O'HARE MODERNIZATION PROGRAM

AERONAUTICAL STUDY
2003-AGL-0848-NRA

FEDERAL AVIATION ADMINISTRATION AND TRANSPORATION SECURITY ADMINISTRATION

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A-GENERAL SAFETY AND SECURITY COMMENTS

TECHNICAL COMMENTS

A-1) **All Navigational Aid (NAVAID), Communication facilities, Weather Facilities and NAVAID critical areas should appear on the existing and future Airport Layout Plan (ALP) unless otherwise noted. This request is in accordance with AC 150/5300-13, Airport Design, Appendix 7, Paragraph 7. C. (6) which states, Drawing Detail- normally limited to existing and future airport features which would indicate aeronautical need for airport property. The missing NAVAIDs on the Existing and/or Future ALP, which will require aeronautical review (Sheet #1 &2) are:**

a) VHF Omnidirectional Range (VOR) critical area of 1000'.
b) Airport Surveillance Radar (ASR) Critical Area of 1500'.
c) Low-Level Wind Shear Alert System (LLWAS). Coordinates for the LLWAS are included as Appendix C.
d) The National Weather Service owned Automated Surface Observing System (ASOS) and its 500' critical area.
e) Distance Measuring Equipment (DME) facilities, which are co-located with Localizer facilities.
f) Inner Markers (IM)s.
g) VOR Test Facility (VOT), which is co-located with RTR-A.
h) Remote Transmitter/Receiver (RTR)- U, West Terminal Area.
i) Precision Approach Path Indicators (PAPI)s.
j) RTR-D.
k) Localizer Far Field Monitors (FFM)s, two of which are normally located on runway extended centerline at least 50 feet apart, just outside the RSA.
l) All Instrument Landing System (ILS) critical areas must be clearly indicated on the future and existing ALP, in accordance with Federal Aviation Administration (FAA) Order 6750.16C.

A-2) **The future ALP does not clearly identify the impact of the railroad realignment on the new Approach Lighting System (ALS) for runways 10C, 10L, 10R 9R, and 9C.**

A-3) **Construction of the north runway will impact on 32R Localizer (LOC). The future ALP does not clearly identify a plan for minimizing this impact.**

A-4) **Although the future ALP documentation mentions that the infrastructure (i.e. FAA power cables, fiber optics, et.) will be improved, the future ALP documentation does not clearly state how the improvements will be tied into the planned phases.**

A-5) **The future ALP and associated documentation do not clearly identify a schedule that will determine how runway construction and facility installation/relocation is conducted to minimize impact.**

A-6) **All FAA National Airspace System facilities will require extensive siting evaluation to determine the optimal location, in accordance with applicable FAA Orders, Advisory Circulars and Siting Criteria.** Specifically, the placement of the VOR, ASR, Air Traffic Control Tower (ATCT), LOC, Glide Slope (GS), Inner Marker (IM), DME, communication and weather system facilities, Etc. will require additional engineering to determine proper placement.

A-7) **Extensive ductwork and fiber modifications will be needed.**
A number of facilities will be required (ASR, Communication, ILS, ect.) to support the future O'Hare Modernization Program (OMP). Proactive, aggressive planning will be necessary to support the infrastructure requirements within the time periods identified.

A-8) **All facility and/or infrastructure additions, modifications, relocations and/or removals required to implement the future ALP will require a reimbursable or similar type agreement.**

A-9) **FAA acceptance of any future ALP does not authorize any construction**.
The review and comments associated with Case number 2002-AGL-0848-NRA, O'Hare International Airport Draft Plan, is for planning purposes only. Construction will not be permitted until the FAA issues a final Environmental Impact Statement and a Record of Decision. In addition, planned construction shall be reviewed in depth and open to a full airspace evaluation.

A-10) **The FAA, Airway Facilities (AF), System management Office (SMO) is responsible for all existing FAA facilities.**
Work impacting FAA equipment as a result of the project will require the sponsor/contractor to notify the FAA AF, SMO of the project pre-construction meeting. Sponsor is responsible for establishing a reimbursable agreement to provide projects to protect, relocate, or re-establish FAA equipment that will be disturbed during sponsor's project. Before each construction activity begins, FAA AF, SMO shall be contacted to provide exact locations of existing facility cables.

A-11) **Lighted navigational aids that may be impacted and will require additional information or phasing plan for reconfiguration are:**

a) Phase 1A: 14L Approach Lighting System with Sequenced Flasher, Category 2 (ALSF-2) & PAPI;
b) Phase 1B: 27L Medium-Intensity Approach Lighting System With Runway Alignment Indicator Lights (MALSR) & PAPI, 9R MALSR & PAPI;
c) Phase 1C: 32L MALSR & PAPI;
d) Phase 2A: 9L & 27R MALSRs & PAPIs;
e) Phase 2B: 32R PAPI & 14L ALSF-2; and
f) Phase 2C: 14R ALSF-2 & PAPI.

A-12) **The localizer/ALSF-2 building can be sited as a localizer building, up to but not closer than 250 feet from runway extended centerline and clear of the Obstacle Free**

Area. They must also be accurately sized. We anticipate that these buildings will be 24' x 68' in size.

A-13) **Localizer antenna array placements require correction.**
Where the localizer antenna arrays are shown centered 1,000 feet out from the end of a runway, the future ALP must be changed to show them centered at least 1,010 feet out. This ensures that no part of the array is inside the runway safety area (RSA). The localizer critical area must be adjusted accordingly.

A-14) **Glide Slope facility composition requires correction.**
A Glide Slope facility consists of an antenna mast with a building immediately behind the mast (within 10 feet), not remote from the mast. The locations and sizes of the Glide Slope buildings {labeled Glide Slope/Runway Visual Range (RVR) buildings} are not accurately shown on the future ALP. Glide Slope buildings are approximately 10' x 12' in size.

A-15) **Glide Slope distance from runway centerline requires correction.**
The future ALP incorrectly depicts the location for the glide slope Facility in relation to the runway centerline. FAA Order 6750.16C, *Siting Criteria for Instrument Landing Systems*, Paragraph 27.c. Category II and III Glides Slopes should be located at a minimum distance of 400 feet from the runway centerline. It has been observed that to make all elements of the glide slope facility (antenna mast and building) clear the runway Object Free Area (OFA) the facility would have to be centered 407 feet off runway centerline. This siting would make the facility encroach upon the taxiway OFA of an Airplane Design Group VI taxiway whose centerline is 600 feet from runway centerline. This conflict must be resolved.

The Runway 10R glide slope, shown 325 feet off runway centerline, must be sited not less than 400 feet off centerline. The height of the glide slope antenna mast is limited by the height-limiting formula in FAA Advisory Circular 150/5300-13, Airport Design, Paragraph 306c(2)(b). By this formula, the maximum height of an antenna 400 feet from runway centerline is x feet above the elevation of the crown of the runway abeam the glide slope antenna mast. If the finished grade elevation at the glide slope antenna mast is 4.0 feet below the runway crown elevation abeam the mast, then the maximum allowable antenna mast height is x' + 4.0' above finished grade. Moving the Runway 10R glide slope out to 400 feet might require moving the fence and the ditch respectively. In addition, the traffic on Irving Park Road and the fence are of concern at the point where they curve in a northerly direction. (See Comment #90 in "Phase 2C – Runway 10R/28L")

A-16) **Glide Slope distance from runway threshold requires correction.**
Where the runway is perfectly horizontal, a glide slope sited 1,050 feet from the threshold would produce a 55-foot Threshold Crossing Height (TCH). Per FAA Order 8260.3B, the standard optimum TCH for Category (CAT) -II and Cat-III approaches for the height group 4 airplane (TERPS) is 55 feet. It is important to site the glide slopes to achieve 55' TCHs, to ensure that the flight-checked actual TCHs are between 50 feet and 60 feet. For a Cat-II or Cat-III approach, the TCH is required to be between 50 feet and 60 feet. On the future ALP, many of the glide slopes for the new runways are sited other than 1,050 feet from threshold.

A-17) **Glide Slope snow removal areas should be modified to meet standard.**
The glide slope snow removal pads are sized incorrectly on the future ALP. FAA Order 6750.49A, Maintenance of Instrument Landing System (ILS) Facilities requires that snow deeper than 18 inches be removed in front of a glide slope, to prevent signal distortion, or, if the snow is not removed the approach minima will be raised to localizer-only minima for category "D" aircraft and Category (CAT) II/III service will be unavailable.

To facilitate snow removal, the FAA maintenance organization insists that the hard-surfaced snow removal areas be constructed in front of each glide slope facility. See appendix B.

A-18) **PAPI placement requires correction.**
Eight PAPIs are paired with eight glide slopes on the new runways. In accordance with FAA Order 6850.2A, Visual Guidance Lighting Systems, in order to accommodate height group 4 airplanes (TERPS), the PAPI must stand 300', +50', -0' behind the glide slope source (antenna mast). In addition, PAPI lamp housings are not permitted to be closer than 50 feet to the edge of a runway or taxiway. The distance criteria produces glide slope/PAPI problems with intervening connector taxiways. See the PAPI discussions in the "Phasing Comments" section under individual runway instrumentation in this document.

A-19) **Inner Markers are missing from the future ALP.**
Inner Markers (IM) must be shown on the future ALP. IMs would be sited at 860 feet from threshold. This assumes that the TCH will be 55 feet, and that the runway threshold is the highest point in the touchdown zone. In all cases, the west ends of the new runways are substantially higher than the east ends, and the west ends are probably the highest points in the touchdown zones. Therefore, the 860-foot siting for the IM's on the Runways 9's and 10's is probably valid. On the Runways 27's and 28's, the touchdown zone elevations can be expected to be up to 5 feet higher than the runway threshold elevations. Therefore, the actual IMs will probably have to be sited up to 95 feet farther out than 860 feet. The IM siting problems on the Runways 28L, 28C and 28R approaches result from runway and taxiway conflicts.

A-20) **The Mid-Field RVRs are shown nominally, but the exact locations will be determined upon facility design.** The Runway 10R/28L Mid-Field RVR will probably stand 3,000 feet west of the Runway 28L end, and 270 feet south of runway centerline. This siting is to maximize the distance from the ditch and pond to the south, and to minimize the access road route to Taft Road to the south.

A-21) **Localizer Far Field Monitor (FFM) antennas are not shown on the future ALP.** The approaches on which their siting is a problem are the Runway 9L, Runway 28C, and Runway 27R approaches.

A-22) **Underground diesel fuel storage tanks are required at some locations.** It is assumed that each of the LOC/ALSF-2 buildings will contain a diesel engine generator. Each engine generator requires a minimum of a 1,000-gallon diesel fuel tank. The localizer buildings must be well within the Runway Protected Zone (RPZ), therefore, so must the tanks. Therefore, the tanks must be underground rather than aboveground. The underground tanks must meet all the applicable environmental requirements.

A-23) **Runway 28L, 28C and 28R ALSF-2's will cross Runway 4R-22L**. Runway 28R (existing 27L) already has light bases embedded in the blast pad and Runway 4R-22L. For the Runway 28C and 28R ALSF-2's, the light bases for the ALSF-2 semi-flush steady-burning and flashing lights must be embedded in Runway 4R-22L and the taxiways that the ALSF-2s cross. The light bases must continuously drain by gravity.

The semi-flush lights of these ALSF-2s will be subjected to snowplowing and some will be subject to airplane wheel loads. Numerous frangible mounted lights and flasher ICCs near taxiways and Runway 4L-22R will be subject to blown snow and ice. For these reasons, substantial damage and the need for replacement is anticipated. Expect the Runway 28L, 28C, and 28R ALSF-2s to require more maintenance than the other nine ALSF-2s. Maintenance access to these ALSF-2s will also be more difficult than for the other nine ALSF-2s. Almost the entire Runway 28L and 28C ALSF-2s will lie within runway and taxiway safety areas. The DOA will have to make allowances for maintenance down time for ALSF-2 maintenance in RSAs.

A-24) **Runways 4R-22L and 4L-22R localizer antenna arrays are inside RSA.** These four antenna arrays are less than 1,000 feet from the stop end of the runway they serve, and are therefore in RSAs. Corrective action is required to meet the FAA RSA area of 1000' and the standard localizer siting of 1010 feet from end of runway.

A-25) **ILS holding position markings (hold line) at glide slope critical area.** It is sometimes necessary to prevent airplanes from entering a glide slope critical area as they taxi on a parallel taxiway that runs past the glide slope facility. To define the point at which the airplanes must hold short of the edge of the glide slope critical area, an ILS hold line is painted across the parallel taxiway. The point at which the ILS hold line is painted across the parallel taxiway is the intersection of the edge of the critical area with the inner edge of the taxiway. The inner edge of the taxiway is the edge closest to the runway that the glide slope serves. If the new glide slopes are all 1,050 feet from runway threshold, the ILS holds lines will be between 820' and 850' from threshold. Present guidance on use of the ILS hold lines is as follows:

a) If weather conditions are less/worse than 800-2, airplanes must hold behind the ILS hold line.
b) If weather conditions are 800-2 or better, airplanes may taxi past the ILS hold line.

