U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION



National Policy

ORDER 6480.4B

Effective Date: 08/13/18

SUBJ: Airport Traffic Control Tower Siting Process

An effective and efficient process to accurately site new and replacement airport traffic control towers (ATCT) is consistent with the Federal Aviation Administration's (FAA) mission to foster a safe, secure and efficient aviation system. The FAA must balance the requirements and considerations, both internal and external to the FAA, to determine the optimum height, cab size, and location of an ATCT.

This order defines the methods used to complete the ATCT siting process in a consistent manner and establishes the criteria and procedures for evaluation and approval for the height and location of an ATCT to ensure safety within the National Airspace System (NAS). It prescribes policy, delegates authority, and assigns responsibility to achieve the ultimate goal of providing the lowest cost ATCT that meets all the siting criteria.

Daniel K. Elwell Acting Administrator

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Chapter 1. General

1-1. Purpose of This Order. This order establishes requirements for determining site location, tower height and cab orientation of a proposed new, replacement of existing, and modernization of Airport Traffic Control Towers (ATCTs) where the overall structure height is changed. The order also establishes a siting process utilizing the standard Airport Facilities Terminal Integration Laboratory (AFTIL) method or the Alternate Siting Process for qualified candidates. The order further defines a method for reporting and approval of siting activities.

Approval of a siting report does not imply the approval or the availability of funding for the ATCT new/replacement project.

This order does not apply to the siting of temporary or mobile towers. Siting of temporary towers is covered in Order JO 7110.315, Mobile Airport Traffic Control Tower Siting Criteria.

This order does not apply to camera mast/ nest siting for remote tower operations.

1-2. Audience. The order applies to personnel involved in the siting of ATCTs where any federal funds are received, including FAA-operated towers, Federal Contract Towers (FCT) and non-federal towers whether they are built by the FAA directly or through other funding mechanisms.

1-3. Where Can I Find This Order. This Order is available on the following websites: https://employees.faa.gov/tools_resources/orders_notices/. Search for 6480.4B.

A copy can also be found on the Program Operations Terminal Facilities Design, Engineering and Integration Siting Knowledge Sharing Network (KSN) Website at the following address: https://ksn2.faa.gov/ajt/programops/Facilities/dei/siting/default.aspx.

1-4. Cancellation. This revision replaces Order 6480.4A, Airport Traffic Control Tower Siting Criteria, dated April 10, 2006.

1-5. Explanation of Policy Changes. The order has been revised to clarify roles and responsibilities of siting team organizations, to add updated references, and to establish a simplified siting report process. It also provides clarity on the alternate siting process for Federal Contract Towers (FCT)/Other Transaction Agreements (OTA) towers.

1-6. Implementation. The requirements of this order are applicable to the establishment of new, replacement of existing, and modernization of (where the overall structure height is changed) ATCT facilities. They apply equally whether the ATCT stands alone or is part of another airport facility.

1-7. Funding Restrictions. Funding provided by the Technical Operation Services Air Traffic Organization (AJW) is not intended for engaging contracting services for the purpose of producing a final siting report as a deliverable. Contracting services may be used for producing various parts of the report. This restriction is not applicable to either sponsor-built FCTs or ATCTs funded through OTAs.

1-8. Requirement for AFTIL Use. Use of the AFTIL is mandated for all new, replacement of existing, and modernization of (where the overall structure height is changed) ATCT projects where federal funds are received unless approved for the alternate siting process (see Chapter 8).

Chapter 2. Siting Criteria

2-1. General. The siting process takes into consideration criteria relating to the safety of air traffic operations for each potential ATCT site. While all siting criteria must be considered, the greatest emphasis on the following items, in descending order:

- a. Impacts to instrument approach procedures (Terminal Instrument Procedures TERPS)
- **b.** Impacts to communications, navigation, and surveillance equipment
- c. Visibility performance
- d. Comparative Safety Assessment (CSA)
- e. Operational requirements
- f. Economic considerations

2-2. Instrument Approach Procedures.

a. FAA Order 8260.3, United States Standard for Terminal Instrument Procedures. TERPS for the airport must be studied to determine what impact a new ATCT would have on Instrument Terminal Procedures into and out of the airport. The ATCT must be sited such that it does not adversely impact any current or planned terminal instrument procedures. Where any siting options would adversely impact these procedures, an assessment of impacts must be coordinated with all stakeholders. Particular emphasis must be made to protect approaches with vertical guidance according to the current approved Airport Layout Plan (ALP). Non-precision approach and circling minimums may only be adjusted to accommodate a proposed ATCT if the impacts of the adjustments are understood and agreed by all stakeholders.

b. Title 14 Code of Federal Regulations (CFR) Part 77, Objects Affecting Navigable Airspace, and Advisory Circular 150/5300-13, Airport Design Standards. Standards must be reviewed and complied as applicable. Airport surfaces of particular concern are the Runway Obstacle Free Zone including the Precision Runway Obstacle Free Zone and the Approach Obstacle Free Zone, the Runway Object Free Area, Runway Protection Zone, Runway Safety Area, and building restriction line. The FAA-approved ALP must be reviewed for conformance. A Non Rulemaking Action (NRA) must be conducted in accordance with FAA Order JO 7400.2, Procedures for Handling Airspace Matters and part 77, Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) requirements.

2-3. Impacts to Communications, Navigation, and Surveillance Equipment.

Communications, Navigation and Surveillance Equipment. The ATCT must be sited where it does not degrade or affect the performance of existing or planned facilities and/or equipment, unless deviations are necessary to meet other siting criteria and mitigation strategies are implemented.

2-4. Visibility Performance Requirements.

a. General. Visibility siting requirements analysis must be conducted using the FAA's Airport Traffic Control Tower Visibility Analysis Tool (ATCTVAT) to address the unobstructed view, object discrimination, and Line of Sight (LOS) angle of incidence requirements. The visibility tool is available on the following website: https://www.hf.faa.gov/visibility/

b. Unobstructed View. Visibility from the ATCT cab must allow an unobstructed view of all controlled movement areas of an airport, including all runways, any other landing areas, and air traffic in the vicinity of the airport. Visibility from the ATCT cab should allow an unobstructed view of all taxiways and ramp areas. The simulation tool at AFTIL must be used to do a dynamic visibility analysis including the evaluation of both moving and parked aircraft.

c. Object Discrimination. ATCT height and distance from critical airport locations must support requirements of object visibility from the ATCT cab. An object discrimination analysis must be performed (see Appendix D, section 1) to assess observers' probability of detection of an object on the airport surface according to the criteria listed in Table 2-1. In the event that an objection discrimination analysis results in a failure, mitigation strategies should be developed.

Table 2-1.	Object Discrimination	Analysis	Criteria
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Observation Capability Requirements	Observation Description	Front View Probability Criteria ¹ Minimum
Detection	Ability to notice the presence of an object on the airport surface without regard to the class, type, or model (for example, an object such as an aircraft or vehicle). The observer knows something is present but may not recognize or identify the object.	95.5%

Front View Probability Criteria are calculated by the ATCTVAT for the front view of a minivan. The ATCTVAT is available during site visits to the AFTIL and is also available online – see paragraph 2.2-a.

d. Line of Sight (LOS) Angle of Incidence.

(1) The ATCT distance from critical airport locations and ATCT height must support requirements for viewing objects on the airport movement areas, taxiways and critical non-movement areas from the ATCT cab. A LOS angle of incidence analysis must be performed (see Appendix D, section 2) to assess the angle at which the observers' view of a distant object intersects with the airport surface, following the criteria in Table 2-2.

Table 2-2. LOS Angle of Incidence Criteria

LOS Viewing Criteria	LOS Viewing Angle of Incidence
Minimum	Equal to or greater than 0.80 degrees

(2) If the determined operational height at a candidate site exceeds the FAA's ATCTVAT identified minimum height, the siting team must document the need to exceed the minimum or to manage visibility requirements.

e. Visibility Performance Considerations.

(1) Two-Point Lateral Discrimination. Consideration must be given to the two-point lateral discrimination to ensure that ATCT location and height enhance visibility performance as much as possible. A two-point lateral discrimination analysis must be performed (see Appendix D, section 3) to ensure that operations at critical points of the airport surface provide the observer sufficient lateral discrimination. Consideration must be given to laterally separating the observer's viewing angle between the two points by 0.13 degrees (8 minutes) or greater.

2-5. Siting Safety Risk Management Process / Comparative Safety Assessment (CSA). The ATO Safety Management System (SMS) requires that safety assessments be performed on changes to the NAS that have safety impact. The Safety Risk Management (SRM) process ensures that safety-related

changes are documented, hazards are identified, risks are assessed and analyzed, high risks are mitigated to an acceptable level, medium risks are mitigated if possible, and all predicted residual risks are verified through monitoring. Each of the siting criteria must be reviewed for potential hazards. The hazards identified for the preferred locations must be assessed and mitigated to an acceptable level of risk to satisfy SRM requirements. A preliminary hazard list and a risk matrix from the ATO SMS manual are contained in Appendix C. Additional site specific risks can be added as required.

a. Safety Assessments. The safety assessment for ATCT siting must comply with the current version of the ATO SMS Manual and include the following in descriptions of the preferred sites:

(1) Identification of hazards for each of the preferred sites.

(2) Analysis of each hazard including causes and potential outcomes.

(3) Risk assessment for each hazard considering the severity of consequence and likelihood of occurrence using the risk matrix in Appendix C, Figure 1.

(4) A comparison of the relative risk for each of the preferred sites.

(5) A hazard analysis of the preferred sites, including a documented safety record that contains a definition of controls, mitigations, and/or procedures for each hazard.

b. Risk Treatment. Hazards with a high initial risk must be mitigated to an acceptable level (medium or low). Controls, mitigations, or procedures to reduce risk must be stated as safety requirements and implemented to satisfy the intent of the mitigation strategy.

c. Risk Acceptance. Hazards with predicted residual medium or low risk will be accepted by the appropriate management official as identified in the current version of the ATO Safety Management System Manual. Predicted residual high risk hazards are unacceptable.

d. Hazard Tracking and Risk Resolution. All safety performance monitoring and risk resolution tracked in accordance with the current ATO SMS manual.

e. Reporting. A comparison of the relative risk for the preferred sites must be documented in a CSA.

2-6. Operational Requirements. For any given site and cab size, the ATCT must be constructed at the minimum height required to satisfy the criteria outlined in this order.

a. ATCT Orientation. Consideration must be given to the following: direct sun glare, indirect sun glare off natural and manmade surfaces, night-time lighting glare, external light sources, and thermal distortion in determining ATCT orientation. The ATCT must be orientated where the primary operational view faces north or alternately east, or west, or finally south, in that order of preference for an ATCT in the northern hemisphere. In areas where snow accumulates on the ground or the ATCT site is surrounded by sand or a large body of water, a southern orientation should be avoided.

b. Weather. Using a ten-year weather history, consideration must be given to local weather phenomena that impair visibility. Weather affecting the predominant flow of traffic should be considered in the siting process. Ceilings and visibility should be considered in determining ATCT height.

c. Look-down Angle. Visibility from the ATCT cab must consider the view of controlled movement areas around the base of the ATCT. The impacts of look-down angle due to the potential of a larger cab and/or taller ATCT must be evaluated.

d. Look Across LOS. Consideration must be given to visibility from operational positions in the ATCT cab and potential impacts to LOS due to an increase in cab size and/or ATCT height. The AFTIL

should be used to assess potential line-of-site impacts due to placement of operational positions in the ATCT cab.

e. Cab Mullion/Column Orientation. Consideration must be given to LOS impacts resulting from placement and configuration of mullions/columns as a function of cab size. The AFTIL must be used to model the approximate sizes and placement of mullions and columns to minimize LOS impacts.

f. Look-up Angle. Consideration must be given to look-up angle for adverse impacts on air traffic operations. The AFTIL should be used to simulate view of missed approaches and assess potential impacts.

g. Construction. Consideration must be given to LOS from the existing ATCT during construction of the new ATCT, and to the LOS impacts of the existing ATCT when operating from the new ATCT.

h. Access. Access to the ATCT must avoid crossing areas of aircraft operations, and should avoid roads or bridges subject to closures due to high traffic volume, flash floods, snow, landslides, falling rocks or other hazards.

i. Non-Movement Areas. Visibility of all airport surface areas for ground operations of aircraft and of airport ground vehicles on ramps, aprons and tie-down areas, and test areas must be considered. Priority must be given to visibility of taxi lanes in non-movement areas.

2-7. Economic Considerations. Consideration must be given to economic factors when evaluating ATCT sites. Cost estimates must be documented for each of the preferred sites. The estimates should be based on the following items:

a. Height. The height of the ATCT at the preferred sites.

b. Land Use Planning. The ATCT plot must have sufficient area to accommodate the initial base building, parking, future expansion, and other requirements as identified in the draft Requirements Document Work Book (RDWB). Each preferred ATCT location must also be evaluated for sustainability considerations in accordance with FAA Order JO 1053.3, Air Traffic Organization Energy Efficient and Sustainable New Construction and Major Renovation. Each of the preferred ATCT locations must be subjected to an Environmental Due Diligence Audit (EDDA) review in accordance with FAA Order 1050.19 to determine impacts.

c. Utilities and Cabling. Connectivity of required cabling and utilities.

d. Site Access. Any necessary new or redesigned site access roadways.

e. Security. The impacts of complying with the latest version of the FAA Order 1600.69, Facility Security Management Program.

f. Mitigation Strategies. Risk mitigation strategies identified during the CSA and EDDA. Potential environmental mitigation requirements, as identified in the EDDA process, must be documented as part of the construction cost estimate

Chapter 3. Siting Report/ Safety Risk Management Document Requirements and Approval

3-1. General. The siting report and CSA documents are separate and have different approval requirements. The siting report documents the degree to which each siting criteria has been met. The CSA documents the risks and mitigations associated with constructing an ATCT at each of the preferred locations. The siting report, along with the CSA, constitutes a Safety Risk Management Document (SRM Document) in accordance with the ATO SMS Manual.

3-2. Siting Report Minimum Requirements. The siting report must contain those items in the Table of Contents shown in Appendix B.

3-3. Comparative Safety Assessment Requirements. The CSA must conform to the guidance outlined in Chapter 2-5.

3-4. Safety Risk Management Document Requirements and Approval. The draft SRM Document must be finalized and transmitted to the Technical Operations (AJW) Terminal Facilities National Coordinator within 90 days of completing AFTIL Trip #2. The final SRM Document must be formatted within the FAA's branding requirements. Refer to

https://employees.faa.gov/tools_resources/branding_writing/.

