit and light fixtures with architectural space and no conflicts exist with duct, piping, or structure.	_____
7. Electrical equipment structural requirements are met.	_____
8. Electrical equipment room fits architectural space, with clearance for safety and maintenance.	_____
9. Electrical kW, voltage, phasing for all motors match on mechanical and architectural designs.	_____
10. Fixtures, speakers, clocks, etc., schedules correspond to a manufacturer's description and design documents.	_____
11. Light fixture spacing and location to eliminate dark spots.	_____
12. Location of duplex outlets, telephone, fire alarms clock outlets, etc., with architectural millwork and finishes.	_____
13. Limits and confines where conduits may be run verified.	_____
14. Site electrical and telephone service requirements verified with supply utility.	_____
15. Seismic bracing details are provided and seismic flexible coupling locations are shown.	_____