A-26) **The ALSF-2s of future Runways 9L, 9C, 9R, 10L, 10C, 10R, 27L, 27C, 27R, and 28R, are all shown crossing public roadways.**

a) Permits for these crossings will be required from the government bodies administering these roadways.
b) To facilitate the issuance of permits for construction within the rights of way of these roadways, it is essential that the DOA begin planning with the responsible entities now, if that planning is not already in progress.

A-27) **The ALSF-2s of future Runways 9L, 9C, 9R, 10L, 10C, and 10R are all shown crossing railroad tracks.** Permits for these crossings will be required from the railroad. To facilitate the issuance of permits for construction within the railroad right of way, it is essential that the DOA begin planning with the railroad now, if that planning is not already in progress.

A-28) **Elements of the ALSF-2s of future Runways 9C, 9R, 10L, and 10C are shown west of York Road on land that is shown off airport property.** It is the DOA's responsibility to furnish all the interests in real estate required for the establishment of navigational aids. For ALSF-2, the interests include land on which to install light bar structures, cable ducts and cables, access roads and walkways, personnel ingress and egress, security, appurtenances, and avigation easements to protect the approach light planes from penetration. These avigation easements will be for airspace below the 14 Code of Federal Regulation (CFR) part 77, 50:1 approach light plane. For the Runways 9C and 10L ALSF-2s, facility elements will have to be constructed on existing buildings off airport property. If these buildings are to remain, then the DOA must obtain special real estate interests that will be mutually acceptable to the owner of the ALSF-2 and of the buildings, which are to be depicted on the Future On-Airport Land Use Plan.

A-29) **Provide DME service (tuned to ILS frequency) on all ILS systems at O'Hare.** If this is not feasible, as a minimum, all category II/III ILS systems should have co-located DMEs.

A-30) **The Low Level Wind Shear Alert System (LLWAS) sites shall be shown on the existing and future ALP. Please see Appendix C, LLWAS Station Locations.** The O'Hare Modernization Program will seriously affect the twenty (20) LLWAS poles. A number of the remote pole sensing stations will need to be relocated due to their proximity to future construction. The LLWAS system will require a new meteorological study to determine the number of poles to be re-located and any additional LLWAS poles needed for proper wind shear detection of the future runway alignments.

A-31) **The construction of buildings "R11" and "R10" may obscure the line of site from the current ATCT to areas of Taxiway Y between Taxiway T and the United Hangar and may require mitigation.** There is an existing impact to this area that may be reduced by the removal of various hangars to accommodate the construction of Runway 9C.

A-32) **All aircraft holding pads must be evaluated with respect to the type(s) of aircraft that can hold inside the pads while providing the required wingtip clearance for aircraft passing by or through the hold pads.**

A-33) **Recommend a maintenance equipment facility on the north airfield to support required airport operations such as snow removal, airfield maintenance, etc. The FAA is concerned with the distance to the north side of the airfield from the current AMC Building.**

A-34) **With the significant increase in pavement, the City of Chicago will need to evaluate the additional snow removal equipment that will be necessary to maintain an effective operation. In addition, the City must continue to meet FAR Part 139 clearance times**

for snow removal as outlined in AC 150/5200-30A Airport Winter Safety and Operations.

A-35) **Existing Taxiway A & B restrictions should be reviewed based on additional aircraft with wingspan greater than the B-747. It must be clearly addressed what aircraft can utilize each respective taxiway. Any new operational restriction should be based on wingspan versus aircraft type.**

A-36) **List all existing and future operational and physical restrictions, including but not limited to those on taxiways, runways, aprons and gate areas.**

A-37) **Open RSAT action Item ORD-02-007 should be addressed during development (to be completed by December 31, 2005). ORD 02-007 requests installation of the taxiway centerline lights at turn radius from Taxiway B to Taxiway P; the turn radius from Taxiway A to Taxiway P; the turn radius from Taxiway P (northbound) to Taxiway H (westbound); the turn radius from Taxiway H (westbound) to Taxiway B (southeast bound).**

A-38) **Will the existing pavements used by ADG VI be structurally upgraded or do they currently have adequate strength for NLA operations?** The Concept Development/Refinement Report states that NLA will be restricted to airport pavements built to ADG VI standards. One standard mentioned is new pavement with adequate strength for NLA (i.e., A380) operations. PDR Exhibit 9 indicates the designated NLA taxi routes. These designated NLA taxiways include many existing pavements, which according to the ALP have existing pavement strength limitations.

A-39) **Future Runway Safety Area (RSA) Analysis:**
Section 11 of the Project Definition Report states that, "There are several instances where the existing airfield deviates from standards in accordance with historical FAA waivers. For all new and relocated runways, and all runways that are extended, all Runway Safety Areas and Object Free Areas are proposed to meet standards, even where they might not have previously. Table 8 presents the disposition of the existing deviations" (p. 82, *Project Definition Report*).

The objective of the FAA's Runway Safety Area Program is that all RSAs at federally obligated airports and all RSAs at airports certificated under 14 Code of Federal Regulations (CFR) part 139 shall conform to the standards contained in AC 150/5300-13 Airport Design, to the extent practicable. Based on the large scope of the O'Hare Modernization Program and long term planning horizon, all safety areas on the airfield should be brought up to standards as soon as possible within the planning period. The table in Section 11 and the additional text in the Project Definition Report does not indicate full RSAs are not practicable for Runway 4L/22R and 4R/22L. Therefore, full standards should be depicted, described and included in plans for implementation. The use of declared distances to achieve a full RSA is not acceptable (see comment #41 of this section). In addition there are items noted in this attachment under each phase that describe items on the Future ALP (Sheet #3) that need to be verified and correlated with the text in Section 11 of the Project Definition Report.

A-40) **Future Object Free Area (OFA) Analysis:**

AC 150/5300-13, defines the OFA as "an area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes." Items noted in this attachment under each phase describe items on the Future ALP (Sheet #3) that must be verified and removed.

A-41) **Future Runway Protection Zone (RPZ) analysis:**

AC 150/5300-13, defines RPZ as "an area off the runway end to enhance the protection of people and property on the ground." Items noted in this attachment under each phase describe items on the Future ALP (Sheet #3) that must be verified and removed. Fee simple land acquisition is the preferred method for protecting the RPZ, especially for new runway facilities, especially to this scale. There are no avigational easements or acquisition depicted on the Future ALP where the RPZ extends beyond the future airport property (Runway 10C, 10L, 9R, 9C, 9L, 27R, and 28R). Zoning restrictions are not considered adequate for protecting the RPZ. If the City uses avigational easements to protect the RPZ, the agreements must have standards to protect against non-compatible uses, obstructions and navigational interference.

A-42) **Declared Distance Analysis:**

In accordance with AC 150/5300-13 the use of declared distances for airport design shall be limited to cases of existing constrained airports where it is impracticable to provide the RSA, OFA, or RPZ in accordance with design standards. If an airport operator wishes to implement declared distances, all relevant information and the appropriate justification must be provided, which would include operational constraints and any numbers, percent, and condition imposed by meeting standards. In addition to adequate justification for declared distances, the following information on the future ALP Drawing set and information in the Project Definition Report must be verified and updated.

a) A Declared Distance drawing used to clearly depict declared distance criteria applied on the future ALP.
b) Declared distance information should be provided on Sheet #4 for Runways 10L/28R and 10C/28C. Currently, only LDA data for 10L and 10C is presented in the Airport Data Sheet.
c) Runway 10C/28C declared distance issues/questions:

    i) Only 10C LDA is presented in the notes (10,543'). LDA, ASDA, TORA, and TODA must also be presented if declared distances are planned. Also, declared distance data for the Runway 28C end should be provided as well. This information should be depicted on the Airport Data Sheet and a separate Declared Distance drawing.
    ii) In the Project Definition Report, the narrative states that "a declared distance LDA of 12,543' (report text should be corrected to read 10,543') has been applied to Runway 10C to provide at least 1,000' of safety area beyond the LDA, specifically to preclude the wings of aircraft on Taxiway "S" from penetrating the safety area" (Page 8). Thus, the Runway 10C LDA is sited approximately 57 feet to the west of the Runway 28C displaced threshold. However, the RSA for Runway 28C is depicted as

extending to the edge of Taxiway "S", not the ADG VI taxiway safety area/wingtip clearance (approximately 131' either side of taxiway centerline for the A380). Clarify operational status of Taxiway S. "S" during west flow configuration. The taxiway S and Runway 28C safety area must not overlap.

iii) No approach or departure RPZ's are depicted. The departure RPZ should be depicted on the Declared Distance drawing.

d) Runway 10L/28R declared distance issues:

i) Only 10L LDA is presented in the notes (12,249'). LDA, ASDA, TORA, and TODA must also be presented if declared distances are planned. Also, declared distance data for the Runway 28R end should be provided as well. This could be accomplished on the Airport Data Sheet or a separate Declared Distance drawing.

ii) No approach or departure RPZ's are depicted. The departure RPZ should be depicted on the Declared Distance drawing.

A-43) **Elevation and end coordinate analysis:**

a) An update in airport and NAVAID magnetic variation is recommended. Currently the airport is using the 1980 magnetic variation of 0 degrees, the ORD VOR/DME is using the 1965 magnetic variation of –2 degrees, the current and 2005 value is also –2 degrees. There will be no change in runway numbering as a result of this update. The current magnetic variation must be shown.

b) New runway end coordinates, runway end elevations, runway touchdown zone elevation and all facility data must be in accordance with FAA 405 Specifications. If the airport elevation changes by 1.0 foot all Standard Instrument Approach Procedures (SIAPS) will have to be revised. Also construction of a runway and establishment of localizer and DME equipment will require development of new and revisions of existing SIAPS, at the airport. (To meet publication cutoff dates a minimum of 12 months or up to 1 1/2 years, based on complexity and current workload, may be required, to revise existing and develop new SIAPS. Any new runway pavement will have to be flight checked for day/night operations: Reference United States Standard Flight Inspection Manual OAP 8200.1, Chapt.100, Sect.104, types and priorities of flight inspections.)

c) Verification of coordinates using GEO83 program resulted in the following runway length and azimuth discrepancies (see table below). In addition there seems to be a discrepancy in the Runway length depicted for Runway 10C/28C. The length of 10,600 feet on the future ALP is from the 10C threshold to the Runway 28C displaced threshold. The full runway length as depicted would be 10,800' if there were a 200 feet displacement at the east end of the runway. The threshold is shown as displaced on the future ALP and in the Project Definition Report but no threshold displacement is indicated in the Airport Data Sheet (Displaced Threshold = "none" in Airport Data Sheet). Once it is determined whether the east 200 feet of Runway 28C/10C is displaced or moved, verify the appropriate markings are depicted on the future ALP. Additionally, the narrative describing this future runway in the Project Definition Report (p. 8) incorrectly identifies the runway length as 12,600'. There are also no coordinates listed for the Runway 28C displaced threshold (Future Runway End Coordinates table) and the elevation needs to be verified. Is the 650 feet referring to the displaced threshold or end

elevation? Please verify for accuracy all coordinates and facility dimensions in the narrative and on the drawings prior to next ALP submittal.

Runway Coordinate Analysis Table				
Runway	**Length (Future ALP)**	**Length (Per coordinates)**	**Length Difference (future ALP vs. coordinates)**	**Azimuth Difference (future ALP vs. coordinates)**
Existing/Future 4L/22R	7,500’	7,520.5’	20.5’	17”
Existing/Future 4R/22L	8,071’	8,091’	20’	13”
Existing 9L/27R	7,966’	7,989’	23’	41.5”
Existing 9R/27L	10,141’	10,146’	5’	12.5”
Existing 14L/32R	10,003’	10,028.6’	25.6’	6”
Existing 14R/32L	13,000’	13,021.5’	21.5’	8”
Existing 18/36	5,341’	No coordinates	No coordinates	No coordinates
Future 9L/27R	7,500’	7,500’	0	13.6”
Future 9C/27C	11,245’	11,240’	5’	5”
Future 9R/27L	11,260’	11,261.5’	1.5’	7”
Future 10L/28R	13,000’	13,001.6’	1.6’	1.1”
Future 10C/28C*	10,600’	10,600’*	0	0
Future 10R/28L	7,500’	7,500’	0	11”

*RUNWAY 28C COORDINATE APPEARS TO BE FOR THE DISPLACED THRESHOLD, NOT THE RUNWAY END

d) Elevations are depicted approximately 500’ from each runway end on the Existing ALP Sheet 2. What does this elevation represent? They do not match the touchdown zone elevations depicted in the Data Tables.
e) Please provide elevation information for the touch down zones on the Future ALP Sheet 3.
f) Elevation Runway 4L (656.0’) does not match the elevation in the RPZ table (655.5’) or the existing end elevation (655.5’) as shown on Existing ALP (Sheet #2)
g) Existing airport elevation (668’) is based upon the highest elevation of existing Runway 14R/32L. When this runway is decommissioned, the airport elevation will be based upon the highest elevation of future Runways 10L/28R and 10C/28C (666’). Therefore, the future airport elevation should be 666’.