- a. Siting Report Approval. Draft siting report must be routed for concurrence and approval to:
 - (1) Service Area Director of Air Traffic Services
 - (2) Service Area Director of Technical Operations
 - (3) Director of ATC Facilities

b. CSA Approval. The CSA portion of the SRM Document must be approved in accordance with the current ATO SMS Manual. Documents with initial high risk must be routed to the ATO Office of Safety (AJI) and the Air Traffic Oversight Service (AOV). AJI and AOV must both approve the mitigations that reduce an initial high risk hazard. CSAs with initial medium/low risk will be routed through the appropriate Service Center Quality Control Group (QCG) for review and signature.

Signatures on the final site approval page represent acceptance of the risk(s) identified in their area of responsibility. The signatories consist of:

- (1) District Manager for Air Traffic Operations (Risk Acceptor)
- (2) Facility Manager (Risk Approver)
- (3) ATO Service Unit Safety (as required per ATO SMS manual)
- (4) ATO Service Unit/Line of Business (LOB) director/manager (as required per SMS Manual)
- (5) ATO Service Unit/LOB Vice President (as required per ATO SMS manual)

c. Approved SRM Document Distribution. Terminal Facilities Execution will be responsible for distribution of the approved report.

d. SRM Document (Validation). The siting report/ CSA will be valid unless any of the following events occur:

(1) FAA Form 7460-1 change or expiration.

(2) Any ALP changes. The ALP changes must be reviewed by Terminal Facilities Execution to determine their impact on each of the preferred site locations.

(3) Revision requirements in the latest version of the ATO SMS Manual.

Chapter 4. Airport Facilities Terminal Integration Laboratory

4-1. General. The AFTIL develops a three-dimensional (3-D) computerized terrain model of the airport and "real time" simulation of airport operations. The ATCT operations simulation tool provides an environment for the siting team to collectively evaluate proposed ATCT sites.

4-2. AFTIL Data Requirements.

a. Purpose of Data. The AFTIL develops 3-D airport models and simulations from a variety of input media. The final product is a simulation and 3-D computerized model of the airport surface containing models of all airport buildings including the present and proposed ATCT. The model allows all siting team members to visualize LOS from any position on the airport while observing simulated aircraft movements.

b. Airport Layout Plan Data. Contact the AJW Terminal Facilities National Coordinator for the latest data requirements.

c. Approved Airport Constructions Project Data. The Airport or Local Airports District Offices (ADO) provides data of known and approved airport construction projects that could potentially affect the visibility from the proposed ATCT locations. Proposed construction must show all pertinent elevation data.

d. Approved ATCT Cab Drawing Data. Technical Operations Engineering Services provides scaled ATCT cab position/equipment drawings in electronic format. This information must show the cab type and size (provided by AJW Terminal Facilities); console/turret dimension; orientation; operational position location; and equipment layout.

e. Electronic Data Format. ALP or approved airport construction project electronic data is to be provided in AutoCAD release 14 or higher and use the preferred data format: ".dwg". The submission of 3-D drawings should illustrate ground elevation contours and/or point data shown in 3-D drawing. ALPs not created with AutoCAD must provide ".dwg", ".dxf" or Microstation ".dgn" files.

4-3. AFTIL Model Validation. The airport 3-D visual model and air traffic simulation must be validated by the Airport Sponsor and local air traffic representatives prior to initiating the control tower siting process. An airport model validation statement must be signed prior to initiating tower siting activities.

Chapter 5. Siting Team Composition

5-1. Siting Team. The siting team identifies sites and recommends a location based on the requirements of this order.

a. Formation of a Siting Team. This order identifies the membership of the siting team. Line of Business Managers are responsible for identifying individual team members. The AJW Terminal Facilities National Coordinator initiates formation of the siting team through coordination with all identified team members. The AJW Terminal Facilities National Coordinator will notify the appropriate Regional Administrator representative upon formation of the siting team.

b. Siting Team Members. See Chapter 6 for detailed individual roles and responsibilities. Not every team member is required to attend either or both AFTIL visits. Team Members who are not required to travel to AFTIL participate remotely on an as-needed basis.

Team members expected to participate in AFTIL trips:

- (1) AJW Terminal Facilities National Coordinator
- (2) ATO Terminal Safety Services Safety Management System Coordinator
- (3) Quality Control Group
- (4) AJW Technical Operations, Engineering Services representative
- (5) OSG Flight Procedures Team (TERPS)
- (6) Flight Standards Services
- (7) Service Center Planning and Requirements Group
- (8) Service Center Operations Support Group representative
- (9) Airports District Office (ADO)
- (10) Local ATCT representatives
- (11) Airport Sponsor
- (12) AJW Terminal Facilities Execution Project Lead
- (13) Air Traffic Services Requirements

Team members where travel to AFTIL is not expected or required:

- (14) AJW Terminal Facilities Planning representative
- (15) Operations Engineering Support Group National Air Space Watch (NASWATCH) representative
- (16) Office of Security and Hazardous Materials Safety representative
- (17) Runway Safety Group
- (18) Corporate Real Estate

c. Airport Sponsor. If the airport sponsor attends any of the trips, a representative from the Airports LOB is required to attend. Participation by the Regional Airports District Office is preferred.

d. Regional Administrator or Deputy Regional Administrator. Retain the option to attend any siting at their discretion.

5-2. AFTIL Trip #1. Trip #1 will consist of using the AFTIL modeling and simulation capabilities for the initial siting and CSA. At a minimum, three preferred operationally viable sites must be identified.

AFTIL Siting Team Members. This siting team consists of the following:

- (1) AJW Terminal Facilities National Coordinator
- (2) ATO Terminal Safety Services Safety Management System Coordinator
- (3) Quality Control Group
- (4) AJW Technical Operations, Engineering Services representative
- (5) OSG Flight Procedures Team (TERPS)
- (6) Flight Standards Services
- (7) Service Center Planning and Requirements Group
- (8) Service Center Operations Support Group representative
- (9) Airports District Office
- (10) Local ATCT representatives
- (11) Airport Sponsor
- (12) AJW Terminal Facilities Execution Project Lead
- (13) AJW Terminal Facilities Planning representative
- (14) Operations Engineering Support Group (NASWATCH) representative
- (15) Office of Security and Hazardous Materials Safety representative
- (16) Runway Safety Group
- (17) Corporate Real Estate

5-3. AFTIL Trip #2. Trip #2 will result in identification of the recommended site, a full scale cab mockup, equipment layout and mullion/column evaluation.

This siting team consists of the following:

- (1) AJW Terminal Facilities National Coordinator
- (2) ATO Terminal Services Safety Engineering
- (3) AJW Terminal Facilities Execution Project Lead
- (4) AJW Technical Operations, Engineering Services
 - (a) Plants Engineer
 - (b) Electronics Engineer
- (5) Service Center Planning and Requirements Group
- (6) Service Center Operations Support Group representative
- (7) Local ATCT representatives
- (8) ATO Terminal Safety and Operations Support representative

- (9) Airport Sponsor (Travel may not be required) representative
- (10) Airports District Office representative
- (11) Air Traffic Services Representatives

Chapter 6. Roles and Responsibilities

6-1. General. This chapter outlines individual siting team members' roles and responsibilities.

6-2. Siting Team Member Obligation. Each siting team member has an obligation to use the latest approved Airport Layout Plan and notify the Terminal Facilities Execution Program Office and the AJW Terminal Facilities National Coordinator of any current, proposed, planned, or envisioned projects that will be constructed on or adjacent to airport property that could possibly impact the LOS from any of the preferred ATCT sites.

6-3. Risk Acceptance. The hazards identified during the siting process have associated risks that must be accepted before construction of the ATCT. Risk acceptance procedures are defined by the SMS orders and manuals from each line of business: Air Traffic Organization, Aviation Safety (AVS), and Associate Administrator for Airports.

6-4. Roles and Responsibilities.

a. AJW Terminal Facilities National Coordinator. This position is the AJW Terminal Facilities Execution AFTIL siting process representative.

(1) Plan and coordinate the overall ATCT siting process.

(2) Coordinate AFTIL trips with all team members.

(3) Obtain the latest approved Airport Layout Plan and other AFTIL data requirements, from the Airport District Office. Must coordinate with the Local Airport District Office participant in time to ensure that the ALP received at the AFTIL facility is the most current and unconditionally approved copy. Ensure recommended ATCT location is adequately depicted on the conditional ALP.

(4) Lead all participants through the process defined in this order.

(5) Conduct the Airport Traffic Control Visibility Tool (ATCTVAT) analysis for the recommended site locations.

(6) Upload draft and final siting reports to KSN under Design Engineering and Integration (DEI), DEI/Siting.

(7) Facilitate siting activities at AFTIL.

b. Airport Facilities Terminal Integration Laboratory.

(1) Develop the three-dimensional airport terrain model and real time simulation of air traffic operations.

(2) Maintain and operate the AFTIL.

(3) Schedule all AFTIL trips.

(4) Provide ATCT modeling and simulation support.

(5) Develop and construct the full-scale mock-ups of the ATCT cab.

c. AFTIL Safety Management System Facilitator.

- (1) Lead siting teams through the CSA process.
- (2) Prepare CSA reports for all ATCT sitings.

(3) Collect and track all hazard information.

d. Quality Control Group (QCG).

- (1) Participate in SMS activities and act as co-facilitator at the AFTIL.
- (2) Review the SRM Document and coordinate required signatures on the CSA portion.

(3) Ensure hazards have been identified and associated mitigation strategies are tracked to completion.

e. AJW Technical Operations, Engineering Services.

- (1) Coordinate with all LOBs.
- (2) Prepare potential site plans for each of the preferred sites to help identify potential construction cost drivers including utility and access road routing and base building configuration (multi-story).
- (3) Prepare and submit Form 7460s for each of the preferred sites.
- (4) Coordinate Environmental Due Diligence Audit efforts.
- (5) Coordinate physical security requirements and potential mitigations with facility SSE.
- (6) Prepare comparative cost estimates for the preferred sites.
- (7) Develop scaled ATCT cab equipment layout drawings.
- (8) Author and distribute the siting report in accordance with the procedures/policies herein.
- (9) Compile the SRM Document and coordinate required approval signatures on the siting

report.

(10) Co-lead the LOB brief and sign off.

(11) Distribute draft and final siting reports to appropriate Regional Administrator.

(12) Implement and follow SMS policies and procedures on the risks identified in the CSA as the mitigation owner. Verify at key milestones, such as the beginning of construction and commissioning, that risks have been acceptably mitigated.

(13) Prepare Airport Concurrence Form; Airport Sponsor Letter.

(14) Coordinate and notify the Regional Administrator of the tower site selection, any associated siting activities, and briefing of the final siting report.

f. OSG Flight Procedures Team (TERPS).

(1) Apply obstruction standards contained in FAA Orders (8260 series), advisory circulars and applicable Letters/ Memorandums to evaluate proposed ATCT locations to determine if these structures have an adverse impact to existing instrument approach procedures and planned procedures on an approved ALP.

(2) Implement and follow SMS policies and procedures on the risks identified in the CSA as the mitigation owner. Verify at key milestones such as beginning of construction and commissioning that risks have been acceptably mitigated.

g. Flight Standards Services.

(1) Evaluate the proposed ATCT site heights and locations based on ground and flight operations safety considerations, the analysis provided by OSG Flight Procedures Team (TERPS), and the analysis of part 77 surfaces.

(2) Provide comments of a general nature, as appropriate. Impacts and comments must be provided to the siting team in plain language.

(3) Implement and follow SMS policies and procedures on the risks identified in the CSA as the mitigation owner. Verify at key milestones such as beginning of construction and commissioning that risks have been acceptably mitigated.

h. Service Center Planning and Requirements Group (PRG). This organization is responsible for coordinating and resolving all equipment requirements issues.

(1) Responsibilities of the Requirements Team include:

- (a) Coordinate with all LOBs.
- (b) Co-lead the LOB brief and sign off.

(c) Implement and follow SMS policies and procedures on the risks identified in the CSA as the mitigation owner. Verify key milestones such as beginning of construction and commissioning risks have been acceptably mitigated.

(2) Responsibilities of the Planning Team (Project Implementation Manager) include:

(a) Help the AJW Terminal Facilities National Coordinator identify the participants from their service area who will be assigned to the siting team in support of the project.

(b) Track and coordinate the NEPA and lease agreements associated with the project, upon completion of the siting process.

(c) Implement and follow SMS policies and procedures on the risks identified in the CSA as the mitigation owner. Verify at key milestones such as beginning of construction and commissioning that risks have been acceptably mitigated.

(d) Co-lead the LOB brief and sign off.

i. Service Center Operations Support Group. This organization is responsible for coordinating and resolving all air traffic procedural, airspace and operational issues.

(1) Evaluate operations from the recommended tower locations.

(2) Co-lead the LOB brief and sign off.

(3) Implement and follow SMS policies and procedures on the risks identified in the CSA as the mitigation owner. Verify at key milestones such as beginning of construction and commissioning that risks have been acceptably mitigated.

j. Airports Districts Office. This organization is responsible for ensuring tower siting and airport development plans are not in conflict.

(1) Ensure the most current and unconditionally approved ALP, including all pen and ink actions, is provided to the AFTIL facility for 1 and 2 siting activities.

(2) Provide:

(a) Knowledge of airport operations and development (Airport Layout Plans).

(b) Known environmental issues.

(c) Knowledge of local issues/concerns at airport that can impact ATCT siting team activities.

(d) Knowledge of FAA planning and design policy/procedures that can impact existing and/or proposed airport development and surrounding airport environments.

(e) Airport safety and design standards under varying development scenarios for proposed ATCT locations.

(f) Determine if the existing tower is an impending AIP project and assess the eligibility of the proposed towers for AIP funding.

(3) Evaluate proposed tower sites for compliance with Airport Design surfaces per Advisory Circular 150/5300-13.

(4) Coordinate with the Airport Sponsor modifications to the ALP indicating the proposed tower sites.

(5) Protect each of the preferred tower sites, including line of sight from future development. Forward submitted Form 7460s on potential projects that may impact operational line of site from the proposed tower locations to Engineering Services for evaluation.

(6) Coordinate with Technical Operations Engineering Services during completion of the NEPA process to ensure ARP federal actions are adequately characterized and that the action meets ARP requirements.

(7) Implement and follow SMS policies and procedures on the risks identified in the CSA as the mitigation owner. Verify at key milestones such as beginning of construction and commissioning risks have been acceptably mitigated.

k. Local ATCT.

(1) Verify and validate airport simulation and visual model.

(2) Identify and evaluate proposed ATCT sites utilizing operational expertise and local area knowledge.

- (3) Narrate siting DVD.
- (4) Lead cab mockup evaluation.
- (5) Narrate mockup DVD.

l. Airport Sponsor. This organization is responsible for the management and development of the airport.

(1) Coordinate with all lease holders and users regarding the availability of proposed tower locations to ensure the tower siting plans do not conflict with airport development plans.

(2) Provide:

- (a) Knowledge of airport operations and development (Airport Layout Plans).
- (b) Known environmental issues.

(c) Knowledge of local issues/concerns at airport that can impact ATCT siting team activities.

(3) Ensure the Airport Layout Plan is modified to indicate the proposed tower site.

(4) Protect recommended tower locations including line of sight from future development.

(5) Coordinate future airspace cases with siting team that may impact selected tower locations.

m. AJW Terminal Facilities Execution Project Lead.

(1) Oversee the project from a program perspective and brief headquarters management on issues related to viable sites; for example, construction, cost, schedule, risk, etc.

(2) Coordinate management decisions relating to viable sites.

(3) Track the mitigation of siting hazards through project implementation.

n. AJW Terminal Facilities Planning. This organization is responsible for identifying and prioritizing towers to be included in the ATCT Replacement Program.

(1) Create and maintain a prioritized list of terminal facilities requiring the use of the AFTIL.

(2) Coordinate the specific schedule of AFTIL trips with the AFTIL Manager and the AJW Terminal Facilities National Coordinator.

(3) Provide validated cab position and equipment list.

o. AJV Air Traffic Services Requirements. Validate changes to the project equipment requirements utilized at AFTIL Trip #2.

p. Operations Engineering Support Group. This organization is responsible for all Technical Services coordination and resolution.

(1) Lead the NASWATCH program efforts and initiating Operational Support Service modeling if necessary.

(2) Coordinate within the LOB.

(3) Coordinate with Technical Operations Engineering Services representatives.

(4) Support AFTIL related activities.

(5) Reviews appropriate case files in OE/AAA and suggests mitigations as applicable.

q. Office of Security and Hazardous Materials Safety.

(1) Evaluate the preferred sites against the latest version of FAA Order 1600.69, FAA Facility Security Management Program. Provide risks and associated liabilities for the preferred sites.

(2) Provide input to Technical Operations Engineering Services on the security, and potential mitigations, of the preferred sites.

r. Runway Safety Group.

(1) Evaluate the preferred ATCT sites for issues impacting runway safety. This evaluation must include visibility of critical runway crossings, changes to the flow of airfield traffic, taxiway use changes, and any other pertinent factors.

(2) Participate in the final siting report briefing to the Regional Administrator.

s. AJW Terminal Facilities Execution. This is a headquarters organizational element which ensures strict compliance with the ATCT siting process. Determines that the intent of this order has been satisfied.

(1) Plans and coordinates the overall ATCT siting process.

- (2) Outline the funding profile for AFTIL activities.
- (3) Coordinate all AFTIL trips.
- (4) Determine and approve siting team members' travel to AFTIL.
- (5) Lead all participants through the process defined in this order.
- (6) Upload draft and final siting reports to KSN under DEI/Siting.
- (7) Facilitate siting activities at AFTIL.
- (8) Facilitate the Alternate Siting Process.

(9) Provide AFTIL funds to cover purchases and labor, model development and other expenses relating to siting efforts.

t. Air Traffic Safety Oversight Service. This organization is responsible for monitoring compliance with safety standards and SMS. All controls used to mitigate high initial risk hazards must be approved by AOV.

u. ATO Office of Safety. This organization is responsible for reviewing and approving SRM Documents which have identified high initial safety risk.

v. ATO Terminal Services Safety Engineering.

- (1) Participate in SMS activities at the AFTIL.
- (2) Provide signature on the CSA.
- (3) Ensure hazards have been identified and associated mitigation strategies are developed.
- (4) Review Alternate Siting Process candidate SMS/SRM documentation.
- (5) Review all SRM documentation.

(6) Coordinate initial high risk SRM documentation to AJI and AOV for appropriate approvals.

(7) Coordinate initial medium/low risk SRM documentation through the appropriate Service Center Quality Control Group for review and signature.

w. Corporate Real Estate. This organization is responsible for addressing real estate related issues at each of the proposed sites and ensuring real estate and related infrastructure are accomplished in the most cost-effective manner.

(1) Lead land use negotiations with the Airport Sponsor.

(2) Ensure estimated lease costs and other real estate expenses are included on each of the preferred site cost estimates.

(3) Ensure consideration is given to economic real estate factors when comparatively evaluating the recommended tower locations.

Chapter 7. Siting Process

7-1. General. The optimum height and location requires balancing many requirements and considerations, based on the latest FAA approved Airport Layout Plan. The AFTIL is the FAA's simulation facility that provides an environment for the siting team to collectively evaluate operationally viable sites, select a minimum of three preferred sites, and identify one recommended site. The tower siting evaluation must include potential locations in diverse areas of the airport. The goal of this process is to provide the least expensive ATCT that best meets siting criteria.

7-2. Project Authorization.

a. Service Center Planning and Requirements Group. Responsible for requesting funding from AJW Terminal Facilities Execution to cover advanced engineering activities and the environmental due diligence audit process. AJW Terminal Faculties execution will directly provide AFTIL funds to cover purchases and labor, model development and other expenses relating to siting efforts.

b. AJW Terminal Facilities Planning. Responsible for creating and maintaining a prioritized list of terminal facilities requiring the use of the AFTIL and providing that list to the AJW Terminal Facilities National Coordinator and AFTIL manager. Coordinates AFTIL trip schedule development with the AFTIL manager and National Coordinator. The AFTIL manager and the National Coordinator will notify Terminal Facilities Planning of any schedule changes. From this point forward the siting process is under the management and operation of AJW Terminal Facilities Execution. The National Coordinator assembles the list of participants and conducts all coordination for AFTIL trip.

c. Participants.

- (1) AJW Terminal Facilities Execution (Lead)
- (2) AJW Terminal Facilities Planning (Lead)
- (3) Service Center Planning and Requirements Group
- (4) AJW Technical Operations, Engineering Services
- (5) AFTIL
- (6) AJW Terminal Facilities National Coordinator
- (7) AJW Terminal Facilities Execution Project Lead

7-3. Project Kick-Off.

a. Purpose. Introduce the siting process to local facility representatives and the airport sponsor to plan and coordinate future siting activities. Distribute a current copy of this order to all participants.

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Terminal Service Center (Operational Support)
- (5) AJW Terminal Facilities Execution Project Lead
- (6) Local Airports District Office

- (7) Local ATCT representatives
- (8) Local Technical Operations
- (9) Airport Sponsor
- (10) Corporate Real Estate

7-4. Data Collection.

a. Purpose. Provide electronic files of the approved ALP data to AFTIL in compliance with the data requirements in Chapter 4, Section 4-2. Date and revision of the ALP must be noted in the executive summary of the siting report. FCT/ OTAs sponsors must provide tower cab plan and profile drawings, equipment list, controller positions, ALP, etc. All modeling and simulation data must be available six months prior to the scheduled visit.

b. Participants.

- (1) AJW Technical Operations, Engineering Services
- (2) AJW Terminal Facilities National Coordinator
- (3) Airport Sponsor
- (4) AFTIL
- (5) Local Airports District Office

7-5. First Pre-AFTIL Telcon.

a. Purpose. Outline roles and responsibilities of the siting team and establish a schedule for the entire siting process. In addition, requirements for all data to be collected and provided to the AFTIL must be outlined and articulated. This telcon must take place no later than four months before AFTIL Trip #1.

- (1) AJW Terminal Facilities National Coordinator
- (2) ATO Terminal Safety Services Safety Management System Coordinator
- (3) Quality Control Group
- (4) AJW Terminal Facilities Execution Project Lead
- (5) AJW Technical Operations, Engineering Services representative
- (6) OSG Flight Procedures Team (TERPS)
- (7) Flight Standards Services
- (8) Service Center Planning and Requirements Group
- (9) Service Center Operations Support Group representative
- (10) Airports District Office representative
- (11) Local ATCT representative
- (12) Airport Sponsor
- (13) Operations Engineering Support Group (NASWATCH) representative

- (14) AJW Terminal Facilities Planning representative
- (15) Office of Security and Hazardous Materials Safety representative
- (16) Runway Safety Group
- (17) Corporate Real Estate
- (18) Regional Administrator or representative

7-6. AFTIL Builds Database.

a. Purpose. AFTIL software modelers build and enhance the airport database. Final modeling and simulation data must be available ten weeks prior to AFTIL Trip #1.

b. Participants.

- (1) AFTIL (Lead)
- (2) Local ATCT
- (3) Airport Sponsor

7-7. Second Pre-AFTIL Telcon.

a. Purpose. Discuss the agenda for AFTIL Trip #1 and outline travel procedures for all participants. This telcon must take place four weeks prior to AFTIL Trip #1.

- (1) AJW Terminal Facilities National Coordinator
- (2) ATO Terminal Safety Services Safety Management System Coordinator
- (3) Quality Control Group
- (4) AJW Terminal Facilities Execution Project Lead
- (5) AJW Technical Operations, Engineering Services representative
- (6) OSG Flight Procedures Team (TERPS)
- (7) Flight Standards Services
- (8) Service Center Planning and Requirements Group
- (9) Service Center Operations Support Group representative
- (10) Airports District Office representative
- (11) Local ATCT representative
- (12) Airport Sponsor
- (13) Operations Engineering Support Group (NASWATCH) representative
- (14) AJW Terminal Facilities Planning representative
- (15) Office of Security and Hazardous Materials Safety representative
- (16) Runway Safety Group
- (17) Corporate Real Estate

7-8. AFTIL Trip #1.

a. Begin Siting Process. The siting team assembles at the AFTIL to begin the process. The National Coordinator will brief the participants on their roles, responsibilities, and siting goals. Participants in this activity are:

- (1) AJW Terminal Facilities National Coordinator *
- (2) ATO Terminal Safety Services Safety Management System Coordinator *
- (3) Quality Control Group *
- (4) AJW Technical Operations, Engineering Services representative *
- (5) OSG Flight Procedures Team (TERPS)
- (6) Flight Standards Services
- (7) Service Center Planning and Requirements Group *
- (8) Service Center Operations Support Group representative *
- (9) Airports District Office *
- (10) Local ATCT representatives *
- (11) Airport Sponsor *
- (12) AJW Terminal Facilities Execution Project Lead *
- (13) Corporate Real Estate

* Note: Participants marked with an asterisk above must participate in AFTIL simulator activities.

b. Visual Check. Check visual accuracy of the model from the existing ATCT and modify as necessary. Participants in this activity are:

- (1) Local ATCT
- (2) Airport Sponsor
- (3) AFTIL Staff
- (4) Local ADO or Airport Organization representative

c. Discuss Approved ALP. Discuss impacts of siting on future land usage, development, demolition of buildings, wetlands, contaminated soils, etc. Participants in this activity are:

- (1) Local ADO or Airport Organization representative (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Airport Sponsor
- (5) Corporate Real Estate

d. Identify and View Initial Sites. The group must identify and evaluate initial sites based on part 77, TERPS surfaces, and airport design standards using the AFTIL simulation capabilities. All quadrants of the airport should be explored for initial sites. Participants in this activity are:

(1) AJW Terminal Facilities National Coordinator (Lead)

- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Service Center Operations Support Group
- (5) Quality Control Group
- (6) AJW Terminal Facilities Execution Project Lead
- (7) Local ADO or Airport Organization
- (8) Local ATCT
- (9) Airport Sponsor

e. Visibility Performance Analysis Using Human Factors Tool. AJW Terminal Facilities National Coordinator must perform visibility analysis as outlined in Appendix E using the Airport Traffic Control Tower Visibility Analysis Tool (ATCTVAT- http://www.hf.faa.gov/visibility) and report the results to the team.

f. NASWATCH. The NASWATCH program will be run for each proposed site following AFTIL Trip #1. Initiate modeling by Technical Services if necessary. Participants in this activity are:

- (1) Operations Engineering Support Group (NASWATCH) (Lead) remotely
- (2) AJW Terminal Facilities National Coordinator

g. Run TERPS Calculations. This identifies the maximum allowable height of the ATCT structure including all equipment and devices. Participants in this activity are:

- (1) OSG Flight Procedures Team (TERPS) representative (Lead) remotely
- (2) AJW Terminal Facilities National Coordinator
- (3) AJW Technical Operations, Engineering Services
- (4) Operations Engineering Support Group (NASWATCH) remotely
- (5) Service Center Planning and Requirements Group
- (6) Service Center Operations Support Group
- (7) Flight Standards Services

h. Eliminate Sites. Based on the NASWATCH analysis, ATCTVAT, or insufficient LOS, proposed sites are eliminated. Additional sites will be selected if required. Participants in this activity are:

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Service Center Operations Support Group
- (5) ATO Terminal Safety Services Safety Management System Coordinator
- (6) Quality Control Group
- (7) Local ADO or Airport Organization
- (8) Local ATCT

- (9) Airport Sponsor
- (10) AJW Terminal Facilities Execution Project Lead
- (11) OSG Flight Procedures Team (TERPS)
- (12) Flight Standards Services
- (13) Corporate Real Estate

i. Determine Preferred Sites. At a minimum, three preferred sites must be identified. All items in Chapter 2, Siting Criteria, must be discussed and impacts assessed and documented. Though a particular site may be preferable in terms of safety, operations, cost, constructability, or other criteria, it must be understood that any of the three preferred sites would be acceptable as the recommended site. Siting Team Members provide inputs on the advantages and disadvantages of each of the viable sites through discussion. The Air Traffic representatives select their preferred sites based upon the teams discussion. Participants in this activity are:

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Service Center Operations Support Group
- (5) ATO Terminal Safety Services Safety Management System Coordinator
- (6) Quality Control Group
- (7) OSG Flight Procedures Team (TERPS)
- (8) Flight Standards Services
- (9) AJW Terminal Facilities Execution Project Lead
- (10) Local ADO or Airport Organization
- (11) Local ATCT
- (12) Airport Sponsor

j. Traffic Simulation/Run Special Effects. AFTIL has the ability to show aircraft type and traffic patterns of the airport; simulate fog, rain, snow, daylight, and nighttime; and show sun angles. Operational impacts must be evaluated. Participants in this activity are:

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) Service Center Planning and Requirements Group
- (3) Service Center Operations Support Group
- (4) ATO Terminal Safety Services Safety Management System Coordinator
- (5) Quality Control Group
- (6) Local ADO or Airport Organization
- (7) Local ATCT
- (8) Airport Sponsor
- (9) AJW Technical Operations, Engineering Services

k. Conduct Comparative Safety Assessment (CSA). The team must perform the CSA on each of the three preferred sites. Risks and resultant mitigations must be identified. Participants in this activity are:

(1) ATO Terminal Safety Services Safety Management System Coordinator (AFTIL CSA Coordinator) (*Lead*)

- (2) Local ATCT
- (3) Quality Control Group
- (4) AJW Terminal Facilities National Coordinator
- (5) Service Center Planning and Requirements Group
- (6) Service Center Operations Support Group
- (7) OSG Flight Procedures Team (TERPS)
- (8) Flight Standards Services
- (9) AJW Terminal Facilities Execution Project Lead
- (10) Local ADO or Airport Organization
- (11) Airport Sponsor

l. Evaluate Preferred Sites. The team must evaluate the preferred sites. All items in Chapter 2, Siting Criteria, must be discussed and impacts assessed and documented. Participants in the evaluation of sites are:

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Service Center Operations Support Group
- (5) ATO Terminal Safety Services Safety Management System Coordinator
- (6) Quality Control Group
- (7) OSG Flight Procedures Team (TERPS)
- (8) Flight Standards Services
- (9) AJW Terminal Facilities Execution Project Lead
- (10) Local ADO or Airport Organization
- (11) Local ATCT
- (12) Airport Sponsor
- (13) Corporate Real Estate

m. Document Sites. Advantages and disadvantages for each of the preferred sites will be documented on DVD. Participants in this activity are:

- (1) Local ATCT representative (Lead)
- (2) AJW Terminal Facilities National Coordinator

- (3) AJW Technical Operations, Engineering Services
- (4) Service Center Planning and Requirements Group
- (5) Service Center Operations Support Group
- (6) ATO Terminal Safety Services Safety Management System Coordinator
- (7) Quality Control Group
- (8) OSG Flight Procedures Team (TERPS)
- (9) Flight Standards Services
- (10) AJW Terminal Facilities Execution Project Lead
- (11) Local ADO or Airport Organization
- (12) Airport Sponsor
- (13) Corporate Real Estate

n. Team Concurrence and Issue Memo of Record for Preferred Sites. The team must concur on the list of preferred sites, and AJW Terminal Facilities National Coordinator issues a memo of record documenting their concurrence.

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Operations Engineering Support Group (NASWATCH)
- (4) OSG Flight Procedures Team (TERPS)
- (5) Service Center Planning and Requirements Group
- (6) Service Center Operations Support Group
- (7) Local ADO or Airport Organization
- (8) Local ATCT
- (9) Airport Sponsor
- (10) Corporate Real Estate

o. Initiate Draft Siting Report. All team members will be required to provide input and assistance in developing the report. The draft report must identify, at a minimum, three preferred sites. The siting report must contain, at a minimum, those items contained in the siting report table of contents (see Appendix B). The Technical Operations Engineering Services Project Engineer will prepare and distribute a copy of the draft siting report to all team members and the appropriate Regional Administrator at least two weeks before AFTIL Trip #2. Participants in this activity are:

- (1) AJW Technical Operations, Engineering Services (Lead)
- (2) AJW Terminal Facilities National Coordinator
- (3) ATO Terminal Services Safety Engineering
- (4) Quality Control Group (QCG)
- (5) Operations Engineering Support Group (NASWATCH)
- (6) OSG Flight Procedures Team (TERPS)

- (7) Service Center Planning and Requirements Group
- (8) Service Center Operations Support Group
- (9) Runway Safety Group
- (10) Office of Security and Hazardous Materials Safety
- (11) Flight Standards Services
- (12) AJW Terminal Facilities Execution Project Lead
- (13) Local ADO or Airport Organization
- (14) Local ATCT
- (15) Airport Sponsor
- (16) Corporate Real Estate

p. Preliminary Discussion on Cab/Console Types. AJW Terminal Facilities National Coordinator will lead a discussion on the current standard design options related to cab and console types.

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services (Lead)
- (3) ATO Terminal Safety Services Safety Management System Coordinator
- (4) Quality Control Group (QCG)
- (5) OSG Flight Procedures Team (TERPS)
- (6) Service Center Planning and Requirements Group
- (7) Service Center Operations Support Group
- (8) Runway Safety Group
- (9) Office of Security and Hazardous Materials Safety
- (10) Flight Standards Services
- (11) AJW Terminal Facilities Execution Project Lead
- (12) Local ADO or Airport Organization
- (13) Local ATCT
- (14) Airport Sponsor

q. Schedule AFTIL #2 Visit. Before the end of trip #1, the team must schedule the site recommendation and validation trip (AFTIL trip #2). It should be no more than six months from the end of the first visit to allow the siting report to be developed. Participants in this activity are:

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) ATO Terminal Safety Services Safety Management System Coordinator
- (4) Quality Control Group (QCG)
- (5) Service Center Planning and Requirements Group

- (6) Service Center Operations Support Group
- (7) Local ATCT
- (8) ATO Terminal Safety and Operations Support

r. Create AFTIL Trip #1 Minutes. Two weeks after the AFTIL Trip #1 concludes, the AJW Terminal Facilities National Coordinator will create and post the AFTIL Trip #1 Minutes to the Program Operations Terminal Facilities KSN website under Siting. The web link is: https://ksn2.faa.gov/ajt/programops/Facilities/dei/siting/default.aspx.

7-9. Service Area Coordination and Issue Resolution.

a. Purpose. All team members are tasked to resolve issues identified during the AFTIL Trip #1 visit before the AFTIL Trip #2.

b. Participants.

- (1) AJW Technical Operations, Engineering Services (Lead)
- (2) Service Center Planning and Requirements Group (Lead)
- (3) Service Center Operations Support Group
- (4) AJW Terminal Facilities National Coordinator
- (5) ATO Terminal Services Safety Engineering
- (6) Quality Control Group (QCG)
- (7) Operations Engineering Support Group (NASWATCH)
- (8) OSG Flight Procedures Team (TERPS)
- (9) Runway Safety Group
- (10) Office of Security and Hazardous Materials Safety
- (11) Flight Standards Services
- (12) AJW Terminal Facilities Execution Project Lead
- (13) Local ADO or Airport Organization
- (14) Local ATCT
- (15) Airport Sponsor
- (16) Corporate Real Estate

7-10. Phase I Environmental Due Diligence Audit (EDDA).

a. The Phase I EDDA should be started on all preferred sites within two weeks after the end of AFTIL Trip #1.

- (1) AJW Technical Operations, Engineering Services (Lead)
- (2) Service Center Planning and Requirements Group
- (3) AJW Terminal Facilities National Coordinator
- (4) Local ADO or Airport Organization

(5) Airport Sponsor

7-11. Initiate Airspace Feasibility Studies on Preferred Sites.

a. Initiate Airspace Studies on the preferred sites two to four weeks after the end of AFTIL Trip #1. Submissions to be made via the OEAAA website.

b. Participants.

- (1) AJW Technical Operations, Engineering Services (Lead)
- (2) Flight Standards Services
- (3) Operations Engineering Support Group (NASWATCH)
- (4) OSG Flight Procedures Team (TERPS)
- (5) Local ADO or Airport Organization

7-12. Provide Validated Positions and Equipment.

a. A minimum of two months before AFTIL Trip #2, AJW Terminal Facilities Planning must provide a validated list of equipment and cab controller positions for the project to the AJW Terminal Facilities Execution and AFTIL staff. This list must be used for the tower cab mockup to be created and evaluated during AFTIL Trip #2.

b. Participants.

- (1) AJW Terminal Facilities Planning representative (Lead)
- (2) AJW Terminal Facilities Execution
- (3) AJW Terminal Facilities National Coordinator
- (4) AFTIL
- (5) AJW Technical Operations, Engineering Services

7-13. AFTIL Trip #2.

a. Preparation for AFTIL Trip #2. Approved positions, validated equipment, and cab size must be available two months prior to AFTIL Trip #2 or the trip will be rescheduled. Cab size is determined by AJW Terminal Facilities Execution and validated at the completion of AFTIL Trip #2.

b. Post AFTIL Trip #2 Changes. If the recommended location's latitude/longitude or elevation changes, the Technical Operations Engineering Services Project Engineer will contact the AJW Terminal Facilities National Coordinator. The National Coordinator will review the impacts of the requested change and notify the appropriate parties if further action is necessary.

c. Review the Draft Siting Report. The siting team assembles at the AFTIL to review the draft siting report. Non-traveling team members will participate via teleconference. Participants in this activity are:

- (1) AJW Technical Operations, Engineering Services (Lead)
- (2) AJW Terminal Facilities National Coordinator (Lead)
- (3) ATO Terminal Safety Services Safety Management System Coordinator
- (4) Quality Control Group

- (5) OSG Flight Procedures Team (TERPS)
- (6) Flight Standards Services
- (7) Service Center Planning and Requirements Group
- (8) Service Center Operations Support Group representative
- (9) Airports District Office representative
- (10) Local ATCT representatives
- (11) Airport Sponsor
- (12) AJW Terminal Facilities Execution Project Lead
- (13) AJW Terminal Facilities Planning representative
- (14) Operations Engineering Support Group (NASWATCH) representative
- (15) Office of Security and Hazardous Materials Safety representative
- (16) Runway Safety Group
- (17) Corporate Real Estate

d. Perform Cab Size Mock-up and Mullion Evaluation. The proposed square footage of the tower cab will be provided by AJW Terminal Facilities Execution and must be evaluated using a full-scale mock-up with equipment layout. Mullion/column placement and stair location, using the model, must be assessed to minimize LOS impacts. Participants in this activity are:

(1) AFTIL representative (Lead)

- (2) AJW Technical Operations, Engineering Services (Lead)
- (3) Local ATCT representative (Lead)
- (4) Service Center Planning and Requirements Group
- (5) Service Center Operations Support Group
- (6) AJW Terminal Facilities National Coordinator
- (7) ATO Terminal Safety and Operations Support

e. Perform Follow-on CSA on All Preferred Sites. The team must perform a follow-on CSA on interior and exterior physical barriers. Participants in this activity are:

(1) ATO Terminal Safety Services Safety Management System Coordinator (AFTIL CSA Coordinator) (*Lead*)

- (2) Local ATCT (Lead)
- (3) AJW Terminal Facilities National Coordinator
- (4) ATO Service Center Quality Assurance
- (5) AJW Technical Operations, Engineering Services
- (6 Service Center Planning and Requirements Group
- (7) Service Center Operations Support Group
- (8) ATO Terminal Safety and Operations Support

f. Identify Recommended Site. Siting Team Members provide inputs on the advantages and disadvantages of each of the preferred sites through discussion. The Air Traffic representatives select their recommended site based upon this discussion. The siting team members provide additional analysis and feedback as necessary. If the air traffic representative's final recommended site is not the least expensive site; the Air Traffic Manager must submit written justification. The justification must detail the rationale for the selection and the cost differences involved. This written justification must be signed by the District Manager and submitted no later than 60 days from the end of AFTIL Trip#2 to the AJW Terminal Facilities Execution Manager for approval. Participants in this activity are:

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services (Lead)
- (3) ATO Terminal Safety Services Safety Management System Coordinator
- (4) Quality Control Group (QCG)
- (5) Service Center Planning and Requirements Group
- (6) Service Center Operations Support Group
- (7) Local ATCT
- (8) ATO Terminal Safety and Operations Support

g. Revise SRM Document. The siting report must be revised to incorporate identified changes. Participants in this activity are:

(1) AJW Technical Operations, Engineering Services (Lead)

(2) ATO Terminal Safety Services Safety Management System Coordinator (AFTIL CSA Coordinator) (*Lead*)

- (3) Quality Control Group (QCG)
- (4) AJW Terminal Facilities National Coordinator
- (5) Technical Operations Engineering Services (Operations)
- (6) OSG Flight Procedures Team (TERPS)
- (7) Service Center Planning and Requirements Group
- (8) Service Center Operations Support Group
- (9) Runway Safety Group
- (10) Office of Security and Hazardous Materials Safety
- (11) Flight Standards Services
- (12) AJW Terminal Facilities Execution Project Lead
- (13) Local ADO representative or Airport Organization
- (14) Local ATCT
- (15) Airport Sponsor
- (16) Corporate Real Estate

h. Simulate Operations. Local ATCT will be given the opportunity to simulate operations. Participants in this activity are:

- (1) Local ATCT (Lead)
- (2) AFTIL
- (3) AJW Terminal Facilities National Coordinator
- (4) AJW Technical Operations, Engineering Services
- (4) Service Center Planning and Requirements Group
- (5) Service Center Operations Support Group

i. Document Recommended Site. The advantages and disadvantages of the recommended site will be documented on DVD, narrated by Local ATCT. Participants in this activity are:

- (1) AFTIL (Lead)
- (2) AJW Terminal Facilities National Coordinator
- (3) AJW Technical Operations, Engineering Services
- (4) Service Center Planning and Requirements Group
- (5) Service Center Operations Support Group
- (6) Local ATCT

j. Initiate Airspace Study. Airspace study (Form 7460-1) must be initiated on the recommended site should conditions noted in 3-4.d. be triggered.

- (1) AJW Technical Operations, Engineering Services (Lead)
- (2) Flight Standards Services
- (3) Technical Operations Engineering Services (Operations)
- (4) OSG Flight Procedures Team (TERPS)
- (5) Local ADO or Airport Organization

k. Issue Memo of Record for Recommended Site. The siting team must issue a memo of record for the recommended site, which must be incorporated into the final siting report. The AJW Terminal Facilities National Coordinator will draft a memo and the team will provide signatures upon completion of the activity. Participants in this activity are:

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Service Center Operations Support Group
- (5) Local ATCT

7-14. Start NEPA on Recommended Site. Upon the approval of the Requirements Document, the National Environmental Policy Act process must be started on the recommended site. Participants in this activity are:

- (1) AJW Technical Operations, Engineering Services (Lead)
- (2) Local ADO representative or Airport Organization
- (3) Airport Sponsor

(4) AJV Mission Support

7-15. Approved Airspace Study. AJW Technical Operations, Engineering Services ensures the approved Form 7460-1, Airspace Analysis, is received on the recommended site and included in the final siting report.