A-44) **Since construction cost is the criteria used in the Concept Development/Refinement report for establishing runway elevation, the runway elevations should be based upon balanced earthwork.** The discussion regarding runway elevations seems to be based upon the assumption that any runway with vertical alignments above existing ground will increase costs. This is a difficult question since a runway centerline set at existing ground surface

would require substantial excavation to allow for pavement structure and lateral slopes to facilitate drainage. However, since the proposed runways will require removal of site demolition and clearing materials, the buildable site elevation is less than the existing surface. Even so, the Utilities Notebook (page 11-17) states that there is 4,000,000 CY of material to be excavated from the south storm water basin and stockpiled for use in the OMP. If Runways 10C/28C and 10R/28L are designed to closely approximate existing ground for economy of construction, the 4,000,000 CY of stockpiled excavation material may need to be hauled off site at considerable expense.

A-45) **In order to maintain existing/and or expand IFR operations at this airport, refer to AC/150-5300-13, appendix 16,table a16-1a/precision or table a16-1b.**

A-46) **Provide future Simultaneous ILS operations. This information is required to supplement procedure design. Simultaneous ILS procedures must meet the requirements of 8260.3B Change 19, Volume 3, Appendix 2.**

A-47) **Prior to the future ALP approval AC 150/5300-13, change 8, *Airport Design*, will be in effect, thus its standards must be reflected in the next ALP submittal.**

A-48) **Runways 9L-27R (400'-500'), 10R-28L (400'), 9R-27L (365'-400'), and 10L-28R (400'-500'): For ILS Category II and III operations, runway to taxiway centerline separation of 500 feet is required for aircraft design group V and 600 feet is required for design group VI. Constructing any portion of the taxiway less than 500 feet will restrict design group V aircraft and/or require the minimums to be raised. Flight Standards TERPS TIL-00005A paragraph 4.1.1c(3) requires a collision risk assessment on any operations not meeting the minimum runway/taxiway separations.**

FREQUENCY ANALYSIS

A-49) **An extensive Navigational Aids frequency allocation study will have to be performed by the FAA; frequency allocation options in the Chicago area are extremely limited.**

a) An extensive Navigational Aids frequency allocation study will have to be performed before an operational ILS frequency plan can be made for implementation of the runway configurations as proposed in the OMP. Very High Frequency (VHF) Localizer frequencies are extremely limited. Presently, 34 out of 38 available frequencies are in use within 60 nautical miles of O'Hare International Airport (ORD). The radio frequency environment surrounding ORD is exceedingly complex and limits which of the 38 frequencies can be assigned at ORD.

b) <u>Results of an extensive NAVAID frequency allocation study may indicate the following:</u>

i) Some ILS runway approaches may require use of radar.
ii) Spectrum Engineering requests that the course width be not more than plus or minus 6 degrees from runway centerline.

iii) Only east/west runway ILS will use DME. These runways as proposed on the future ALP are to be CAT II and III.

iv) The plan will require Spectrum Engineering to change ILS/DME frequencies at other airports away from O'Hare in order to provide ILS/DME as requested on the 6 East – West runways. The ILS/DME frequency change impacts due to the expansion of O'Hare International Airport will require mitigation and the costs of making these ILS/DME frequency changes at other airports may have to be covered by the sponsor.

v) Specific ILS approaches may have to be restricted if interference is predicted or the operation on these approaches will have to be mitigated in other ways, i.e. use of radar.

vi) The navigational aid frequency allocation study will require revising as each phase of the OMP is implemented.

c) <u>After the new runway 9L-27R is added in Phase 1A, ILS/DME frequency assignments for new east-west runways may require shutdown of ILS/DME NAVAIDs on runways 14L-32R and 14R-32L</u>. These frequencies may be required to establish ILS/DME NAVAIDs for new 9-27 and 10-28 east-west runways after 9L-27R is established. The period for 14L-32R and the 14R-32L NAVAID shut down is critical for the assignment of ILS/DME frequencies at the other new future east-west runways during the later phases of the O'Hare Modernization Program.

A-50) **The OMP as proposed, removes the present O'Hare RTR sites and requires new RTR facilities to be constructed.** This may require site relocation of present O'Hare ATCT, Elgin TRACON, and ZAU ARTCC frequencies presently located on O'Hare International Airport. Relocation of these frequencies may require new off airport sites depending on how the air traffic flow will be managed and to maintain frequency operational compatibility.

A-51) **The OMP as proposed requires additional communication channels (frequencies).** Specifically, additional local control VHF frequency and additional ground control VHF frequency for an ATCT and additional VHF frequencies for the TRACON. All of these additional air/ground communication channels must be found within in the present FAA air/ground Spectrum allocation.

Due to frequency congestion in the Chicago Metropolitan area, an extensive air/ground frequency study will be required to generate an air/ground frequency plan with sufficient spectrum to support the Air Traffic proposed operational requirements. This frequency plan may require changes in existing frequency assignments both, en-route and control tower, over a wide area including airspace control frequencies nationally. This frequency plan may require both National and International coordination.

COMMUNICATIONS

A-52) **The modernization of the O'Hare International Airport, as depicted on the subject future ALP, will require the relocation of all existing O'Hare Remote Transmitter/Receivers.**

Impacts to FAA facilities and infrastructure due to the future expansion of the O'Hare International Airport will require mitigation, the costs of which will be covered by the sponsor through reimbursable agreement with the FAA. A complete evaluation of the communication plan for O'Hare ATCT, TRACON and ARTCC as it relates to the planned airport development must be completed before we can fully identify the extent of these impacts. Costs may include work both on and off airport property, additional equipment and infrastructure, and phasing the placement of communication facilities on an interim or final basis. No existing communication or fiber facilities or infrastructure will be removed from service or impacted by airport development without prior coordination with the FAA and new or interim communication services and/or facilities being in place and ready for operation. A suggested set of replacement facilities was presented to the proponent and are depicted on the future ALP with the following exceptions:

a) Existing Communication Facilities

i) RTR ORD is presently located in the area identified as the future location of the West Terminal Satellite Concourse (T4) and will require relocation. FAA requests additional information on the future concourse building to be used for further evaluation of its potential as a home for a replacement co-located communication site.

ii) RTR-A will require relocation due to its proximity to the future Runway 10R/28L. An interim and/or final location for the equipment and services provided from this facility must be identified and evaluated.

iii) RTR-B will have to be relocated due to its proximity to the future Runway 10C/28C. An interim and/or final location for the equipment and services provided from this facility must be identified and evaluated.

iv) The future ALP shows a four level rental car facility at that location P3 requiring the removal or relocation of RTR-C. This impact was not identified in early planning documentation. This parking structure is identified as "unphased". FAA can only assume that this indicates that this portion of the plan has yet to be tied to the Phasing Plan. Early planning documents did not indicate any work, which would place current RTR-C (feature 902) in jeopardy. The frequencies currently housed in RTR-C must be relocated as a result of planned construction. While it may be possible that communication facilities from RTR-C can be accommodated in other RTR sites, there is no guarantee. This particular item requires resolution. The FAA requests additional details on the plans for this parking area for further evaluation. An interim and final location for the equipment and services provided from this facility must be identified and evaluated.

v) RTR-D will require relocation due to the construction of terminal #4. An interim and/or final location for the services provided from this facility must be identified and evaluated.

vi) The ORD RCAG (listed as RTR-F) will penetrate the 7:1 transitional surface of Runway 9L/27R, therefore requiring relocation. An alternate site is not identified on the future ALP. A new site must be located and evaluated. If the alternate site is on airport, it should be identified on the future ALP.

vii) No automatic assumptions should be made regarding the ability of existing facilities to accommodate equipment and services from communication facilities targeted for

removal from the airport. Further evaluation and planning will be required, as staging plans become more specific for airport development.

viii) The site referred to as future RTR-T may be collocated with the existing Airport Traffic Control Tower (feature 402). It should be depicted on the future ALP in some way if such depiction is appropriate.

ix) A site referred to, as future RTR-U will need to be accommodated in the West Terminal Satellite Concourse (BLDG. T4 on the future ALP). Space must be reserved for this facility and should be depicted on the future ALP in some way if such depiction is appropriate.

b) Future Communication Facilities

i) Further evaluation will be required to determine on and off airport impacts to communication facilities directly or indirectly impacted by the configuration at the airport. Additional work or facilities may be required off the airport in support of Chicago ATCT, TRACON or ARTCC requirements to properly provide air traffic services. When the communication plan for O'Hare ATCT, the TRACON and ARTCC air traffic control operations are further defined and coverage and frequency plans are studied, it will be determined if the conceptual locations of communication facilities are adequate or if any alternate facilities may be required. The costs of work both on and off airport will be the responsibility of the airport to cover through the reimbursable agreement.

ii) Four new RTRs are depicted to the northwest (RTR-P), the northeast (RTR-Q1), the southwest (RTR-R) and the southeast (RTR-S). The OMP supports the requirement for two additional RTRs in the area of the West Terminal Concourse (RTR-U) and the existing ATCT (RTR-T). Space and funding should be reserved for the construction of RTR-U and RTR-T, associated towers and infrastructure in the event that a co-location of facilities cannot be accommodated. Both locations should have references on the future ALP as planned RTR locations.

iii) We request details on both the concourse (T4) and parking structure (P3), as they become available for possible incorporation of FAA collocation requirements. These might be candidate sites for co-located facilities. Space, power, utilities, cabling and antenna location may be completed in conjunction with airport work if facilities are acceptable to FAA requirements.

iv) RTR-Q1 is shown too close to existing Runway 14L/32R. The facility should be shifted away from the runway to avoid penetration of the transitional surface of the existing Runway 14L/32R. Antenna towers for this site are estimated at 60' plus the addition of antennas and lightning protection, which brings the overall height to approximately 75'. The placement of the site and phasing with respect to removal of 14L/32R will be important.

v) RTR-S location must be evaluated with respect to the timing of RTR-A and RTR-B removals, and shortening of Runway 14R/32L. Placement and timing will be important with respect to the removal of 14R/32L.

vi) Additional equipment and materials may need to be obtained to support the new or transitional communication or fiber requirements associated with the airport development and in the mitigation of any operational impacts.

vii) Detailed integrated scheduling for the construction of all new communication facilities must be developed to ensure services are continued without disruption. The FAA may determine that some work can be consolidated with airport activity. Details of this nature and associated responsibilities will be outlined in the future reimbursable agreement with the airport.

viii) Fiber optic cables, ductwork, conduit and equipment requirements must be included/planned for connecting all the new communication facilities to the existing ATCT and two future ATCTs.

ix) Further planning will be required within the FAA and with the airport to determine specific plans and timing of when new fiber network requirements need to be in place. The FAA will determine where and when new fiber optic capabilities must be established prior to any impact to the existing Fiber Optic Transmission System (FOTS) infrastructure.

x) Two separate manholes must be provided for physical diversity of power, control, and communication cables, etc. for each new communication facility.

xi) The airport must construct access roads, grading and sub-surface work to and for each new communication site.

xii) Fiber Optic Transmission System (FOTS) presence at ORD. The established FOTS systems provide operational service communications between on airport FAA sites and the ORD Airport Traffic Control Tower (ORD ATCT). Further, it is important to establish awareness as soon as possible, that construction activities must consider first the existing FOTS infrastructure, then new and/or revised runway and site transitions. Listed below are some items to keep in mind prior to construction:

1) All FAA operational on airport services, between the ORD ATCT and navigational aids, radio transmitter, or radar site locations are provided over a FOTS system.

2) There is a future FOTS plan, in association with the OMP and any runway construction activities should consider associated FOTS requirements (e.g., conduit, duct, and fiber optic cable and equipment requirements).
In addition, any runway or site relocation (e.g., LOC, GS, ALSF, MALSR, ASR-9, and RTR) presently connected via a FOTS system, will need to be established at the new location before disconnection occurs at the current location. The duct or conduit will be traceable back to the ORD ATCT. Fiber Optic Cable and FOTs Equipment will be used for all Federal Aviation Administration (FAA) on airport operational services between the ORD ATCT and FAA Sites.

3) Construction activities, especially from Runway 9L/27R and south, may put fiber Optic Cable at risk. Damage to cable; will result in loss of service.