7-16. Service Area SRM Document Briefing and Approval. The Terminal Service Center will brief the siting report to the Service Area Director of Air Traffic Operations, for their concurrence and signature. At the end of the briefing, signatures on the ATCT Final Site Recommendation and Approval page represent concurrence with the siting report. The signatures on the Final Preferred Site Comparative Safety Assessment Approval represent acceptance of the risk(s) identified in their area of responsibility.

7-17. Submit Final Report.

a. AJW Technical Operations, Engineering Services will submit the final siting to AJW Terminal Facilities Execution within five months of completing AFTIL Trip #2.

b. Headquarters Briefing and Approval. AJW Terminal Facilities Execution will brief the siting report to the Director of ATC Facilities and the Director of Operations, Headquarters as identified on the signature pages in Appendix B, Sample Siting Report, for their concurrence and signature. At the end of the briefing, signatures on the ATCT Final Site Recommendation and Approval page represent concurrence with the siting report. The signatures on the Final Recommended Site page represent acceptance of the risk(s) identified in their area of responsibility. Participants in this activity are:

- (1) AJW Terminal Facilities Execution
- (2) AJW Terminal Facilities Execution Project Lead
- (3) ATO Terminal Services Safety Engineering

7-18. SRM Document Approval. The siting report and the CSA together constitute a SRM Document per the ATO SMS Manual. The CSA is transmitted from ATO Terminal Safety Services Safety Management System Coordinator to AJW Terminal Facilities Execution for approval by the designated safety manager within each operations service unit of the ATO. Additionally, Flight Standards and Associate Administrator for Airports safety managers are responsible for the approval of the SRM Document for issues impacting their LOBs. A SRM Document with a high initial safety risk must be coordinated with ATO Terminal Safety Services and then sent for approval to the appropriate ATO service units' safety directorate(s). Approving the SRM Document means the approving party agrees that the analysis accurately reflects the safety risk associated with change, the underlying assumptions are correct, the findings are complete and accurate, and the planned remediation is acceptable. Risk acceptance is the certification of the appropriate management official that he/she understands the safety risk associated with the change, the mitigations are feasible and will be implemented, and he/she accepts that safety risk into the NAS.

7-19. Preliminary Hazard Assessment (PHA).

a. PHAs must be conducted before the design phase, construction phase, and facility commissioning. This is necessary due to the potential delays between ATCT siting and facility commissioning. PHAs are conducted to verify that the site has not been compromised and hazard mitigation strategies are in place.

b. Participants.

(1) ATO Terminal Safety Services Safety Management System Coordinator (AFTIL CSA Coordinator) (Lead)

- (2) Quality Control Group
- (3) AJW Terminal Facilities National Coordinator
- (4) AJW Technical Operations, Engineering Services
- (5) Service Center Planning and Requirements Group
- (6) Service Center Operations Support Group
- (7) Local ATCT
- (8) Airport Sponsor
- (9) Local ADO or Airport Organization
- (10) ATO Terminal Safety and Operations Support

7-20. Issue Final SRM Document.

a. Upon Headquarter's approval of the SRM Document, the signature pages will be added to the final siting report, converted to electronic format, and posted on KSN. The original signed SRM Document will be mailed to AJW Technical Operations, Engineering Services for placement in the project file.

b. Participants.

- (1) AJW Terminal Facilities National Coordinator (Lead)
- (2) AJW Technical Operations, Engineering Services
- (3) Service Center Planning and Requirements Group
- (4) Service Center Operations Support Group

7-21. Tracking and Monitoring.

a. Throughout the construction and completion phases, the project must be tracked and monitored by AJW Terminal Facilities Execution Project Lead to ensure all safety risks identified in the siting process have been mitigated as outlined in the CSA.

- (1) AJW Terminal Facilities Execution Project Lead
- (2) AJW Technical Operations, Engineering Services
- (3) Local ATCT
- (4) Service Center Planning and Requirements Group

Chapter 8. Alternate Siting Process

8-1. General. This process applies only to Federal Contract Towers and non-federal towers. The sponsor must apply by contacting the AJW Terminal Facilities Execution prior to beginning the Alternate Siting Process. Potential candidates must provide the required documentation to AJW Terminal Facilities Execution demonstrating adherence to the criteria outlined in paragraph 8-8. Upon receiving the documentation, AJW Terminal Facilities Execution will review the submission for compliance and submit an official decision memorandum back to candidates.

If compliance to any of the criteria in paragraph 8-8 is not validated or if a high hazard is identified during the Comparative Safety Assessment (CSA), the candidate must use the standard process and meet all of the requirements in FAA Order 6480.4B. Exceptions can be granted only through written authorization from AJW Terminal Facilities Execution. Airport Sponsors may utilize contracted services to complete the Alternate Siting Process. The Airport Sponsor coordinates with all lease holders and users regarding the availability of proposed tower locations to ensure that the tower siting plans do not conflict with airport development plans.

During any stage of the process please feel free to contact AJW Terminal Facilities Execution for assistance.

8-2. Alternate Siting Process Requirements. Alternate Siting Process candidates must provide a SRM Document following the guidelines in the most recent version of the ATO SMS Manual. The SRM Document consists of the siting report and a PHA or CSA.

8-3. FAA Involvement and Oversight. Throughout the Alternate Siting Process, AJW Terminal Facilities Execution conducts reviews of the draft SRM Document to ensure compliance with all siting and safety criteria outlined in the sections below.

Draft SRM Document review milestones with AJW Terminal Facilities Execution as follows:

a. Alternate Siting Process Pre-Planning/Kickoff Meeting – This meeting clarifies the siting process, outlines requirements, identifies roles and responsibilities, and develops a schedule. This meeting is conducted before the Safety Risk Management Panel (SRMP) meeting.

b. FAA initial PHA/CSA Review (after completing the SRMP meeting).

c. FAA initial draft siting report review.

d. Final SRM Document Review with FAA. Final review process and approvers are the same as the full siting process (see paragraph 3-4).

8-4. Siting Report. The siting report documents the degree to which each siting criteria has been met. It addresses the safety of air traffic operations from the proposed site(s).

8-5. Siting Report Requirements.

a. The siting report must follow FAA Order 6480.4B, Chapter 2, Siting Criteria.

b. The proposed ATCT location(s) must be depicted on a copy of the latest approved ALP or equivalent site development plan for new airports or equivalent for non-obligated airports.

c. The report must contain all documentation required in the Alternate Process Criteria – see paragraph 8-8.

d. The report must be compiled as shown in Appendix B, Sample Siting Report/Safety Risk Management (SRM) Document. Non-relevant sections or sub-sections may be deleted.

e. The report must contain an Executive Summary as shown in Appendix B, Sample B-2, Executive Summary.

f. The report must contain a site attribute chart as shown in Appendix B, Sample B-4, Site Comparison Chart. The risk mitigation cost/construction cost and airport arrival rate/capacity impact information is not required.

g. The report must contain a recommended site concurrence document. The completed siting report must be coordinated with the AJW Terminal Facilities Execution to aid in the development of the required document signatories. Appendix B, Sample B-5, Final Site Recommendation and Approval, can be used as a guide.

8-6. PHA/CSA. The ATO SMS requires that safety assessments be done on changes to the NAS that have significant safety impact. The PHA/CSA are done during the siting process on potential sites to comply with the SRM process outlined in the ATO SMS manual. The PHA is an analysis of the hazards that can impact aviation safety by executing the project at the recommended evaluated location and height. A CSA is a comparison of the relative risks among multiple preferred sites.

8-7. PHA/CSA Requirements

a. The PHA or CSA must follow guidance in paragraph 2-5.

b. The PHA or CSA must be completed following the most recent version of the ATO SMS Manual.

c. Each PHA or CSA must address all items listed in Appendix C, Table C-3 Preliminary Hazard List.

d. Potential location must have a completed hazard matrix as shown in Appendix C, Figure C-1, ATCT Siting Hazards.

e. A final site approval signature document must be prepared, identifying each hazard, risk level, and responsible lines of business. A sample document is found in Appendix B, Sample B-5, Final Recommended Site Comparative Safety Assessment. AJW Terminal Facilities Execution will help determine the appropriate lines of business for each identified hazard.

8-8. Alternate Process Criteria. Each of the following criteria must be addressed in order to qualify for the Alternate Siting Process.

a. Criteria 1 – Visual Performance.

(1) *Intent* – Demonstrate there is an unobstructed view from any proposed ATCT site, at controller eye level, of all controlled movement areas on the airport, including all runways, taxiways, and other landing areas, and of air traffic in the vicinity of the airport. Use the ATCTVAT to do both an object discrimination analysis and LOS angle of incidence analysis. This tool can be found at www.hf.faa.gov/visibility.

(2) Acceptance Criteria – Provide a shadow study indicating shadows obscure no portion of any movement area. Provide a printout of the data derived from ATCTVAT verifying the preferred sites meet criteria established in Chapter 2, Siting Criteria.

b. Criteria 2 – TERPS.

(1) *Intent* – Document any TERPS impacts caused by proposed ATCT site. Ensure no adverse impacts to any current or planned terminal instrument procedures.

(2) Acceptance Criteria – Final Form 7460-1 documenting no impacts to approaches with vertical guidance. Final 7460-1 documenting non-precision approaches are impacted must be acknowledged by a memo from the sponsor acknowledging impacts.

c. Criteria 3 – part 77.

(1) *Intent* – Document part 77, Objects Affecting Navigable Airspace and other design surfaces (e.g. AC 150/5300-13 surfaces) are reviewed and complied with.

(2) *Acceptance Criteria* – Final Form 7460-1 evaluated as a Non Rule Making Action (NRA) following FAA Order JO 7400.2, Procedures for Handling Airspace Matters, documenting that part 77 and Airport Design Surfaces are not impacted or, if impacted, can be properly mitigated or approved as a modification to standards (for Airport Design Standards).

d. Criteria 4 – Sunlight/Daylight.

(1) *Intent* – Document that sun glare off natural and manmade surfaces, thermal distortion, etc. does not impact the operation of the ATCT.

(2) Acceptance Criteria – Panoramic photographs from controller eye height of proposed ATCT sites showing no potential impacts. Provide statement demonstrating criteria consideration and outlining rationale used to determine sunlight/daylight does not impact operations from proposed tower location(s).

e. Criteria 5 – Artificial Lighting.

(1) *Intent* – Identify impacts to night-time ground and airborne operations caused by airport lighting/background clutter, municipal lighting, and industrial lighting.

(2) Acceptance Criteria – Panoramic Photographs that demonstrates the airport lighting/background clutter, municipal lighting, and industrial lighting does not impact ground and airborne operations as viewed from the ATCT. If a potential impact is noted, provide documentation addressing mitigation.

f. Criteria 6 – Atmospheric Conditions.

(1) *Intent* – Identify any naturally occurring atmospheric conditions that create site limitations from any proposed ATCT site.

(2) Acceptance Criteria – Acceptable risk level for atmospheric conditions must have a hazard rating of low based on Appendix C, Table C-1 Hazard Matrix and definitions. Evaluate available data and acknowledge potential impacts to the air traffic operation from the proposed sites.

g. Criteria 7 – Industrial Municipal Discharge.

(1) *Intent* – Identify any industrial/municipal discharges that create site limitations from any proposed ATCT site.

(2) Acceptance Criteria –Acceptable risk level for Industrial Municipal Discharge conditions must have a hazard rating of low based on Appendix C, Table C-1 Hazard Matrix and definitions. Assess local conditions and acknowledge potential impact to the air traffic operation from the proposed sites.

h. Criteria 8 – Site Access.

(1) *Intent* – Document that access to any proposed ATCT site does not cross movement and non-movement areas.

(2) *Acceptance Criteria* - Site plan depicting proposed ATCT site access does not cross movement and non-movement areas.

i. Criteria 9 – Interior Physical Barriers.

(1) *Intent* – Identify any interior physical barriers of an ATCT (mullions/equipment, etc.) that create sight limitations. (Cab Drawings)

(2) Acceptance Criteria - Cab drawings depicting console equipment and mullion layout orientation in relation to runway configuration. Mullions and cab equipment cannot impact line of sight from the proposed ATCT to critical movement areas. These include, but are not limited to, runway approach and departure ends, runway/taxiway intersections, high speed turnoffs.

j. Criteria 10 – Security.

(1) Intent- Identify any security risks to any proposed ATCT site.

(2) Acceptance Criteria- Contact local Servicing Security Element (SSE) to identify security requirements and any required mitigations for the recommended site.







Appendix A. Siting Process (continued)

Appendix B. Sample Safety Risk Management Decision (SRMD) Document

1. SRMD Document Requirements and Approval. The intent of the siting report is to document and communicate the degree to which each siting criteria has been met. The CSA documents the risks and mitigations associated with constructing an ATCT at the preferred locations. The two documents are related but separate and have different approval requirements. The siting report, along with the CSA, constitutes an SRMD Document in accordance with the ATO SMS Manual. This report must be finalized, and then transmitted to the AJW Terminal Facilities National Coordinator within 90 days of completing AFTIL Trip #2.

2. Organization. The final siting report must be organized in the following manner:

Sample B-1. Table of Contents

Section 1	Executive Summary
Section 2	Initial Sites Considered Airport Layout Site Location Map (all preferred sites)
Section 3	Preferred Sites
	Site X: Description: (Centrally located) Site Reference Data: (Lat/Long) Siting Criteria: (Refer to Chapter 2) Conclusions: (Explain why site was or was not selected as recommended site) Estimated Construction Cost NASWATCH Summary
	Site Y: Description Site Reference Data Siting Criteria Conclusions Estimated Construction Cost NASWATCH Summary
	Site Z: Description Site Reference Data Siting Criteria Conclusions Estimated Construction Cost NASWATCH Summary
Section 4	Site Comparison Chart
Section 5	Final Site Recommendation and Approval

Sample B-1. Table of Contents (Continued)

Final Recommended Site Comparative Safety Assessment Approval

Appendices:

- Appendix A List of Contacts and Sign-in Sheets
- Appendix B Panoramic Photographs by AFTIL Views from Site X
- Appendix C Terminal Instrument Procedures (TERPS) Calculations
- Appendix D NASWATCH Report Navigation Aids
- Appendix E Comparative Safety Assessment (CSA)
- Appendix F Preliminary Hazard Assessment (PHA)
- Appendix G Form 7460-1, Notice of Proposed Construction of Alteration
- Appendix H Results from AFTIL Trip #2
- Appendix I Airport Traffic Control Tower Visibility Analysis Tool Print Outs
- Appendix J Environmental Information
- Appendix K Airport Concurrence Form
- Appendix L Construction Cost Estimates

Appendix M Drawings

Latest Approved Airport Layout Plan (or EALP, note date and revision) Latest Draft ALP (or EALP) Update (Note date and revision) Airport Layout Missed Approach Airport Airspace Drawing Airport Cable Drawing Soils Map Airport Sponsor Letter (if required)

3. Executive Summary. There are two components to the executive summary. The following guidelines should be used when writing this part of the siting report:

a. The Recommended Site. Site location narrative, cab size, the selection of columns (3 or 4) or mullions, cab eye height, cab console type and the latest approved ALP (include date and revision) used in the analysis. Include narrative that indicates whether the recommended site is the least expensive of the preferred sites. If the recommended site is not the least expensive site, indicate that justification and approval were obtained according to Section 7-13f. If the recommended tower height exceeds the human factors line of sight angle of incidence analysis, justification must be provided.

b. Impacts. List impacts to any approach and departure procedures and annotate in plain language. Identify impacts to airport operations in plain language including but not limited to: TERPS, line of sight, part 77, future airport development, and local weather phenomena with the potential to impair visibility.