AIRCRAFT RESCUE AND FIREFIGHTING

A-53) **The depicted number and location of ARFF stations do not appear to be sufficient to meet minimum 14 CFR part 139 response times.** Under the existing configuration of the airport, Runway 18/36 is not authorized for air carrier use due to ARFF response times that have exceeded current 14 CFR part 139 requirements. The future Runway 9L/27R is

located considerably farther from the current Runway 18/36. In addition, the ARFF response time to Runway 10R/28L could also present ARFF response difficulties from the current Rescue Station #1. While we cannot definitely say how many airside ARFF facilities will be necessary to meet 139 requirements, it would appear that a minimum of 4 airside stations would be necessary in the ultimate future development. It is important to point out that maintaining minimum requirements, in terms of ARFF facilities and response capabilities should not necessarily be viewed as the standard for an airport with the current and projected activity levels of ORD. As a large international airport and in the interest of public safety, we would support ORD in designing the ARFF response capabilities in accordance with the International Civil Aviation Organization (ICAO) ARFF response recommendations. ICAO ARFF recommendations suggest "The operational objective of the rescue and firefighting service should be to achieve response times of two minutes, and not exceeding three minutes, to the end of each runway as well as to any other part on the movement area, in optimum conditions of visibility and surface conditions." It is also strongly recommended that an ARFF response study be conducted to establish the necessary station layout. Consideration of airfield complexity and traffic flow should also be factored into the evaluation. The FAA will not certify any air carrier runway unless the City of Chicago can consistently meet the minimum ARFF response times outlined in FAR Part 139.319(i)(2). The FAA Certification Safety and Standards Branch (AGL-620) requests to be directly involved in the planning phases of these stations to ensure that minimum ARFF response times can be met prior to the commissioning of all new air carrier runways.

A-54) **It may be necessary to relocate the ARFF Training Facility off-airport**. The ARFF training facility <u>must</u> provide vehicle and personnel access and egress without crossing or utilizing aircraft movement areas. In addition, this facility must be situated in a location that is not limited by potential operational restrictions to the Future Runway 9L-27R due to smoke obscuration.

A-55) **We request identification and evaluation of detention alternatives not involving on-site, on surface facilities to assist in ARFF (see also comments under "Wildlife").** With steep side slopes and significant depth as presently depicted, the detention facilities appear inimical to timely and effective ARFF response.

GROUND VEHICLE/SERVICE ROADS

A-56) **Provide information, in drawing format, on which perimeter roads are removed, constructed, or are to remain as they currently exist and their relation to the airport operations area**. This information should be shown both on the future ALP and on a separate drawing. It may also be helpful to distinguish those roads on the airport versus those roads off airport. Roadway information should also be provided on access roads and gates for current and future FAA facilities.

A-57) **In exhibit 16, the future runway configuration for 9R/27L shows the existing service road crossing the runway.** The future ALP does not indicate that this road will be removed. If the road is remaining, the future ALP does not identify what measures will be taken to prevent runway incursions.

A-58) **Show access roads for the navigational aids on the future ALP. They must be mutually acceptable for both the Department of Aviation (DOA) and FAA. FAA was unable to evaluate the availability of adequate facility access.**

A-59) **A complete perimeter road system must be included in this plan which will keep all vehicles off all movement areas except for those vehicles that must access movement areas due to activities such as: inspections, maintenance, snow removal, and emergency response.** All non-essential vehicles must have access to a service road system to prevent unnecessary runway crossings. This is a necessity for runway incursion prevention in addition to providing a necessary ARFF access road system. Access roads must be provided behind each and every runway located outside Runway and Taxiway Safety Areas.

A-60) **A vehicular traffic study is needed to determine if the future on airport vehicle roadways (perimeter/service) will be sufficient to handle the projected traffic.** Specific concerns exist with the additional traffic associated with the West Terminal complex to the main terminal core.

A-61) **Any new vehicular roadway should be tunneled if it crosses an aircraft movement area.**

A-62) **The service road bridge depicted on the east side of the future ALP that crosses the expressway is strongly supported and should be installed with Phase 1A of the airport development.** This service road is necessary to provide for the current and expanded level of vehicular traffic, which support the operations on the north side of the airfield.

A-63) **Service road access to Explosive Chamber, R1 is needed and should be clearly depicted.**

COMPLEX INTERSECTIONS

A-64) **Eliminate intersections with large pavement areas where several taxiways and/or runways come together at a single point and keep the intersections perpendicular except for high-speed exit taxiways where required.** These areas can be confusing to pilots and a potential for runway incursions. Examples: Phase 1A, the area of runway 9L/27R, along with its parallel taxiway, at the point they cross existing runway 14L-32R and taxiway P. Phase 1B, the new eastbound high-speed taxiway at the point it crosses existing runway(s) 9L-27R and 14R-32L. Phase 1C, new eastbound high speed as it crosses existing runway 14R-32L. Just to the west of that location where an eastbound and westbound high speed come together. Phase 2A where extension to existing runway 9L-27R and its parallel taxiway all come together with the taxiway leading north out of the satellite ramp and existing runway 14R-32L.

A-65) **All abandoned pavement created, as a result of this construction project must be completely removed.**

WILDLIFE

A-66) **Prior to commencing any construction related to development in the OMP, the City of Chicago shall complete a wildlife hazard assessment (WHA) to evaluate each separate phase of the construction plan**. USDA Wildlife Services is an acceptable party to conduct this assessment based on their expertise with animal damage control at airports, in addition to their specific expertise at O'Hare. If the WHA is not conducted by USDA Wildlife Services, AGL-620 will need to be consulted to evaluate the qualifications of the person(s) conducting the assessment prior to approval.

A-67) **As communicated in a letter to the City of Chicago on January 23, 2003, the FAA requests an evaluation of alternatives not involving on-site, on the ground detention facilities.** Alternatives to the current planned detention facilities should minimize the potential for wildlife attraction while also minimizing the risks for aircraft operating on the airfield. As a related matter, we take this opportunity to note that our letter of January 23, 2002 also referenced the FAA policy not to locate wildlife attracting compensatory wetlands near runway ends. The disposition of off-site below ground facilities should be included in the next ALP submittal.

TRANSPORATION SECURITY ADMINISTARTION

A-68) **All new facilities must have an adequate infrastructure to accommodate an access control system as well as personnel screening facilities since all new construction will either be contained within, or provide access to, the secured area of O'Hare International Airport.**

A-69) **Terminal and cargo buildings must be designed with sufficient space to handle screening equipment for passengers, employees, baggage and cargo.**

A-70) **Relocation and modification of perimeter gates must be designed to accommodate an area where screening of vehicles and occupants can take place.**

A-71) **The increase in the number of employees will necessitate additional capacity in the access control and identification badge computer systems.**

B-PHASING COMMENTS

PHASE 1 GENERAL COMMENTS

Guidance concerning the existing runways that will be required through the course of construction is included in Phase 1 for continuity.

B-1) **Runway 14L Instrumentation.** In order to maintain CAT II/III, the following are some of the actions that need to be taken.

a) Runway 14L Glide Slope and Touchdown RVR. If the excavation of the Detention basin begins (detention basin locations have not been approved), the glide slope and the touchdown RVR will be removed from service.
b) Runway 14L Mid-RVR. Damage to the Midfield RVR power and control cable during excavation is possible. Promptly repair as necessary.
c) Runway 14L ALSF-2.

   i) Reconstruct the regulator substation 650 feet north of Runway 9L-27R centerline, more than 400 feet southwest of Runway 14L centerline, and about 1,350 from 14L threshold.
   ii) The regulator substation building will be under the Runway 9L-27R 14 CFR part 77, 7:1 transitional surface.
   iii) Frangible steady-burning light bars will be in the Runway 9L-27R RSA and OFA, from threshold bar out to and including the station 7+00 bar. No flashers or flasher ICCs will be in the Runway 9L-27R RSA and OFA.
   iv) Light bars falling on Runway 9L-27R will have to be semi-flush.
   v) Construct the parking area around the ALSF-2 without disturbing the ALSF-2. Complete the parking area when the ALSF-2 is decommissioned. Do not permit penetration of the approach light plane.

d) Runway 14L Inner Marker. The IM antenna will be outside the Runway 9L-27R RSA and OFA, and will be about 500 feet off Runway 9L-27R centerline.

e) Runway 14L Localizer FFM. Continue to use the existing FFM antennas that are at the middle marker site. All control cable routes shall be preserved or new routes shall be established.

f) Runway 14L Rollout RVR. Do not disturb the existing rollout RVR, located at the existing Runway 32R glide slope site.

g) Runway 14L Localizer. Do not disturb the existing localizer, which is about 950 feet from the landing threshold of Runway 32R.

B-2) **Additional information will be needed to evaluate the phasing of 14R-32L, specifically as it pertains to the relocated or displaced threshold.**

B-3) **The pavement modifications to Runway 14L are not clearly depicted; specifically the 1200' relocation or displacement needs to be clearly identified.** In addition, if Runway 14L approach is relocated to the SE due to the construction of Runway 9L-27R, access to the 14L approach should be identified.

B-4) **Runway 14L-32R will be temporarily closed, but only pavement near the new Runway 9L-27R is shown to be removed.** We understand that Runway 14L-32R will be temporarily reopened after Runway 9L-27R is built, until the commissioning of Runway 9C-27C (Phase 2B). This may create a confusing condition with runway incursion potential at the Runway 14L end. What is the intended future use/disposition of this pavement after Runway 14L-32R is closed? It would appear that all of the runway pavement will be removed and no future taxiway use is planned.

B-5) **Runway 14R Instrumentation:**
In order to maintain Cat-II/III; do not disturb the existing ILS, ALSF-2, and RVR facilities serving Runway 14R. Also, do not construct any objects that would jeopardize the use of Runway 14R.

B-6) **At the bottom of Page 75 of the "Project Definition Report", there is an incorrect operational assumption that "The future GS-RVR Building will be temporarily relocated to enable the use of Runway 14R-32L."**
The future GS-RVR building referred to must be the Runway 9R GS-RVR building. The 9R glide slope has to be installed with the antenna mast 1,050 feet from 9R threshold and 400 feet from 9R centerline. The antenna mast will be only about 15 feet from the edge of the Runway 14R southwest shoulder. The 9R glide slope building will be on the shoulder. The touchdown RVR will be on the Runway 14R pavement. A portion of 14R shoulder and runway pavement will have to be demolished in order to construct the 9R glide slope and RVR.

PHASE 1A- RUNWAY 9L/27R

B-7) **Runway 9L Instrumentation:**

a) Trains on the railroad tracks may be a concern for glide slope performance. Further study is required and must be done under a reimbursable agreement between the FAA and Sponsor.
b) The ALSF-2 light lane as proposed crosses the railroad tracks where the tracks are narrow.
c) Due to the railroad, a non-standard light bar interval about 1500' from threshold is noted on the future ALP. Corrective action will be required. A railroad grade crossing will not be required, since access to the light lane will be possible and easy from both sides of the tracks. West of the tracks, access will be via Higgins Road and one of the side streets leading into the existing industrial park.

d) FFM antennas are not fixed by function, and cannot be sited in the runway safety area. FFM antennas should not have ground traffic in front of them. Therefore, relocate the service road to run through the ALSF-2 about 1,230 feet from Runway 9L threshold. This will create a viable FFM siting area between the service road and the end of the RSA.

B-8) **Runway 27R Approach and Runway 22R Instrumentation:**

a) The Runway 27R glide slope location is depicted incorrectly on the future ALP in relation to the runway centerline. In accordance with FAA Order 6750.16C, Siting Criteria for Instrument Landing Systems, Paragraph 27.c., Category II and III glides slopes should be located at a minimum distance of 400 feet from the runway centerline. It has been observed that to make all elements of the glide slope facility (antenna mast and building) clear the runway Object Free Area (OFA) the facility would have to be centered 407 feet off runway centerline.
b) The Runway 27R ALSF-2 as proposed, will cross several roads, creating a non-standard light bar interval. The current ALP configuration prevents standard installation of the ALSF-2 equipment. Corrective action will be required to meet current FAA standards.
c) The outermost light bar of the Runway 27R ALSF-2, as proposed, will have to be at the same elevation as the outermost flasher of the Runway 22R MALSR.
d) The alignment of the Bessie Coleman Extension and its on-ramp to I-90 eastbound as shown on the future ALP, are incompatible with the 27R ALSF-2 and the 22R MALSR and create a non-standard condition. Corrective action will be required to meet current FAA standards. These designs must be coordinated, with the design of the extension of Bessie Coleman Drive accessing I-90, and its on-ramp to I-90 eastbound.
e) The FAA was unable to identify an acceptable siting location for the Runway 27R localizer FFM antennas. The best FFM antenna site would probably be about 1,250 feet from threshold. At that site, the ALSF-2 light plane could be about 21 feet high. If the FFM antennas were 20 feet high, they would look over the vehicular traffic on the service roads in front of them, and they would be under the approach light plane.

B-9) **North Detention Basin:**
Runway 14L Glide Slope and Touchdown RVR. If the excavation of the Detention basin begins, the glide slope and the touchdown RVR will be removed from service.

B-10) **Air Traffic Control Tower:**

a) The requirement for two additional Airport Traffic Control Towers (ATCT) is valid from a line of sight perspective. The FAA will determine and approve the appropriate locations.
b) The new ATCT site must meet FAA Order 6480.4, Air Traffic Control Siting Criteria.
c) The City of Chicago, Department of Aviation must submit an ATCT Siting report indicating the following information:

i) Distance and depth perception to runway ends.
ii) Maximum To Avoid (MTA) elevations at each site.
iii) Shadow studies at each site.

iv) Look down angle radius at each site.

v) A narrative for the new sites addressing sunrise and sunset impacts, glare and light reflection impacts and employee access.

vi) The new sites must be large enough (2+ acres) for employee parking, Government Owned Vehicle (GOV) parking, a base building and support equipment.

d) The ultimate location and characteristics of the North and South Air Traffic Control Towers (ATCT), will not only need to take into account ATCT line-of-sight requirements, but will also need to consider it's impact to TERPS surfaces. Including CAT II/III Obstruction Clearance Criteria. Under a preliminary study conducted by the city in coordination with the FAA, there was impact to both current and future instrument approach procedures. Under this study two sites were selected, site 1 and site 5A. Our evaluations of each site was:

i) Site 1: 41° 59′ 40.955″N/087° 55′ 10.604″W, 881 Above Mean Sea Level (AMSL), 221 Above Ground Level (AGL), this site would result in a 40' MDA increase to the RNAV (GPS) approach to Runway 22R, it would also impact any planned usage to Runway 14L/14R after the ATCT is constructed.

ii) Site 5A: 41° 59′ 45.01″N/087° 54′ 55.639″W, 881AMSL, 221AGL, this site would result in a 60' MDA increase to the RNAV (GPS) approach to Runway 22R, it would also impact any planned usage to Runway 14L/14R after the ATCT is constructed.

B-11) **Geometry to Taxiway N2, U & existing Runway 18-36 should be reconfigured. Shift the new north/south taxiway east to line up with the transition to Runway 27R approach.**

B-12) **The runway OFZ's for 14L and the new Runway 9L-27R must not overlap, if simultaneous operations are anticipated.**

B-13) **CAT II and CAT III on new Runway 9L-27R will require hold lines to conform to TERPS requirement of 400 feet plus in some places.**

B-14) **Runway 9L-27R safety areas show what appear to be open creeks passing through the runway safety areas. Standing water is not permitted in any runway safety area. Additionally, the future Willow Higgins Creek must be tiled below ground level so it does not create a wildlife hazard.**

B-15) **The following items must be removed from the Runway 9L/27R Safety Area.**

a) A future drainage ditch transverses the RSA on both ends.

b) The existing structures in the Runway 9L RSA.

B-16) **The following items must be removed from the Runway 9L Object Free Area**

a) Roadway beyond the end of the runway at the northwest corner of the OFA.

b) Fence shown inside the roadway limits beyond end of runway near northwest corner of the OFA.

B-17) **OFA for the future 9L/27R parallel taxiway appears to be incorrect**

B-18) **From other documents, it appears that the existing Runway 9R pad will be removed and a tunnel will be constructed underneath three parallel taxiways before connecting with an existing airfield roadway tunnel. This development is not depicted on the future ALP.**

B-19) **Future Runway 9L (Sheet 1 of 2) (Sheet #11)**

a) Ensure the alignment of obstruction evaluation points between the plan and profile views (i.e., R5 through R9).
b) It appears that obstruction evaluation points FW1, FW2, and FW3 delineate a future waterway. If so, depict this waterway on the plan view and on the Future ALP.
c) What is the rationale behind trimming certain existing trees on future property to be acquired by the Airport (i.e., T27-T29, T34-T38, T49-T50) instead of removal? The FAA recommends removal of the trees.
d) There are at least two required obstruction evaluation points (existing roads) that are not depicted.
e) There are two sets of parallel railroad tracks crossing under the approach surface, but obstruction evaluation points are only depicted for the closer set.

B-20) **Future Runway 9L (Sheet 2 of 2) (Sheet #12)**

a) In the Plan view, the label for object B-13 is illegible because of the property line.
b) Points FW1, FW2, and FW3 are depicted on both sheets #11 and #12. See specific comment on Sheet #11 pertaining to these points.

B-21) **Future Runway 27R (Sheet #13)**

a) Depict planimetrics for the area beyond Interstate Highway I-90.
b) There are several future roads shown beyond the Runway 27R end on the Future ALP that are not depicted in the plan view. These roads should be added to the plan view and the appropriate obstruction evaluation points should be depicted.

PHASE 1B- RUNWAY 10L/28R EXTENSION

B-22) **Runway 10L Instrumentation:**

a) Glide Slope and PAPI. The glide slope as shown on the future ALP is incorrectly distanced from threshold, instead of the nominal 1,050 feet. Corrective action will be required to meet Glide Slope/PAPI FAA standard siting criteria. The centerline of the connector taxiway behind the shown PAPI is 1,374 feet from threshold. If the glide slope antenna mast stands 1,050 feet from runway threshold, the PAPI sited anywhere between 300' and 350' behind the glide slope will fall on the connector taxiway behind the glide slope.

b) The ALSF-2 light lane must cross the railroad tracks at a right angle where the tracks are set widely apart.
The railroad tracks on the 10L approach are two sets of two tracks each, separated by a wide median. In that median, there is ample room to install a light bar tower. If a light bar tower is installed in the railroad median, an access road grade crossing would be necessary across the two tracks on which railroad cars would block the crossing for the shortest duration. Even with the light bar in the railroad median, a couple of light bar intervals would deviate from the standard siting criteria. This non-standard spacing requires corrective action. With the light bar in the railroad median, an ALSF-2 bridge would not be required, but a special turnoff on the east side of York Road might be necessary to access the light bar. If a light bar tower is sited between the tracks and York Road, a special turnoff on the east side of York Road would definitely be needed. Alternatively, if an ALSF-2 bridge across York Road and the tracks were constructed, the turnoff on the east side of York Road would not be necessary.

c) If the building just west of York Road remains, one or two ALSF-2 light bars would have to be mounted on the building. This light bar siting would be a structural, access, safety, and leasing problem that would have to be solved.

B-23) **Runway 28R Instrumentation**

a) Instead of showing the Runway 28R glide slope 330 feet off runway centerline, show the existing glide slope in its existing location as future glide slope. We plan to use the existing glide slope for the future Cat-II/III approach.

b) The ALSF-2 as proposed will require 156 semi-flush lights. This is a non-standard configuration. Corrective action should be taken. The Runway 28R blast pad has been extended out to Taxiway Q and from Taxiway Q to the northwest edge of Runway 22L. In addition, the lights embedded in Runway 22L will also have to be semi-flush. A total of 156 ALSF-2 steady-burning lights will have to be semi-flush. Fifteen existing Medium Intensity Approach Lighting Systems (MALS) semi-flush lights are installed and operating under a National Change Proposal (NCP) waiver. There will also be a long non-standard space between the two light bars nearest Mannheim Road. This non-standard configuration requires correction. The approach light plane can begin to rise significantly above ground elevation only east of the thousand-foot bar east of Runway 22L.

c) Based on the future configuration, the Runway 28R approach Inner Marker and Localizer Far Field Monitors would be non-standard. Corrective action is required.

d) Based on the future configuration, the Runway 28R Inner Marker (IM) antenna would be installed about 205 feet south of the Runway 28R centerline and 205 feet southeast of the Runway 22L centerline. This non-standard configuration will require corrective action to meet current FAA standards.

e) The offset from Runway 28R centerline is required to preclude penetrating the approach light plane. The Far Field Monitor (FFM) antennas will be installed west of the snow equipment road, under the approach light plane. The antenna feed cables for the FFM and IM antennas will originate in the Runway 10L Localizer/28R ALSF-2 building. The IM antenna will stand about 650 feet from the building. That should be a short enough distance to run antenna feed cable in underground conduit to the IM antenna direct from the building.

f) Railroad Relocation:
The ALSF-2s of future Runways 9L, 9C, 9R, 10L, 10C, and 10R are all shown crossing railroad tracks. Permits for these crossings will be required from the railroad. To facilitate the issuance of permits for construction within the railroad right of way, it is essential that the DOA begin planning with the railroad now, if that planning is not already in progress.

g) Irving Park Road/York Road Intersection Reconstruction:
Elements of the ALSF-2's of future Runways 9C, 9R, 10L, and 10C are shown west of York Road on land that is shown off airport property. It is the DOA's responsibility to furnish all the interests in real estate required for the establishment of navigational aids. For ALSF-2, the interests include land on which to install light bar structures, cable ducts and cables, access roads and walkways, personnel ingress and egress, security, appurtenances, and avigation easements to protect the approach light planes from penetration. These avigation easements will be for airspace below the FAR Part 77 50:1 approach light plane. For the Runways 9C and 10L ALSF-2s, facility elements will have to be constructed on existing buildings off airport property. If these buildings are to remain, then the DOA must obtain special real estate interests that will be mutually acceptable to the owner of the ALSF-2 and of the buildings.

B-24) **Runway 10L high-speed exit taxiway at the intersection with current Runway 14R/32L and Taxiway M creates a vast expanse of concrete, which is not conducive to pilot orientation and runway safety and must be redesigned.** It appears that a portion of Runway 14R-32L will become taxiway when it is decommissioned, i.e., at the commissioning of Runway 10R-28L. The superfluous pavement should be demolished and removed. This configuration would still cause a complex taxiway/taxiway/runway intersection for Runway 10L-28R.

B-25) **To protect the runway from incursions, the pad adjoining the north side of the Runway 10L approach end should be shifted north toward the terminal apron and a single, standard connecting taxiway should be provided.** Consideration should be given to the length of the hold line and the placement of the signs. If two separate taxiway connectors are absolutely needed, an island should be constructed adjacent to the runway to control access to Runway 10L.

B-26) **The previous 9R and future 28L Pads depict pavement removal and or reconfiguration.** What operational restrictions will be placed on holding aircraft in the old 9R pad and the new 28L / 22L pad?

B-27) **Provide valid justification for the removal of pavement in the future 28L / 22L pads and to create islands.** The pavement was originally paid for by AIP funds and a justification on why the islands are being created and why the current pavement is no longer valuable to the airport's operation is required for removal. If the pavement is removed, the future ALP should depict pavement removal in this location.

B-28) **Runway 10L/28R Length**
In the phasing program presented in the Project Definition Report, Phase 1C, an operational assumption is that a maximum runway length of 13,000' is available on Runway 14R/32L until

construction progresses to the point of impacting the runway. At that point, a maximum runway length of 13,000' will be available on Runway 10L/28R (assuming completion of the facilitating railroad relocation). Runway 10L will have an LDA and ASDA of 12,249', not 13,000'. TORA and TODA for 10L, as well as all declared distances for 28R, will be 13,000'.

B-29) **See "General Technical Comments #A-46" section of this document on runway/taxiway separation for Runway 10L/28R.**

B-30) **Explore other options for snow removal equipment staging and consider eliminating the East/West Snow Road.** The runway-taxiway separation between future Runway10L-28R and parallel Taxiway M is apparently being reduced from 500 to 400 feet at the east end to accommodate the snow road transition to the north side of Taxiway B. This would seem to sacrifice a long-term benefit for a short-term gain, since it may preclude CAT II/III operations on 10L-28R. Request this be reevaluated. In addition this would clean up the geometry in this location.

B-31) **Remove the existing Union Pacific railroad track from the Runway 10L Safety Area.**

B-32) **Depict future land acquisition for ALS "light lanes" that extend off of the future airport property (i.e., 9C, 9R, 10L, 10C)**

B-33) **Depict taxiway to taxiway separation distance for Taxiways "A" and "B" in the vicinity of the existing core terminal**

B-34) **Depict Taxiway "A" OFA in the vicinity of the existing core terminal**

B-35) **Restrict Taxiway Q and/or controlled during departure operations on Runway 10L and 28R and during arrival operations on 28R.**

B-36) **Future Runway 10L (Sheet # 18)**

a) Depict obstruction evaluation points for terrain that penetrates the approach surface.
b) The relocated railroad is not depicted in the plan view. The appropriate obstruction evaluation points should be added.
c) Consider changing existing railroad resolutions from "N/A" to "relocated".
d) Object Number R16 is not depicted in either the Plan or Profile View.
e) There are at least six other required obstruction evaluation points (existing roads) that are not depicted.