Sample B-2. Executive Summary

The Recommended Site

Site #3 is the recommended location. The proposed tower cab size is 440sf, with three columns, a cab eye height of 136 feet Above Ground Level (AGL), and will utilize the slat wall type consoles. Site #3 is an acceptable site in safety risk management assessments. This site is the least expensive ATCT that meets all siting criteria and has followed the safety management system. The proposed tower provides unobstructed views of all controlled airport surface areas and maximum visibility of all airborne traffic.

Impacts

The impacts from the proposed construction of this ATCT at Site #3 are as follows:

- VHF omni-directional range (VOR). However, this impact can be completely mitigated with a proposed Doppler VOR.
- Raising circling Minimum Descent Altitude (MDA) from 1,320 feet to 1,340 feet
- Raising the MDA of VOR Runway 35 from 1,280 to 1,300 feet. The AZO airport sponsor and airport users have agreed to the increased MDAs. This impact is completely mitigated when the instrument approach procedures are revised.

There are no other known impacts in terms of TERPS, line of sight, part 77, future airport development, and local weather phenomena with the potential to impair visibility.

W J Hughes Technical W J Hughes Technical
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CSP Preferr	ed Site C	'omnarie	on Cha	rt				te. 03_2	5.2011			Γ
Item Description		Site 8			Site 9			Site 12			Site 13	
Preferred Site		UNKN			UNKN			UNKN			UNKN	
Eye-Level (AGL)		125			66			120			125	
HF Tool Minimum Eye-Level (AGL)		125			66			119			120	
Eye-Level (AMSL)		1066			1065			1045			1065	
Latitude	34-5	4-04.0716	Z	34-{	54-04.073	SN SN	34-{	53-50.1475	N	34-{	53-59.865	3N
Longitude	82-1	2-30.1981	N	82-1	2-32.461	Mt	82-1	2-39.9815	M	82-1	2-32.6028	M
Top of Tower (AGL)		150			124			145			150	
Top of Tower (AMSL)		1091			1090			1070			1090	
Maximum Distance (to farthest point on all		8943			8873			7418			8551	
runways and taxi ways)												
2-Point Lateral Discrimination (Deg)	35 deg	grees (4L-4	4R)	36 de	grees (4L.	-4R)	45 de	grees (4L-	4R)	37 de	grees (4L-	4R)
Object Discrimination Pass/Fail		Fail			Fail			Pass			Fail	
Front View Dodge Caravan												
Pass/Fail		Pass			Pass			Pass			Pass	
Front View C-172												
Line of Sight Angle of Incidence		.80			.80			.80			.83	
ATCT Orientation Direction		UNKN			UNKN			UNKN			UNKN	
Access to ATCT Site (yes/no)		Yes			Yes			Yes			Yes	
Environmental Issues		UNKN			UNKN			UNKN			UNKN	
ATCT Potential Impacts to Future &		UNKN			UNKN			UNKN			UNKN	
Existing Navaids												
TERP/Part 77 Impacts		No			No			No			No	
Construction Cost Estimates	8\$,125,000		æ	6,435,000		θ	7,800,000		÷	8,125,000	
Safety Assessment	т	Σ		I	Þ		I	Σ		F	Σ	
Initial Risk Ranking	0	0	0	0	0	0	0	0	0	0	0	0
Safety Assessment	т	Þ	_	т	Þ		т	Μ		т	Σ	_
Predicted Residual Risk Ranking	0	0	0	0	0	0	0	0	0	0	0	0

Sample B-3. Site Comparison Chart

Sample B-4. Final Site Recommendation

ATCT Site Recommendation XXX Airport Traffic Control Tower

This Agreement is made by and between ATO Terminal Program Operations, and the Terminal Area Office, collectively known as the "Parties." The purpose of this agreement is to address the siting requirements for the new XXX ATCT planned for construction at XXX in XXX City, XXX State.

Section 1. The parties agree that the siting requirements must be as follows:

Article 1: The location of the ATCT, herein after referred to as Site #3.

Latitude: $N 41^{\circ} 24' 37.853''$ (provide reference datum) Longitude: $W 081^{\circ} 24' 37.853''$

Article 2: The Air Traffic Control Specialist (ATCS) eye height used at the AFTIL Lab for the purposes of this agreement is 998 feet Mean Sea Level (MSL) or 137 feet AGL, assuming 861 feet MSL site elevation.

Article 3: The total ATCT height including antennae and all other obstructions will be approximately 1027 feet MSL or 166 feet AGL, assuming 29 feet from eye height level to top of structure and 861 feet MSL site elevation.

Article 4: The parties are in general concurrence with the assumptions documented in the final site selection report.

Section 2. The Airport Sponsor agrees to notify the assigned AJW Technical Operations, Engineering Services project engineer of any proposed, planned, envisioned projects that would be constructed on airport property that could possibly impact the LOS from the recommended ATCT sites.

Section 3. This agreement does not constitute a waiver of any right guaranteed by law, rule, regulation, or contract on behalf of any party. The undersigned unanimously agree with the choice of Site #3 for the new Airport Traffic Control Tower at the XXX Airport (XXX):

Service Area Director of Air Traffic OperationsDateService Area Director of Technical OperationsDateDirector of Air Traffic Control Facilities/Engineering ServicesDate

Sample B-5. Final Recommended Site Comparative Safety Assessment

Final Site Approval Regional Lines of Business XXX Airport Traffic Control Tower FAA Headquarters

The undersigned* concur with the choice of Site #3 for the new Airport Traffic Control Tower at the XXX Airport (XXX).

Hazard #1 – Potential interference with navigation equipment, VHF Omni-Directional Range (VOR). Mitigation - Dopplerize the VOR. RISK – LOW Technical Operations Engineering Services

Hazard #2 – Potential interference with communication, navigation, or surveillance equipment, no potential impacts identified no safety effect. RISK – LOW

Hazard #3 – Potential Interference with existing and/or planned surveillance equipment, proposed ASR-11 sites 1, 2 and 3. A final ASR-11 site has not yet been selected. RISK – LOW

Hazard #4 - TERPS impacts, circling minimum increases from 1320' to 1340'. RISK - LOW

Hazard #5 – Direction of visual field creates sight limitations; tower faces west, no safety impact. RISK – LOW

Hazard #6 – Line of Sight/Angle of view creates visual sight limitation, visibility to all aircraft movement areas, no safety impact. RISK – LOW

Hazard #7 – Distance of view creates visual sight limitations, potential loss of situational awareness. Mitigations – ATC use of 7110.65. RISK – MEDIUM Terminal Area Office

Hazard #8 – Sunlight/Daylight creates lighting atmospheric sight limitations, potential loss of situational awareness. Mitigations – DBRITE, sun shades. RISK – LOW Terminal Area Office

Hazard #9 – Artificial lighting creates sight limitations (ground), manufacturing plants to the south, potential loss of situational awareness. Mitigations - ATC use of 7110.65. RISK – MEDIUM Terminal Area Office

Hazard #9a – Artificial lighting create sight limitations (airborne), potential loss of situational awareness. Mitigations – ATC use of 7110.65 and DBRITE. RISK –LOW Terminal Area Office

Hazard #10 – Naturally occurring atmospheric conditions create site limitations, potential loss of situational awareness. Mitigations – Aircraft equipage, ATC use of 7110.65 and verification of aircraft/vehicle position. RISK – MEDIUM Terminal Area Office

Hazard #11 – Industrial/municipal discharges to the atmosphere create site limitations, no safety effect. RISK – LOW

Hazard #12 – Access to proposed site does not cross existing ground/air traffic patterns, no safety effect. RISK – LOW

Hazard #13 – Interior physical barriers create sight limitations, design not siting issue. RISK – LOW

Hazard #14 – Exterior physical barriers create sight limitations, extremely remote as current tower is not impacted by construction of the proposed ATCT. RISK – LOW

Date

*Signatures as required per the latest version of the FAA Safety Management System Manual. Additional signatories may be required based upon identified hazards and assessments. Date

Sample B-6. Airport Sponsor Letter

Mr. John Doe Director XXX Airport 123 Main Street Any Town, USA

Re: Proposed ATCT/TRACON Development

Dear Mr. Doe:

As agreed to during our meeting last week concerning the Federal Aviation Administration's (FAA) plan to replace the Air Traffic Control Tower (ATCT) and Terminal Radar Approach Control facilities at XXX Airport (XXX), I am providing your office with the impacts to procedures for aircraft operating at XXX as a result of the proposed ATCT.

The FAA conducted an airspace review of the proposed structure on Date XX, 20XX (new XXX ATCT, 03-AXX-82-NR). The XXX Flight Procedures Team, AJX-XXX, determined the proposed ATCT will raise "NON-PRECISION MINIMUMS" and "CIRCLING ALL CATEGORIES" non-precision instrument procedure at XXX as follows:

NOTE: The new tower is surveyed under FAA AC 150/5300-16, AC 150/5300-17, AC 150/5300-18; Airspace case review requires the evaluation of existing airfield conditions and operations.

a) Circling categories A, B, C, & D; 1300/1360 feet to 1420 feet maximum allowable height (MAH) adverse Instrument Flight Rules (IFR) effects, 1000 feet–Above Mean Sea Level (AMSL). Due to the required height of the new ATCT, necessary to obtain a clear line of site for Air Traffic Control (ATC) purposes, the circling categories will rise regardless of where the ATCT is located. This increases amounts to raising circling minimum 120 feet above existing procedures.

b) XXX ILS RWY 24L (Current Threshold) Missed Approach DH 260 feet HAT to 342 feet HAT,– 1016 feet AMSL. This procedural impact would occur if the airport was not relocating the threshold of runway 6R/24L from intersecting with 10/28 under the current Airport Layout Plan. [Refer to Footnote #1.] This runway threshold relocation must be completed prior to actual construction of the ATCT and thus this impact will not actually exist once the ATCT is constructed.

c) XXX RNAV (GPS) RWY 24L LPV; 1360 feet to1380 feet, -1110 feet AMSL. This increase in the MAH represents a change of 20 feet and is considered, by local ATC personnel, a minimal change with no significant impact relative to aircraft/historical use of this procedure.

d) XXX RNAV (GPS) RWY 24L VNAV 1180 feet to 1300 feet, -1009 feet AMSL. This increase in the MAH represents a change of 120 feet and is considered, by local ATC personnel, a minimal change with no significant impact relative to aircraft/ historical use of this procedure.

e) XXX NDB RWY 06R; 1220 feet to 1240 feet, -1107 feet AMSL. At the request of XXX Airport, City of Any Town, the Non-Directional Beacon (NDB) located on the airfield is to be decommissioned and removed from the airport, prior to the construction of the proposed ATCT, which will result in the decommissioning of the NDB procedure.

Current FAA policy requires a written confirmation from the XXX Airport owner/operator stating they advised the user community of the proposed new ATCT and the affects the above impacts would have

on their operations at the airport. Following your coordination with the user community, please complete and return the enclosed form (Airport Concurrence Form) confirming the coordination with the users and their acceptance of the above proposed airspace procedural changes. Receipt of this completed form is necessary for us to continue beyond the design phase of this project.

To reiterate the need for expeditious completion of this process, the eventual use of the planned extension to runway 6R/24L is dependent upon the completion and commissioning of the new ATCT in order to meet air traffic control line of sight criteria.

If there are any questions concerning these findings, please call me. I can be reached at (555) 555-5555.

Sincerely,

AJW Terminal Facilities Planning

Enclosure (1): ATCT Site Survey

cc:

Regional Administrator Flight Procedures Team Flight Standards Services Service Center Planning and Requirements Group Airports Division/ District Office Technical Operations – Engineering Services OSG Flight Procedures Team (TERPS) AJW Terminal Facilities Execution AJW Terminal Facilities Planning ATO Terminal Safety & Operational Support Airport District Office

Sample B-7. Airport Concurrence Form

This form identifies the siting requirements and impacts of the new FAA Airport Traffic Control Tower (ATCT) planned to be constructed at the XXX Airport. The signed document will satisfy FAA national policy regarding written confirmation from the Airport owner/operator stating they have advised the XXX airport user community about the new ATCT and the impacts the project would have on their operations.

Section 1. The siting requirements are as follows:

Item 1: The location of the ATCT (provide geodetic datum, e.g. NAD-27, NAD-83, WGS-84)

Lat. N 41° 24' 37.853" Lon. W 081° 24' 37.853"

Item 2: The ATCT height is 1109.19 MSL (324' AGL).

Item 3: The ATCS eye height used is 1085 MSL (300' AGL).

Item 4: The exact location of the ATCT is subject to moving no more than 80 feet within the boundaries of the site to efficiently accommodate the base building. This may impact the ATCT height no more than 5 feet.

Item 5: The exact ATCT height is subject to Official Air Space Approval per FAA Form 7460-1.

Item 6: The existing ASDE-3 must remain on the existing ATCT. The line of sight from the proposed ATCT over the existing ATCT does not shadow any movement area.

Item 7: Sunrise, sunset, fog, snow, rain, look down angle, ramp lighting, glare and other issues that can adversely affect the ATCS sight have been considered for the ATCT location.