B-37) **Existing Runway 27L/Future Runway 28R (Sheet # 19)**

a) Remove Runway 22L elevation.
b) Depict plan metrics for the area beyond Interstate Highway I-90.

B-38) **Runway 10C Instrumentation**

a) Glide Slope and PAPI. The Glide slope is shown only 850 feet from threshold, instead of the nominal 1,050 feet. Corrective action will be required to meet Glide slope/PAPI FAA standard siting criteria. The centerline of the connector taxiway behind the shown PAPI is 1,374 feet from threshold. If the glide slope antenna mast stands 1,050 feet from runway threshold, the PAPI sited anywhere between 300' and 350' behind the glide slope will fall right on the pavement of the connector taxiway behind the glide slope.

b) ALSF-2. The ALSF-2 light lane must cross the railroad tracks at a right angle where the tracks are set widely apart.

i) The railroad tracks on the 9R approach are two sets of two tracks each, separated by a wide median. In that median, there is ample room to install a light bar tower. If a light bar tower is installed in the railroad median, an access road grade crossing would be necessary across the two tracks on which railroad cars would block the crossing for the shortest duration. Even with the light bar in the railroad median, a couple of light bar intervals would deviate from the standard siting criteria. With the light bar in the railroad median, an ALSF-2 bridge would not be required, but a special turnoff on the east side of York Road might be necessary to access the light bar. If a light bar tower is sited between the tracks and York Road, a special turnoff on the east side of York Road would definitely be needed. Alternatively, if an ALSF-2 bridge across York Road and the tracks were constructed, the turnoff on the east side of York Road would not be necessary.

ii) On the Runway 9R approach, there is no building (at present) at the light bar sites west of York Road.

B-39) **Runway 28C Instrumentation**

a) The Runway 10C Localizer antenna array is shown on the future ALP at 1,000 feet from the marked 28C threshold. With this siting, the southeast corner of the localizer critical area touches the northwest edge of Taxiway "S". The 10C array cannot move any farther east, because if it did, Taxiway "S" would encroach upon the critical area. Therefore, to center the Runway 10C array 1,010 feet from the Runway 28C marked end, the marked end must move 10 feet west of its present location. Moving the runway end 10 feet west:

i) Makes 10,590 feet available for Runway 10C departures and Runway 28C landings.

ii) Results in a 210-foot pavement length between pavement end and marked threshold, rather than the presently shown 200-foot space.

iii) Causes the inner edge of the approach surface to lie 10 feet west of the runway pavement end. In option LA-1 below, a 230-foot pavement length between the end of the pavement and the threshold is considered.

b) Runway 28C ALSF-2 and Inner Marker and Runway 10C Localizer:

i) The FAA anticipates that semi-flush steady-burning and flashing lights will be installed at nominal stations 13+00, 14+00, 16+00, 21+00, and 22+00.

ii) The approach light plane must have a very low profile. In crossing Runway 4R-22L and Taxiways "S" and "S4", the ALSF-2 approach light plane will have to stay very close to runway and taxiway existing grade.

iii) The Runway 10C Localizer array location as proposed is a high object, and is prohibited from penetrating the low-profile Runway 28C ALSF-2 approach light plane.

iv) The array is 6.8 feet high from the top of the foundation (at finished grade) to the top of the radome. With customary infield grading, the array would penetrate the level approach light plane of a low-profile ALSF-2. FAA Order 6850.2a, Visual Guidance Lighting Systems prohibits any penetration of the approach light plane on CAT-II or CAT-III approaches. The antenna array will be at least a 14-Element Log Periodic Dipole Array. While such arrays do behave as frangible objects when struck, there would nevertheless be considerable mass protruding above the approach light plane. Corrective action will be required to meet FAA standards. In view of the above, the following two design options should be considered:

(a) Option LA-1: This option requires coordination among:

- The designer of the runway and RSA
- FAA Airports
- FAA Flight Standards
- FAA Airway Facilities ANI NAVAIDs designer
- FAA Airway Facilities maintenance

This option requires the following features shown on Sketch LA-1 and defined in the numbered legend:

- Marking the Runway 28C threshold (end) 230 feet from the runway pavement end instead of the 200 feet as shown on the future ALP.
- RSA grading with a runway extended centerline elevation of exactly 650.0 from runway pavement end to 970 feet east of runway pavement end (1,000 feet from runway end, at station 10+00).
- A 4H: 1V finished grade slope from elevation 650.0 on runway centerline at station 10+00 down to 645.0 at station 10+20.
- On runway centerline, a 1.0 percent downslope from 645.0 at station 10+20 to 644.6 at station 10+60, and a rising slope from station 10+60 to Taxiway "S".
- Watersheds and storm drain inlets.
- Localizer antenna, ALSF-2 light bars and flashers, Localizer/ALSF-2 building, and inner marker.

Moving the runway end 230 feet west of pavement end:

- Makes 10,570 feet available for Runway 10C departures and Runway 28C landings.
- Results in a 230-foot taxiway length between pavement end and marked threshold, rather than the presently shown 200-foot space.
- Causes the inner edge of the approach surface to lie 30 feet west of the runway pavement end.

For the remainder of the discussion of this option, station numbering will be based on the 230-foot threshold as origin (0+00).

If the runway end is just 230 feet west of pavement end, there will be a small RSA/TSA overlap, as shown on Sketch LA-1 (See comment #B-48). It is hoped that this overlap will not require grade changes that affect NAVAID design.

The Localizer infield grading, drainage, and storm sewerage must be designed such that the Localizer antenna array foundation top elevation is 645.0, for a radome top elevation of 651.8 above mean sea level. This elevation setting gives the best compromise between localizer function and low ALSF-2 profile. The lowest elements of the localizer antenna will be at elevation 651, or one foot above the RSA maximum elevation of 650. A localizer antenna array installed any lower would run the risk of signal blockage by the ground. There must be line of sight from the localizer antenna elements to all points on the runway. Therefore, the runway must slope continuously upward from the 28C end to the 10C end.

The localizer array radome top will be at elevation 651.8. The lamp centerline elevation of the thousand-foot bar will be 652.0, just high enough to make the ALSF-2 approach light plane clear over the localizer array without penetration.

If the pavement configuration on the approach to Runway 28C does not change, the ALSF-2 threshold light bar (station 0+10), and the next two light bars east (1+14 and 2+18), must be semi-flush. The next light bar east (3+22) will be frangible, and the lamp centerline elevation will be 651.2. Between the 3+22 bar and the 10+50 bar, the positive slope in the approach light plane will be 0.11 percent, extremely shallow. In that 728-foot-long segment, the plane would rise only 0.8-foot.

The problem will be the negative slope between the 10+30 light bar and the semi-flush light bar at approximately station 13+10, embedded in Taxiway "S". With the 10+50 light bar lamp centerline elevation 652.0, and the 13+30 semi-flush light fixture elevation 649.0 (estimated), the negative slope of this four-station segment will be 1.11 percent. For maintenance reasons, we desire to site the semi-flush light bars as close to taxiway and runway edges as feasible. So sited, they will incur minimal damage from airplane wheel loads. For this reason, we recommend against placing the semi-flush bar at station 13+50.

FAA Order 6850.2A criteria prohibit:

- More than one sloping segments in an ALSF-2.
- A negative slope steeper than 1.0 percent.
- A negative slope in an ALSF-2 beginning less than 1,500 feet from threshold

The light plane segment between stations 10+50 and 13+30 would deviate from these three criteria, but differ *significantly* only from the third. Corrective action will be required to meet FAA Standards.

The unusual infield grading proposed in Sketch LA-1 is designed to preclude penetration of the approach light plane by the localizer antenna array. The design was developed because:

- Siting the localizer east of Runway 22L will give create a significant ground control problem.
- **The Localizer as sited in option LA-1 has a 75-percent probability of performing to Cat-II/III tolerances.** If the localizer fails to perform to Cat-II/III standards, then it will be necessary to re-establish the localizer east of Runway 22L per Paragraph (b) below, with the attendant ground control problem. The risk of failure is low but significant.

The approach light plane will necessarily be choppy in elevation as it alternates between semi-flush and frangible mounts. The semi-flush lights will range 1 to 1.5 feet lower than the adjacent frangible lights. Corrective action will be required to meet FAA Standards. At four locations, frangible flasher ICCs will penetrate the approach light plane by about two feet. These penetrations are unacceptable and will require corrective action to meet current FAA standards.

The frangible lights near the taxiway and runway edges will have to be as low as feasible, to ensure that they will not be struck by any portion of any airplane, regardless of the airplane's position on the runway. The flasher ICCs will have to be remote from those lights for the same reason. Previous research has revealed that the outboard nacelles of some four-engine jets are low enough to be of concern for low objects mounted a considerable distance from runway and taxiway edge. Because of cable length limits, some ICCs will have to stand within taxiway or runway safety areas, some in OFAs. We anticipate that it will be necessary to cluster three ICCs near station 15+27, on the slightly depressed grade of the infield between stations 14+24 and 16+30. The three ICCs near station 15+27 will be those for the sequenced flashers at stations 14+24, 15+27, and 16+30.

Similarly, there will have to be a cluster of:

- Two ICCs near station 18+30, serving flashers at 17+30 and 18+30.
- Three ICCs near station 19+30, serving flashers at 19+30, 20+30, and 21+30.

- Three ICCs near station 24+30, serving flashers at 22+30, 23+30, and 24+30.

These ICCs will have to penetrate the approach light plane, but will not break line of sight. If the Runway 28C ALSF-2 is to be established and operated with Cat-II/III visibility credit, a two-foot penetration of an approach light plane will require corrective action to meet current FAA standards.

(b) Option LA-2. Design the 10C Localizer array 2,650 to 2,700 feet from the Runway 28C threshold. In this design, the 10C localizer critical area would overlie Runway 4R-22L and Taxiways "S" and "S4". Runway 22L would be a routine taxi route to departure Runway 10R in Exhibit V-35 (Taxiway Routes, Option 5 - IFR East Flow) of the Airside Simulation Analysis. This Localizer siting would give Air Traffic a significant ground control problem, since the Runway 22L taxi route would run right through the localizer critical area of Runway 10C, the primary IFR arrival runway.

v) For a 10C localizer array installed west of Runway 4R-22L, the localizer building will stand to the northeast of the array. The building will be outside the RSA and the OFA. This building would be in danger of being jet-blasted by an airplane turning from westbound on Taxiway "L" to northbound on the nearby connector to Runway 28R (existing 27L). Consideration should be given to constructing this building of concrete block, for maximum strength.

vi) The inner marker (IM) will probably be sited about 960 feet from the Runway 28C threshold.

(1) If design option LA-1 above is selected:

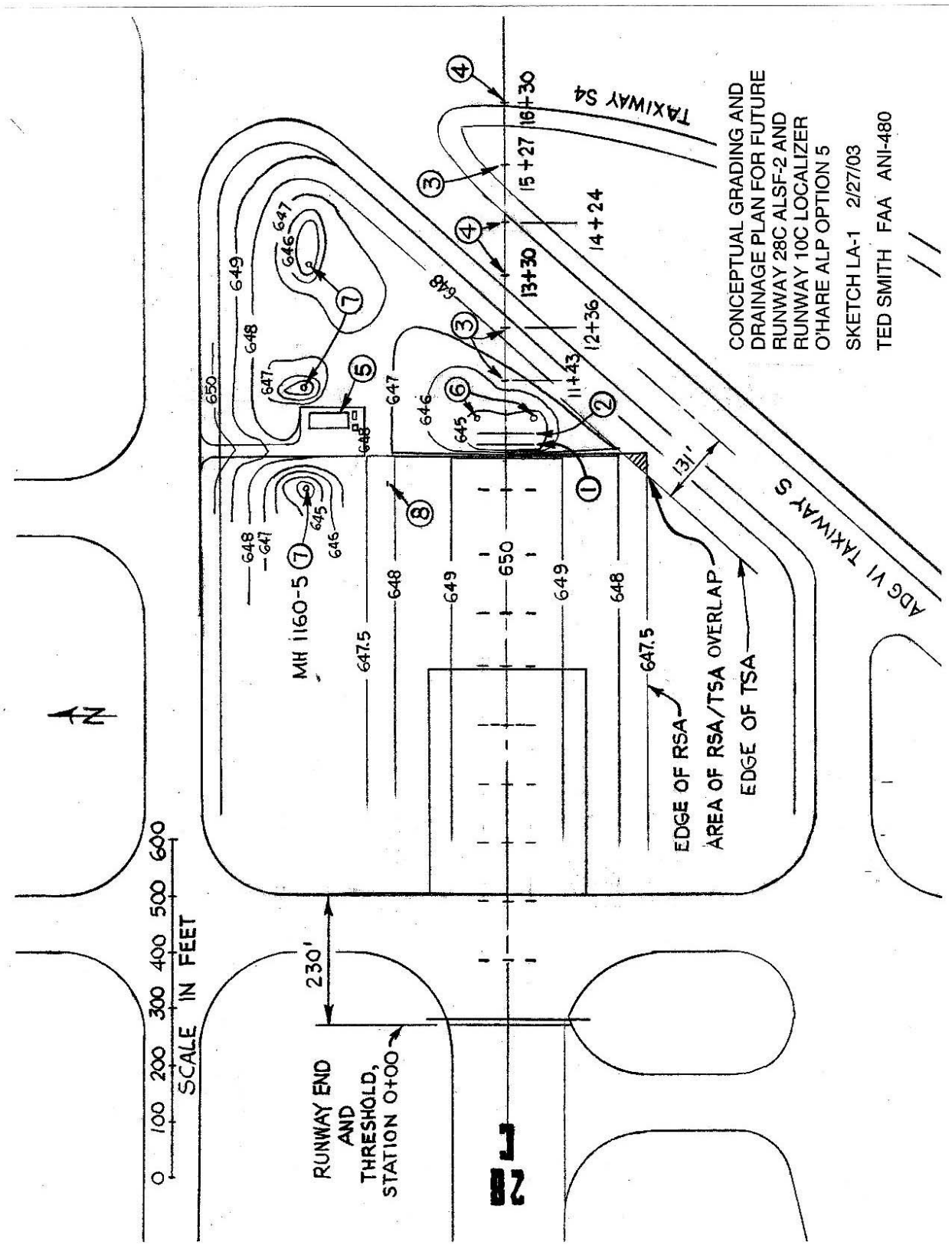
(a) The Runway 28C IM antenna might be able to be installed short enough to clear under the approach light plane. If this is not possible, corrective action will be required to meet current FAA standards.
(b) The IM antenna feed cable routing will be standard, and no problem.

(2) If design option LA-2 above were selected, the IM would be about 2,000 feet from the Localizer shelter. The solution to this remoteness would possibly be a freestanding weatherproof box housing the inner marker equipment, mounted 205 to 210 feet from runway extended centerline.

vii) Because the Runway 28C approach light plane is so low, the Runway 28C localizer FFM antennas will have to be installed east of the approach light plane. FFM antennas must be sited on runway extended centerline. If design option LA-1 above is selected, the FFM equipment will have to be housed either in a freestanding weatherproof box near the FFM antennas, or in the existing Runway 22L glide slope building 450 to 500 feet away from the FFM antennas.

viii) The Runway 28C glide slope is shown 1,050 feet from threshold, which is acceptable.

(1) The Runway 28C PAPI is shown 300 feet behind the glide slope antenna mast, which is correct.
(2) The connector taxiway that runs just behind the glide slope may be incompatible with the glide slope and PAPI. The taxiway connector centerline is only 124 feet west of the glide slope antenna. The wingtip of an Airplane Design Group (ADG) VI airplane on that connector could strike the glide slope shelter. In addition, an airplane turning off the connector could cause jet blast to the shelter. Move the connector west 300 feet, to make it clear the PAPI, which will then stand on the east side of the connector. The PAPI cannot be moved to the other side of the runway, as it would land on the high-speed turnoff taxiway. In its new location, the connector's east edge will be about 370 feet from the glide slope building, which is an acceptable distance.


CONCEPTUAL GRADING AND
DRAINAGE PLAN FOR FUTURE
RUNWAY 28C ALSF-2 AND
RUNWAY 10C LOCALIZER
O'HARE ALP OPTION 5
SKETCH LA-1 2/27/03
TED SMITH FAA ANI-480
TAXIWAY S4
ADG VI TAXIWAY S
MH 1160-5
EDGE OF RSA
AREA OF RSA/TSA OVERLAP
EDGE OF TSA
RUNWAY END
AND
THRESHOLD,
STATION 0+00
SCALE IN FEET
0 100 200 300 400 500 600
N
230'
131'
11+43
12+36
13+30
14+24
15+27
16+30
647.5
648
649
650
647
646
645
28R

NUMBERED LEGEND FOR SKETCH LA-1

1 RUNWAY 10C LOCALIZER ANTENNA ARRAY CENTERED AT STATION 10+30, RADOME TOP EL 651.8.

2 RUNWAY 28C THOUSAND-FOOT LIGHT BAR AND FLASHER, STATION 10+50, LAMP C/L EL 652.0.

3 FRANGIBLE ALSF-2 LIGHT BAR AND FLASHER. AT STATION 11+43, LAMP C/L EL IS 651.0. AT STATION 12+36, LAMP C/L EL IS 650.0.

4 SEMI-FLUSH ALSF-2 LIGHT BAR AND FLASHER. AT STATION 13+30, LAMP C/L EL IS 649.0.

5 RUNWAY 10C LOCALIZER/28C ALSF-2 BUILDING.

6 NEW STORM DRAIN INLET.

7 EXISTING STORM DRAIN INLET.

8 RUNWAY 28C INNER MARKER ANTENNA.

B-40) **The proposal to have high-speed exit taxiways from the north side of the new Runway 10C-28C where existing Taxiway K and existing Runway 14R-32L cross the new runway creates complex intersections that could contribute to pilot disorientation thus should be avoided.**

B-41) **Delete the two, joined, high-speed exit taxiways on the north side of Runway 10C-28C, west of Taxiway K, and East of Taxiway L1 that creates a wide expanse of pavement (excess of 600 feet wide) that could be confusing for pilots as part of an overall reduction of high-speed exit taxiways on the north side.** If the joined, high-speeds are absolutely needed at that location, an island should be inserted clearly defining two, separate, high-speed exit taxiways and taxiing aircraft on Taxiway L.

B-42) **The second connecting taxiway, perpendicular to the runway, just east of the west end of Runway 10C-28C, should be eliminated to reduce pilot confusion potential, unless absolutely needed.**

B-43) **Sheet 3 of the 38-sheet ALP set, "Future Airport Layout Plan", shows a different taxiway layout north of the Runway 10L extension and parallel taxiway than Exhibit 31, "Implementation Phase 1C", in the Project Definition Report. Which is correct?**

B-44) **Tunnel from South Cargo to terminal core is not fully color coded in accordance with legend.**

B-45) **Ensure headwall to south service road tunnel is outside Runway 10C/28C RSA.**

B-46) **The depicted service road system in the vicinity of the expanded M5 & Bravo Taxiways and K Concourse must be tunneled.** It would be impossible to ensure safe vehicle transition in this location based on the magnitude of traffic and the increased distance, with the vast expanse of taxiway pavement that a vehicle must give way to aircraft while on the service road.

B-47) **The taxiway safety area and the runway safety areas must not overlap on Runway 28C and Taxiway S.** A review of Group 6 aircraft utilizing S Taxiway behind Runway 28C will need to be performed. This will also require evaluation of the threshold for Runway 28C.

B-48) **The Future Bensenville Ditch should be placed in a culvert to prevent a potential wildlife hazard.**

B-49) **Verify that the base map buildings depicted in the 10C RPZ and the flight Kitchen located in the 28C RPZ are not public places of assembly. If these buildings are considered places of public assembly, remove the facilities.** This verification includes the type of facilities and the number of people gathered at peak times and the amount of time considered peak time (AC 150/5300-13).

B-50) **Airport Data Sheet (Sheet #4)**

a) Runway 28C threshold is displaced on the future ALP but no threshold displacement is indicated in the Airport Data Sheet (Displaced Threshold = "none" in Airport Data Sheet)
b) No Runway Threshold Elevation is depicted for the Runway 28C displaced threshold
c) Future Runway 10C/28C PAPI's depicted on the future ALP are not included in the Airport Data Sheet
d) Runway length for 10C/28C should be 10,800'.

B-51) **Future Runway 10C (Sheet # 20)**

a) Depict obstruction evaluation points for terrain that penetrates the approach surface.
b) The relocated railroad is not depicted in the plan view. The appropriate obstruction evaluation points should be added.
c) There are at least five required obstruction evaluation points (existing roads) that are not depicted.

B-52) **Future Runway 28C (Sheet # 21)**

a) There are two approach surfaces shown on the plan view. The correct approach surface should be depicted as beginning 200 feet beyond the physical end of the runway, not 200 feet beyond the displaced threshold.
b) Remove the label in the profile view that states "Spine Road Centerline at Extended Runway Centerline". If necessary, depict an obstruction evaluation point as required at this location.
c) Why is Runway 4R/22L shaded?
d) There are at least two required obstruction evaluation points (existing road) that are not depicted.

B-53) **Future Airport Layout Plan Part 77 Surfaces Drawing (Sheet #35)**

a) Verify Runway 28C end elevation (is 650' the displaced threshold or end?)
b) Verify Runway 28C approach surface origination point, which should begin 200' from the end of the runway, not the displaced threshold (primary surface appears to be approximately 11,000' long)

PHASE 1 WEST SATELLITE CONCOURSE

B-54) **RTR ORD is presently located in the area identified as the future location of the West Terminal Satellite Concourse (T4) and will require relocation**. FAA requests additional information on the future concourse building. This will be used for evaluation of its potential as a home for a replacement co-located communication site.

B-55) **The existing FAA Special Purpose Building and the HAZMAT Building will require relocation.**

B-56) **The taxiway off the north side of the apron should intersect existing Runway 14R-32L perpendicularly. Is this a temporary configuration? It is not clear on the "Future Airport Layout Plan".**

B-57) **Unless the existing terminal core roadway is tunneled, a roadway system must be added to connect South Cargo and the Post Office to the West Terminal**. It appears that the current configuration of roadways will force traffic from the south cargo / post office into the terminal core roadways in order to access the West Terminal. This would create an unacceptable amount of additional traffic, which would cross active taxiways.

B-58) **The service roads on the West Satellite Terminal Apron show the TOFA as 160'. The terminal is used be Group VI aircraft and the TOFA is 193' in accordance with AC 150/5300-13, Airport Design.**

B-59) **Airport Surveillance Radar (ASR):**
The existing ASR shall be relocated and operational at the new location prior construction activity and earthwork for Phase 1-West Satellite and Phase 2- West Terminal.

PHASE 2 WORLD GATEWAY

B-60) **Further describe what sections of World Gateway Program will be included in OMP and those that are not to be included.**

B-61) **K Concourse extension goes through the terminal core service road system. This service road must be properly relocated.**

B-62) **K Concourse extension appears to violate the 131' TOFA for Alpha Taxiway.**

B-63) **ARFF Station 3 access/egress appears to be compromised by Terminal 4 development.**

B-64) **Clarify the location of the Federal Inspection Services (FIS) locations in reference to the demand for such a facility and the phasing of the OMP.** Page 26 Paragraph 4.1 of the Project Definition Report discusses wide body jets are no longer part of the redevelopment of Terminal 2, but does not discuss where those wide body jets will be included in the OMP development. In a recent meeting it was discussed Federal Inspection Services (FIS) will remain in Terminal 2, would this not necessitate some wide body jets would remain in terminal 2? In addition the Project Definition Report shows NLA, which are assumed used for international flights, in the West and West Satellite Terminals, but the Project Definition Report only discusses an FIS station in the West Terminal, which is shown to be built after the West Satellite Terminal.

B-65) **Will NLA still be able to go to terminals 2, 4, and 5, especially if the airlines located in these terminals will be using NLA?** Page 26 Paragraph 4.2 of the Project Definition Report states, "the East Terminal Area will be developed consistent with the WGP." This does not take into consideration the shifting of the NLA from the WGP to the West Terminal development. In addition WGP stated Terminal 2, 4 and 5 would be capable of NLA.

B-66) **Why does the proposed Taxiway B and M extensions (east of M5 and adjacent to Runway 28R end) need to be designed for ADG VI, when exhibit 9 (page 17) in the PDR does not indicate that ADG VI aircraft will use this parallel taxiway system to access Terminal 5/6 (East Terminal).**

B-67) **Is there proposed future use of the East Terminal by NLA that is not described in the Project Definition Report?** Both the Concept Development/Refinement Report and Exhibit 9 in the Project Definition Report indicate a need for Group VI aircraft to have access to the East Terminal area. However, the East Terminal Plan exhibit in the PDR (Exhibit 18) does not depict any A380/NLA capable gates at the East Terminal. The only A380/NLA capable gates depicted on the Composite Terminal Plan (Exhibit 16) are at the West Terminal. It is also assumed that the southwest cargo area will accommodate A380 aircraft (i.e., FedEx).