Section 2. Identified impacts

Item 1: The XXX Flight Procedures Team, AJX-XXX conducted a TERPS analysis of existing and proposed procedures of the proposed structure (new XXX ATCT, 03-AXX-XX-NR). Their findings determined the proposed ATCT will raise "NON-PRECISION MINIMUMS" and "CIRCLING ALL CATEGORIES" non-precision instrument procedure at XXX as follows:

a) [Procedure Name(s)] Circling minima approach category (CAT) A, B Minimum Descent Altitude (MDA) increases from 1300 to 1420 feet and CAT C, D increases from 1360 to 1420 feet. The circling categories will rise regardless of where the ATCT is located. This is due to the required height of the new ATCT facility, which is necessary to obtain a clear line of sight for Air Traffic Control (ATC) purposes. This increase amounts to raising circling minimum 120 feet above existing procedures.

b) XXX ILS RWY 24L (CURRENT THRESHOLD) MISSED APPROACH DH 260 feet HAT TO 342 feet HAT, MAH–1016 feet AMSL. This procedural impact would occur if the airport were not relocating the threshold of runway 6R/24L from intersecting with 10/28 under the current ALP. This runway threshold relocation must be completed prior to actual construction of the ATCT and the impact will not exist once the ATCT is constructed.

Note: The new tower is surveyed under FAA AC 150/5300-16, AC 150/5300-17, AC 150/5300-18; Airspace case review requires the evaluation of existing airfield conditions and operations.

c) XXX RNAV (GPS) RWY 24L LPV; 1360 TO1380 feet, MAH–1110 feet AMSL. This increase in the MAH represents a change of 20 feet and is considered a minimal change with no significant impact by local ATC personnel relative to aircraft/historical use of this procedure.

d) XXX RNAV (GPS) RWY 24L VNAV 1180 TO 1300 feet,-1009 feet. This increase in the MAH amounts to change of 120 feet and is considered a minimal change with no significant impact by local ATC personnel relative to aircraft/historical use of this procedure.

e) XXX NDB RWY 06R 1220 TO 1240 feet,-1107 feet. At the request of the Airport Sponsor, City of Any Town, the non-directional beacon (NDB) located on the airfield is to be decommissioned and removed from the airport. This equipment removal also decommissions the NDB procedure. This must also occur prior to the construction of the proposed ATCT.

Section 3. The airport authority understands the following risks identified during the Comparative Safety Analysis (CSA) and accepts the responsibility for their mitigation.

Removal of trees north of Runway 15.

Section 3. The submission of this signed document constitutes concurrence and adherence to FAA [construction] policy concerning appropriate public notification of the airport community regarding the intent to build a new ATCT and any impacts therein concerning the use of said airfield. The submission of this document does not waive the requirement of public comment as defined in the National Environmental Policy Act), the Council on Environmental Quality regulations implementing NEPA (Title 40 of the United States Code of Federal Regulations, Parts 1500-1517, and other statues, orders, directives, or policy concerning environmental assessment and alternatives.

Section 4. Airport Submission

For the Airport Sponsor

City of Any Town, USA

Name	Date	Name	Date
		77.1	
Title		Title	

Litteilinood	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A	Low	Medium	High	High	High
Probable B	Low	Medium	High	High	High
Remote C	Low	Medium	Medium	High	High
Extremely Remote D	Low	Low	Medium	Medium	High
Extremely Improbable E	Low	Low	Low	Medium	High* Medium

Figure C-1. Hazard Matrix

*Risk is high when there is a single point or common cause failure.

Risk	Composite of predicted severity and likelihood of outcome or effect of the hazard in the worst credible system state.
Severity	Severity is determined by the worst credible potential outcome.
Likelihood	An expression of how often an event is expected to occur. Severity must be considered when determining likelihood.

Note: The Tables and Figures of Appendix C are taken from SMS Manual v4.0

	Hazard Severity Classification				
	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
		CONDITIONS RESU	ILTING IN ANY ONE OF	THE FOLLOWING:	
ATC Services	A minimal reduction in ATC services CAT D Runway Incursion ¹ Proximity Event, Operational Deviation, or measure of compliance greater than or equal to 66 percent ²	Low Risk Analysis Event severity, ³ two or fewer indicators fail CAT C Runway Incursion	Medium Risk Analysis Event severity, three indicators fail CAT B Runway Incursion	High Risk Analysis Event severity, four indicators fail CAT A Runway Incursion	Ground collision ⁴ Mid-air collision Controlled flight into terrain or obstacles
Unmanned Aircraft Systems	Discomfort to those on the ground Loss of separation leading to a Measure of Compliance greater than or equal to 66 percent	Low Risk Analysis Event severity, two or fewer indicators fail Non-serious injury to three or fewer people on the ground	Medium Risk Analysis Event severity, three indicators fail Non-serious injury to more than three people on the ground A reduced ability of the crew to cope with adverse operating conditions to the extent that there would be a significant reduction in safety margins Manned aircraft making an evasive maneuver, but proximity from Unmanned Aircraft remains greater than 500 feet	High Risk Analysis Event severity, four indicators fail Incapacitation to Unmanned Aircraft System crew Proximity of less than 500 feet to a manned aircraft Serious injury to persons other than the Unmanned Aircraft System crew	A collision with a manned aircraft Fatality or fatal injury to persons other than the Unmanned Aircraft System crew
Flying Public	Minimal injury or discomfort to persons on board	Physical discomfort to passenger(s) (e.g., extreme braking action, clear air turbulence causing unexpected movement of aircraft resulting in injuries to one or two passengers out of their seats) Minor injury to less than or equal to 10 percent of persons on board ⁵	Physical distress to passengers (e.g., abrupt evasive action, severe turbulence causing unexpected aircraft movements) Minor injury to greater than 10 percent of persons on board	Serious injury to persons on board ⁶	Fatal injuries to persons on board ⁷

Table C-1. Hazard Matrix Definitions – Severity

	N	Hazard Severity Classification				
	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1	
		CONDITIONS RESULTING IN ANY ONE OF THE FOLLOWING:				
NAS Equipment (with table 3.5)	Flight crew inconvenience Slight increase in ATC workload	Increase in flight crew workload Significant increase in ATC workload Slight reduction in safety margin	Large increase in ATC workload Significant reduction in safety margin	Large reduction in safety margin	Collision between aircraft and obstacles or terrain	
Flight Crew	Pilot is aware of traffic (identified by Traffic Collision Avoidance System traffic alert, issued by ATC, or observed by flight crew) in close enough proximity to require focused attention, but no action is required Pilot deviation ⁸ where loss of airborne separation falls within the same parameters of a Proximity Event or measure of compliance greater than or equal to 66 percent Circumstances requiring a flight crew to initiate a go-around	Aircraft is in close enough proximity to another aircraft (identified by Traffic Collision Avoidance System resolution advisory, issued by ATC, or observed by flight crew) to require specific pilot action to alter or maintain current course/ altitude, but intentions of other aircraft are known and a potential collision risk does not exist Pilot deviation where loss of airborne separation falls within the same parameters of a Low Risk Analysis Event severity Reduction of functional capability of aircraft, but overall safety not affected (e.g., normal procedures as per Airplane Flight Manuals) Circumstances requiring a flight crew to abort takeoff (rejected takeoff); however, the act of aborting takeoff does not degrade the aircraft performance capability	Aircraft is in close enough proximity to another aircraft (identified by Traffic Collision Avoidance System resolution advisory, issued as a safety alert by ATC, or observed by flight crew) on a course that requires corrective action to avoid potential collision; intentions of other aircraft are not known Pilot deviation where loss of airborne separation falls within the same parameters of a Medium Risk Analysis Event severity Reduction in safety margin or functional capability of the aircraft, requiring crew to follow abnormal procedures as per Airplane Flight Manuals Circumstances requiring a flight crew to reject landing (i.e., balked landing) at or near the runway threshold Circumstances requiring a flight crew to abort takeoff (i.e., rejected takeoff); the act of aborting takeoff degrades the aircraft performance capability	Near mid-air collision results due to a proximity of less than 500 feet from another aircraft, or a report is filed by pilot or flight crew member that a collision hazard existed between two or more aircraft Pilot deviation where loss of airborne separation falls within the same parameters of a High Risk Analysis Event severity Reduction in safety margin and functional capability of the aircraft requiring crew to follow emergency procedures as per Airplane Flight Manuals	Ground collision Mid-air collision Controlled flight into terrain or obstacles Failure conditions that would prevent continued safe flight and landing	

Table C-1. Hazard Matrix Definitions – Severity (Continued)

Table C-1. Hazard Matrix Definitions – Severity (Continued)

- 1. Refer to the current version of Order 7050.1, Runway Safety Program.
- Proximity Events and Operational Deviations are no longer used to measure losses of separation, but they are applicable when validating old data. The minimal loss of standard separation is now represented as a measure of compliance of greater than or equal to 66 percent.
- 3. Risk Analysis Event severity indicators are as follows:
 - a. Proximity. Failure transition point of 50 percent of required separation or less.
 - b. Rate of Closure. Failure transition point greater than 205 knots or 2,000 feet per minute (consider both aspects and utilize the higher of the two if only one lies above the transition point).
 - c. ATC Mitigation. ATC able to implement separation actions in a timely manner.
 - d. Pilot Mitigation. Pilot executed ATC mitigation in a timely manner.
- 4. Ground Collision. An airplane on the ground collides with an object or person.
- 5. Minor Injury. Any injury that is neither fatal nor serious.
- 6. Serious Injury. Any injury that:
 - Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received;
 - b. Results in a fracture of any bone (except simple fractures of fingers, toes, or nose);
 - c. Causes severe hemorrhages, nerve, muscle, or tendon damage;
 - d. Involves any internal organ; or
 - e. Involves second or third-degree burns, or any burns affecting more than five percent of the body's surface.
- 7. Fatal Injury. Any injury that results in death within 30 days of the accident.
- 8. Refer to Order JO 8020.16, Air Traffic Organization Aircraft Accident and Incident Notification, Investigation, and Reporting, for more information about pilot deviations.

Table C-2.	Hazard Matrix	Definitions –	Likelihood
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	Operations: Expected Occurrence Rate (per operation / flight hour / operational hour ⁶)
	Quantitative (ATC / Flight Procedures / Systems Engineering)
Frequent A	(Probability) ≥ 1 per 1000
Probable B	1 per 1000 > (Probability) ≥ 1 per 100,000
Remote C	1 per 100,000 > (Probability) ≥ 1 per 10,000,000
Extremely Remote D	1 per 10,000,000 > (Probability) ≥ 1 per 1,000,000,000
Extremely Improbable E	1 per 1,000,000,000 > (Probability) ≥ 1 per 10 ¹⁴



	Operations: Expected Occurrence Rate (Calendar-based)
	(Domain-wide: NAS-wide, Terminal, or En Route)
Frequent A	Equal to or more than once per week
Probable B	Less than once per week and equal to or more than once per three months
Remote C	Less than once per three months and equal to or more than once per three years
Extremely Remote D	Less than once per three years and equal to or more than once per 30 years
Extremely Improbable E	Less than once per 30 years

Note: Prior to use, check with the SMS Coordinator

1.	Potential interference with navigation equipment both planned and existing.
2.	Potential interference with communication equipment both planned and existing.
3.	Potential interference with existing and/or proposed surveillance equipment.
4.	TERPS surfaces penetrations.
5.	Part 77 surfaces penetrations.
6.	Relevant Airport Design standards violated.
7.	Direction of view:
	7a. North
	7b. East
	7c. West
	7d. South
8.	Line of sight/angle of view
	8a. Up
	8b. Down
9.	Visual Performance
	9a. Unobstructed view
	90. Object Discrimination 9c. Line of sight angle of incidence
	9d. Two-point lateral discrimination
10	Lighting and Atmospheric Limitations – Davlight
	10a. Sun Angle
	10b. Sun Glare
	10c. Sun Shadows
	10d. Thermal Distortion
	10e. Light changes/contrast eye adaptation
11.	Lighting and Atmospheric Limitations – Night
	11a. Dawn
	11D. DUSK
10	Artificial Lighting
12.	12a Airport lighting equipment outgas
	12a. Aliport lighting equipment outages 12b. Lighting shadows
	12c. Airport lighting
	12d. Construction lighting
	12e. Residential/industrial lighting
	12f. Background clutter
13.	Naturally occurring atmospheric conditions
	13a. Dust
	13b. Ash
	13c. Smoke
	130. Haze
	136 Rain
	13q. Sleet
	13h. Snow
	13i. Sun glare off snow
	13j. Minimum ceiling heights (historical data)
14.	Industrial/municipal discharges
	14a. Dust
	14b. Ash
L	14c. Smoke
15.	Access to proposed site does not cross existing ground/air traffic patterns

Table C-3. Preliminary Hazard List

Table C-3. Preliminary Hazard List (Continued)

16.	Interior physical barriers
	16a. Position of ATC in Tower Cab
	16b. Position of Tower Cab equipment
	16c. Position of Tower Cab mullions
17.	Exterior physical barriers
	17a. Construction equipment
	17b. Proposed new structures and airport expansion (ALP)
	17c. Existing ATCT
18.	Other

Appendix D. Visibility Performance Analyses

1. Object Discrimination Analysis

a. Purpose. Conduct a quantitative object discrimination analysis to assess an observers' probability of detection of an object on the airport surface as a function of observation range, tower height, and atmospheric and surface conditions. This is done using the airport traffic control tower visibility analysis tool (ATCTVAT), available at the FAA's AFTIL, the William J. Hughes Technical Center, the Human Factors Research and Engineering Group, and online at http://www.hf.faa.gov/visibility.

b. Question Answered by the Analysis. What improvement in detecting a distant object can be gained by increasing tower height or decreasing tower distance from the object?

c. Analysis Assumptions. The following assumptions are inherent in this analysis:

(1) Detection is defined as the ability to notice the presence of an object on the airport surface without regard to the class, type, or model (for example, an object such as an aircraft or vehicle). The observer knows something is present, but cannot recognize or identify the object.

(2) Recognition is defined as the ability to discriminate a class of objects (for example, a class of aircraft such as single engine general aviation aircraft).

(3) The object (aircraft or vehicle) size is taken to be the square root of the front or side cross-sectional area of the object (for example, wing span x height).

(4) Modified Johnson's criteria is used for the number of optical cycles required for a 50 percent probability of success in object discrimination (N50).

(5) All observations are made with the unaided eye. Observers have normal vision.

(6) The observer is assumed to be at the specified tower height while all objects (for example, aircraft, vehicles) are taken to be at a height of approximately 3 feet (1 meter).

(7) To account for the impact of atmospheric (optical) turbulence on the downward-slanting optical path, an average/effective refractive-index-structure-parameter scaling factor was calculated. This scaling factor was derived by taking the line integral of the Tatarski height scaling equation over the downward-slanting optical path.

d. Analysis Procedure. The Object Discrimination Analysis may be conducted using standard procedures for evaluation of an observers' probability of detection of a specified object at a given distance/range under specified surface and atmospheric conditions. Standard procedures are incorporated into the ATCTVAT, which generates probability-of-discrimination curves, by drawing from four well-developed and empirically validated functions and models:

(1) U.S. Army Night Vision Laboratory's Standard Object Transfer Probability Function (using modified Johnson's discrimination criteria)

(2) Barton's model for the human eye's Contrast Transfer Function

- (3) Kopeika's atmospheric (optical) turbulence modulation transfer function
- (4) Tatarski's atmospheric-index-structure-parameter height-scaling model

The siting team representatives may use standard default values or manipulate the ATCTVAT's input parameters (for example, tower height, tower distance to object, object characteristics, surface

properties, atmospheric conditions, contrast ratios, and ground turbulence) to determine what improvement in visibility can be gained by increasing or decreasing tower height or increasing or decreasing the distance to key points on the airport surface. Under control of the user, the ATCTVAT performs the steps identified below:

- (1) Select object and relevant object dimensions.
- (2) Specify tower height and key point distance.
- (3) Use human contrast threshold function for discrimination.
- (4) Scale the atmospheric index for the specified location.
- (5) Determine turbulence ranges.
- (6) Determine visibility function.

(7) Calculate the probability of detection and recognition (probability of identification is also available but less important).

(8) Compare and evaluate the object discrimination probabilities (for example, compared with the minimum).

e. Criteria. Object Discrimination Analysis probabilities provide a baseline measure from a sample of ATCTs and offer values that enable the tower siting team to assess the impact of the height and location of the tower relative to that sample. Based on the analysis of the test object (for example, front view of a Dodge Caravan minivan, unless another object or object orientation is selected), parametric derivations of the sample provide recommended baseline values, where the minimum is approximately 1.5 standard deviations below the sample mean (that is to say, better than 6.7 percent of the sample).

f. Analysis Considerations. The distance from key airport locations and the ATCT height must support requirements for object visibility from the ATCT cab. In addition to the ATCTVAT parameters, other operational considerations that can affect the probability of discrimination, but not calculated in the model, include:

(1) Types of airport operations and movement patterns.

(2) Various types of aircraft and vehicles that may need to be detected for the selected airport (unless otherwise specified in the model).

(3) Textual dimensions of the airport movement and surrounding areas including the degree of contrast between pavements and non-pavement areas.

(4) Some attributes of the objects to be detected or recognized for the specified airport (for example, shape, color).

(5) Cognitive cues and situational awareness of the ATCS that can enhance or detract from discrimination performance.

2. Line of Sight Angle of Incidence Analysis

a. Purpose. Conduct a LOS angle of incidence analysis to assess an observer's viewing perspective of the airport surface key points. This is done using the ATCTVAT available at the FAA's AFTIL, William J. Hughes Technical Center, the Human Factors Research and Engineering Group, and online at http://www.hf.faa.gov/visibility.

b. Questions Answered by the Analysis. What improvement in the ATCS viewing perspective can be gained by increasing the observer's line of sight angle of incidence to the airport surface at key distance points?

c. Analysis Assumptions. The following assumptions are inherent in this analysis:

(1) All observations are made with the unaided eye. Observers have normal vision.

(2) LOS viewing performance criteria are established using a 50 percent probability of achieving designated ATCS assessment ratings.

(3) Distant key points (for example, furthermost runway threshold) and elevation difference (the difference between mean sea level of the tower base and mean sea level of the designated key point) have been identified accurately.

(4) Runway slope is insignificant or calculations adjusted to account for any significant slope.

d. Analysis Procedure.

(1) The analysis uses the results of a study in which observers performed common ATCS visual tasks at different tower heights while positioned in a tower cab simulation. The observer's task was to visually scan a designated distant "key point" on an airport surface and rate (using the scales below) the observer's ability to: (Q1) distinguish boundaries of the movement areas and (Q2) identify the position of an object at the airport's key point, when various settings were used for tower height.

Table D-1.

Q1. How well can you distinguish between boundaries of the movement areas?

1	2	3	4	5
Can see object area. Cannot discriminate boundaries of	Can discriminate boundaries of most of runways and taxiways.	Can discriminate boundaries of all runways and taxiways.	Can discriminate boundaries of runways and taxiways.	Can discriminate boundaries of runways and taxiways.
runways or taxiways.	Provides no distance information.	Unable to estimate distances between movement areas.	Provides some information about distances between movement areas.	Can readily estimate distances between movement areas.

Table D-2.

Q2. How well can you identify the position of an object at the airport's key point?

1	2	3	4	5
Can see object. Cannot determine any information about the object position relative to key point or movement areas.	Can determine the general object position relative to key point. Cannot determine if object is on or off movement area.	Able to determine that object position is in general vicinity of key point. Cannot estimate distances of object within movement area.	Can determine that object position is near key point. Provides some information about distances of object within movement area.	Can determine the exact object position relative to key point. Can readily estimate distances of object within movement area.

(2) The analysis involves the following steps:

(a) Determine the most distant key point (for example, runway threshold) on the airports surface movement area.

(b) Calculate the height of the observer in the tower according to the formula:

$$HO = HC - (PE - TE)$$

(i) HO is height of observer.

(ii) HC is ATCS eye height above the ground at the tower. ATCS eye height is defined as 5 feet above cab floor height.

- (iii) PE is ground elevation of key point above mean sea level.
- (iv) TE is ground elevation of tower above mean sea level.

(c) Compute the LOS angle at which the observer's view intersects with the airport surface at the key point. LOS angle = Arc Tan (height of observer/distance between key point and tower).

(d) Compare the calculated LOS angle of incidence with rated values to determine the observer's perspective for the resultant LOS viewing criteria (for example, minimum)

e. Criteria. LOS viewing angles of incidence were derived from an ATCS study of sample ATCTs and offer values that allow the tower siting team to assess the impact of the height and location of the tower relative to that sample. Parametric derivations of ATCS ratings on that sample provide recommended baseline values, where the minimum is established at 50 percent probability that ATCS assessments indicated. Q1: "Can discriminate boundaries of most runways and taxiways. Provides no distance information" (receiving a rating of 2 or better) and Q2: "Can determine that object position is in general vicinity of key point. Cannot estimate distances of object within movement area." (receiving a rating of 3 or better). (See Table D-3.)

Table D-3.LOS Viewing Angle of Incidence

LOS Viewing Criteria	LOS Viewing Angle of Incidence		
Q1: Minimum	Equal to or greater than 0.481 degrees		
Q2: Minimum	Equal to or greater than 0.799 degrees		

NOTE-

Minimum LOS viewing criteria is set at the higher of the two values for Q1 and Q2.

f. Analysis Considerations. ATCT distance from critical airport locations and ATCT height must support requirements for viewing objects on the airport movement areas, taxiways, and non-movement areas from the ATCT cab. The tower distance and height requirements reflect the observer's perspective of the airport surface as represented by the ATCT LOS angle of incidence to designated key points on the airport surface. Other operational considerations that relate to the observer's perspective or the LOS angle of incidence analysis include:

(1) Airport operations, airport layout, texture of areas surrounding the airport movement areas (for example, runways/taxiways) can enhance or detract from the observer's perspective without regard to the LOS angle of incidence.

(2) Furthermost distant key points represent a "worst case" angle of incidence for the purpose of tower siting and viewing perspective; they may not necessarily represent the most operationally significant points on the airport surface to be observed.

(3) The study and analyses upon which the LOS angle of incidence requirements were based eliminated the influence of object discrimination. Thus, the LOS angle of incidence is independent of the probability to detect or recognize an object.

3. VISIBILITY PERFORMANCE CONSIDERATIONS – TWO-POINT LATERAL DISCRIMINATION ANALYSIS

a. Purpose. Quantify the impact of tower height on the ability to laterally separate two critical points of the airport surface operations.

b. Question Answered by the Analysis. What improvement in discriminating between two critical points of the airport surface operations can be gained by changing the tower location?

c. Analysis Procedure. Determine the amount of lateral separation between two points by measuring the angle between the line of sight from the tower to the object at key point 1 (Object 1 on Runway 14L) and the line of sight from the tower to the object at key point #2 (Object 2 on Runway 14R). Using this procedure ensures that there is sufficient lateral separation between two key points on the movement areas, especially at distant points on the airport surface.

d. Criterion. Ensure that two objects of distant key locations provide the observer sufficient lateral discrimination to be separated by 0.13 degrees (8 minutes) or greater.



D-6

Appendix E. Administrative Information

1. Distribution. This order will be distributed electronically.

2. Related Publications

- FAA Order 6480.7, Airport Traffic Control Tower (ATCT) and Terminal Radar Approach Control (TRACON) Design Policy
- Safety Management Systems (SMS) Manual
- System Safety Management Program
- System Safety Handbook, Volume 2, Tools and Techniques
- FAA Order 8260.3 United States Standard for Terminal Instrument Procedures (TERPS) and associated directives
- FAA Order 1600.69, FAA Facility Security Management Program
- FAA Order JO 7400.2, Procedures for Handling Airspace Matters
- Advisory Circular 150/5300-13, Airport Design Standards
- Advisory Circular 150/5300-16, General Guidance and Specifications for Aeronautical Surveys: Establishment of Control and Submission to the National Geodetic Survey
- Advisory Circular 150/5300-17, General Guidance and Specifications for Aeronautical Survey Airport Imagery Acquisition and Submission to the National Geodetic Survey
- Advisory Circular 150/5300-18, General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System Standards
- FAA Order 1050.1, Policies and Procedures for Considering Environmental Impacts
- FAA Order 1050.19, Environmental Due Diligence Audits in the Conduct of FAA Real Property Transactions
- FAA Order 5050.4, National Environmental Policy Act Implementing Instructions for Airport Projects
- 14 CFR Part 77, Objects Affecting Navigable Airspace
- FAA Form 7460-1 Notice of Actual Construction or Alteration
- JO 7110.XX, Mobile Airport Traffic Control Tower Siting Criteria
- FAA Order JO 1053.3, Air Traffic Organization Energy Efficient and Sustainable New Construction and Major Renovation.

3. Acronyms

		First Instance
Acronym	Meaning	(Page)
ADO	Local Airports District Offices	4-1
AFTIL	Airport Facilities Terminal Integration Laboratory	1-1
AGL	Above Ground Level	B-3
ALP	Airport Layout Plan	2-1
AMSL	Above Mean Sea Level	B-4
AOV	Air Traffic Safety Oversight Service	3-1
ATC	Air Traffic Control	B-6
ATCS	Air Traffic Control Specialist	B-5

Acronym	Meaning	First Instance (Page)
ATCT	Air Traffic Control Tower	Cover Page
	Airport Traffic Control Tower Visibility Analysis	
ATCTVAT	Tool	2-1
ATO	Air Traffic Organization	1-1
AVS	Aviation Safety	6-1
CFR	Code of Federal Regulations	2-1
CSA	Comparative Safety Assessment	2-1
DEI	Design, Engineering, Integration	6-1
EDDA	Environmental Due Diligence Audit	2-4
FCT	Federal Contract Tower	1-1
HF Tool	Human Factors Visibility Tool	A-1
IFR	Instrument Flight Rules	B-8
KSN	Knowledge Sharing Network	1-1
LOB	Line of Business	3-1
LOS	Line of Site	2-1
MAH	Maximum Allowable Height	B-8
MDA	Minimum Descent Altitude	B-3
MSL	Mean Sea Level	B-5
	50 percent probability of success in object	
N50	discrimination	D-1
NAS	National Air Space	Cover Page
NASWATCH	National Air Space Watch	5-1
NDB	Non-Directional Beacon	B-8
NEPA	National Environmental Policy Act	2-4
NRA	Non Rule Making Action	2-1
OE/AAA	Obstruction Evaluation/ Airport Airspace Analysis	2-1
OTA	Other Transaction Agreements	1-1
PHA	Preliminary Hazard Assessment	7-15
QCG	Quality Control Group	3-1
RDWB	Requirements Document Workbook	2-4
SMS	Safety Management System	2-3
SRM	Safety Risk Management	2-3
SRMD	Safety Risk Management Document	iii
SRMP	Safety Risk Management Panel	8-1
TERPS	Terminal Instrument Procedures	2-1
VOR	VHF Omni-Directional Range	B-3

4. Definitions

Comparative Safety Assessment (CSA) –A listing of all of the hazards associated with a change, along with a risk assessment for each alternative hazard combination that is considered. It is used to rank options for decision-making purposes.

Environmental Due Diligence Audit (**EDDA**) – An EDDA is a systematic investigation of real property to determine if activities involving hazardous materials have occurred at a site or resulted in environmental contamination and informs the baseline environment description in the NEPA document

FAA's Human Factors Tool – The Human Factors Tool described in this order refers to the Airport Traffic Control Tower Visibility Analysis Tool (ATCTVAT- <u>http://www.hf.faa.gov/visibility</u>). The tool establishes the minimum height required to meet the 0.8 degree angle of incidence recommended by Human Factors analysis.

Federal Contract Tower – Low activity visual flight rules ATCTs providing air traffic control services for a municipality or subdivision thereof while under contract to the FAA.

Movement Area – The runways, taxiways, and other areas of an airport/heliport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas.

NASWATCH – A preliminary check of impacts created by proposed tower locations on electronics systems.

Operational Height – Minimum tower height determined by the siting team to meet operational requirements.

Preliminary Hazard Analysis -- A listing of all of the hazards associated with a change, along with a risk assessment for the alternative considered. It is used when there is only one operationally viable site.

Preferred Site – Refers to the three viable sites considered to be the most promising candidates for a tower location at the end of the AFTIL Trip #1 process. Preferred sites are further evaluated before final recommendations occur during the AFTIL Trip #2 process.

Proposed Site – Refers to any potential siting area for an ATCT.

Recommended Site – Refers to the preferred site selected by the siting team at the end of the AFTIL Trip #2.

Requirements Document – Document that defines the validated parameters of a new/ replacement ATCT project including: staffing, equipment, space, cost, schedule, risk and special considerations.

Safety Risk Management – A formal process within the SMS composed of describing the system, identifying the hazards, assessing the risk, analyzing, and controlling the risk. The SRM process is embedded in the processes used to provide the product/service; it is not a separate/distinct process.

Sponsor – Individual or entity that organizes and is committed to the development of a program or project--referred to in this document as Airport Sponsor.

TERPS – U.S. Standard for Terminal Instrument Procedures, FAA Order 8260.3. The criteria, along with associated Directives, used for development of instrument flight procedures in the U.S.A.

Viable Site – Refers to any potential siting area for an ATCT that meets all the criteria outlined in Chapter 2 as part of the AFTIL Trip #1 vetting process. A viable site is considered to be an area that would be an operationally acceptable tower location.

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