PHASE 2A - RUNWAY 9R/27L EXTENSION

B-68) **Runway 9R Instrumentation**

a) Glide Slope and PAPI. The glide slope distance from threshold is incorrect, instead of the nominal 1,050 feet. Corrective action will be required to meet glide slope/PAPI FAA standard siting criteria.
b) The ALSF-2 light lane must cross the railroad tracks at a right angle where the tracks are set widely apart. The railroad tracks on the approach to runway 9R are two sets of two tracks each, separated by a wide median. In that median, there is ample room to install a light bar tower. If a light bar tower is installed in the railroad median, an access road grade crossing would be necessary across the two tracks on which railroad cars would block the crossing for the shortest duration. Even with the light bar in the railroad median, a couple of light bar intervals would deviate from the standard siting criteria. With the light bar in the railroad median, an ALSF-2 bridge would not be required, but a special turnoff on the east side of York Road might be necessary to access the light bar. If a light bar tower is sited between the tracks and York Road, a special turnoff on the east side of York Road would definitely be needed. Alternatively, if an ALSF-2 bridge across York Road and the tracks were constructed, the turnoff on the east side of York Road would not be necessary.

B-69) **Runway 27L Instrumentation**

a) Runway 27L Glide Slope and PAPI. The glide slope is not at the nominal 1,050 feet. Corrective action will be required to meet Glide slope/PAPI FAA standard siting criteria.
b) Instead of showing the glide slope 750 feet from Runway 27L landing threshold, show the glide slope 1,070 feet from threshold. As shown, the Glide slope is 1,050 feet from the runway pavement end; this is not the landing threshold.
c) Show the PAPI 1,420 feet from threshold, which will be 350 feet west of the glide slope antenna mast. This will give the PAPI ample room to clear the connector taxiway.

d) Runway 27L ALSF-2. The threshold light bar and nominal stations 1+00 and 2+00 light bars must be semi-flush. The ALSF-2 will extend into the car rental area east of Bessie Coleman Drive.

B-70) **Operational Assumptions**
The ALP has an incorrect operational assumption- "The future GS-RVR Building will be temporarily relocated to enable the use of Runway 14R-32L."

The future GS-RVR Building referred to must be the Runway 9R GS-RVR building. The 9R Glide slope has to be installed with the antenna mast 1,050 feet from 9R threshold and 400 feet from 9R centerline. So sited, the antenna mast will be only about 15 feet from the edge of the Runway 14R southwest shoulder. The 9R Glide slope building will be on the shoulder. The touchdown RVR will be on the Runway 14R pavement. A portion of 14R shoulder and runway pavement will have to be demolished in order to construct the 9R Glide slope and RVR.

B-71) **The extension of Runway 27L/9R will create some complex configurations due to multiple runway and taxiway intersections creating large expanses of pavement, albeit on a temporary basis, at intersections with existing Runway 14R-32L, which is not planned to be demolished until Phase 2C is completed (commissioning of Runway 10R-28L).**

B-72) **The future high-speed exit taxiway for Runway 9R arrivals north of the Terminal One Satellite appears to overlap the one for Runway 27L arrivals, creating a very large expanse of pavement that must be resolved.** Could it be shifted to the east? If so, could the second future high-speed exit taxiway at former Runway 18-36 remain a simple perpendicular connector?

B-73) **To protect the runway from incursions, the large pad adjoining the south side of the Runway 9R end should be shifted south toward the terminal apron and a single, standard connecting taxiway should be provided**. Consideration should be given to the length of the hold line and the placement of the signs. If two separate taxiway connectors are absolutely needed, an island should be constructed adjacent to the runway, to control access to Runway 9R.

B-74) **Remove old Runway 9L pad at Taxiway J & E unless it provides operational benefit.** Currently the pad is restricted to holding B-1900 aircraft or smaller.

B-75) **Remove Taxiway R at the intersection of Taxiway B and Runway 4L from a runway safety standpoint.**

B-76) **Shifting Taxiway H1 to the west and expanding the width of the taxiway creates a potential runway safety issue and is not recommended.** This particular area contains high traffic from aircraft access and egress into United's North Port and also contains high vehicular traffic associated with airline ground support equipment on the terminal apron.

B-77) **Depict the parallel runway separation distance between Runway 9R/27L and 10L/28R.**

B-78) **The following buildings/facilities located in the RPZ must be removed.**

a) #572: Hertz Rental Car Maintenance
b) #580: Budget Rental Car Administration
c) #569: Dollar Rental Car
d) #574: Avis Car Rental Administration and Maintenance
e) #570: National Car Rental Administration
f) #568: Avis gas island
g) #566: Hertz gas island

B-79) **Move the Runway 9R Localizer building eastward to clear the object free area.**

PHASE 2B - RUNWAY 9C/27C

B-80) **Runway 9C Instrumentation:**

a) Glide Slope and PAPI. The glide slope is shown only 850 feet from threshold, instead of the nominal 1,050 feet. Corrective action will be required to meet Glide slope/PAPI FAA standard siting criteria. The centerline of the connector taxiway behind the shown PAPI is 1,374 feet from threshold. The glide slope antenna mast stands 1,050 feet from runway threshold, the PAPI sited anywhere between 300' and 350' behind the glide slope will fall on the connector taxiway behind the glide slope.

b) The runway 9C ALSF-2 light lane must cross the railroad tracks at a right angle where the tracks are set widely apart. There is probably insufficient space between tracks to install a light bar tower. An ALSF-2 bridge might be necessary over the tracks and York Road, which are close together, since coherent light bar spacing might not be possible without a bridge. Otherwise, the gap in light bar spacing might be too great to meet current FAA standards. A railroad grade crossing will not be required, since access to the light lane will be possible and easy from both sides of the tracks. A special turnoff on the eastside of York Road would be necessary to access the light bar between York Road and the tracks, if such a bar siting proves feasible. With an ALSF-2 bridge across York Road and the tracks, the turnoff on the eastside of York Road would not be necessary.

c) If the building just west of York Road remains, one or two ALSF-2 light bars would have to be mounted on the building. This light bar siting would be a structural, access, safety, and leasing problem that would have to be solved.

B-81) **Runway 27C Instrumentation**

a) Runway 27C Glide Slope and PAPI. The glide slope is shown only 850 feet from threshold, instead of the nominal 1,050 feet. Corrective action will be required to meet glide slope/PAPI FAA standard siting criteria.

i) Instead of showing the glide slope 850 feet from Runway 27C landing threshold, show the Glide slope 1,050 feet from threshold.

ii) Show the PAPI 1,400 feet from threshold, which will be 350 feet west of the glide slope. This will give the PAPI ample room to clear connector Taxiway V1 if the excess width of Taxiway V1 is removed. Show Taxiway V1 a consistent 75 feet wide.

b) The Runway 27C ALSF-2 will have to cross Bessie Coleman Drive, and extend into the parking lot, where some parking spaces will be lost. Actions must be taken to minimize nonstandard intervals between light bars and to facilitate ALSF-2 construction and operation. Those required actions include, but not limited to:

i) Route Bessie Coleman Drive such that:
   (1) It does not begin widening out to more than 75 feet wide until it is north of runway extended centerline.
   (2) Its centerline crosses the runway extended centerline 1,265 from Runway 27C threshold.

ii) Create light bar sites, 55 feet from both sides of Bessie Coleman Drive, being 1,210 feet and 1,320 feet from threshold, respectively.
iii) Route the service road such that its west edge crosses the runway extended centerline 1,140 feet from Runway 27C threshold.
iv) Route the fence not farther east than 1,180 feet from Runway 27C threshold.

B-82) **The National Weather Service Owned ASOS facility is currently located near the existing Runway 14R glide slope building. The future Runway 9C and its connecting taxiways will run through this area and jeopardize the siting criteria of the current ASOS site.**

There is a 500' building restriction around the ASOS sensor. The ASOS sensor facility should be relocated and operational before construction begins within 500' of the facility. Construction activity, to include earthwork, in the area of the ASOS can degrade its operation and make in unusable. The ASOS sensor shall be shown on the future ALP.

B-83) **VOR/DME Relocation:**

The VOR/DME must be relocated and operational at the new location before construction activity occurs within 1000' of the existing facility. The facility is a vital navigational tool for large numbers of both IFR and VFR aircraft operating in and around Chicago airspace. The VOR/DME will require a reimbursable or similar type relocation agreement. VOR/DME relocation will require revision of 22 Standard Instrument Approach Procedures (SIAPS), 5 Standard Terminal Arrival Routes (STARs), and 3 Departure Procedures (DPs), which may require 12 months or up to 11/2 years lead time based on current workload and complexity.

B-84) **Depict the VOR/DME critical area for the relocated VOR/DME. Are the buildings approximately 600' - 1000' to the east of the VOR/DME (i.e., #8029, #8025, #8028, #8018) to remain or be removed?**

B-85) **When Runway 9C/27C is commissioned, Runway 14L/32R will be decommissioned, as understood from information provided. Please provide information if this assumption is not correct and the timing of these events.**

B-86) **Page 77 of the Project Definition Report describes sections of Runway 14L/32R are to be demolished. Remove all unused portions of this runway.**

B-87) **Review and redesign the future construction of a partial parallel taxiway on the north side of Runway 4L/22R that will create a potentially confusing intersection at its southern end where it connects with Taxiways E and H.**

B-88) **The new high-speed exit taxiway, for Runway 9C arrivals, on the south side of Runway 9C/27C at its intersection with Runway 4L/22R, should be shifted to the east, to avoid the runway intersection.** This may cause a complex intersection (more than 4 corners) where Taxiway Z and former Runway 18/36 intersect and should be further evaluated.

B-89) **Review and redesign the new high-speed exit taxiway, for Runway 27C arrivals, from the south side of runway 9C/27C at Taxiway E that will create potentially confusing geometry.** Possibly, Taxiway E needs to be reconfigured and/or partially removed.

B-90) **This new runway will create some complex configurations, albeit on a temporary basis, at intersections with existing Runway 14R/32L.**

B-91) **The configuration of the depicted 9C Pad presents some challenges with Taxiway Y crossing directly through the pad. Additional information and study will be needed to see how positive guidance and wingtip separation clearance will be provided between taxiing aircraft and holding aircraft east and west of Taxiway Y.**

B-92) **The pavement configuration at V1 Taxiway both north and south of Runway 27C is unclear on what will be removed versus what is proposed.**

B-93) **The service road system servicing the Northwest Maintenance facilities and adjacent tenant buildings must be designed to eliminate all tenant vehicular traffic from crossing taxiways. Roadways should be tunneled.**

B-94) **Buildings 8066 & 8067 (Training Aid Shop) located in the 27C RSA should be shown in green as "To Be Relocated".**

B-95) **The standing water shown in Runway 9C Safety Area must be mitigated.**

B-96) **Remove the Airport Transit System (ATS) from the Runway 27C RPZ.** The Remote Parking ATS station is approximately 1,900' east of the Runway 27C threshold. According to the Project Definition Report, "…it is not anticipated that the concentrations of persons at the ATS station would reach levels of assembly similar to facilities identified in AC 150/5300-13 as inappropriate in the RPZ…" (page 6). Based on additional information

provided in a March 25, 2003, letter from The City of Chicago to the FAA, the peak population of the station is 95 people. This was based on the World Gate Way Program estimates. This amount, plus the amount of people in the cars would be considered under AC 150/5300-13 to be a public assembly.

B-97) **Remove the Surface long-term automobile parking (Lot E) from the Extended OFA portion of the RPZ**. Surface long-term automobile parking (Lot E) is proposed to remain within the OFA extension. According to the Project Definition Report, "There are no parking structures or appurtenances within the OFA-extension. While relocation of the Lot E auto surface parking was considered, such action was determined impractical given landside constraints" (Page 6). AC 150/5300-13 states that "Automobile parking facilities, although discouraged, may be permitted (in the RPZ), provided the parking facilities and any associated appurtenances…are located outside of the object free area extension." Surface Parking is considered a facility due to the large number of vehicles containing fuel.

B-98) **Remove building #8067 (Training Aid Shop) from the RSA.**

B-99) **Remove the creek or drainage ditch (Willow Creek) located about 850 feet from the Runway 9C RSA.**

B-100) **Remove approximately 300 feet of pavement located prior to Runway 27L threshold that is marked as a taxiway and place connecting taxiways at actual beginning of the runway (Threshold).** Advisory Circular 150/5300-13, paragraph 305 d (2) "The displacement of a threshold that does not also include relocation of the lead-in taxiway can create an undesirable and confusing operating environment for the pilot."

B-101) **Due to the potential wildlife attractant, the future landside detention basin located between the Runway 9C and 9R Runway Protection Zones, which is not depicted on the future ALP, must be resolved (off site or underground alternatives).**

B-102) **Future Runway 9C (Sheet #14)**

a) Depict obstruction evaluation points for terrain that penetrates the approach surface.
b) There are at least two required obstruction evaluation points (existing roads) that are not depicted.
c) There are two sets of parallel railroad tracks crossing under the approach surface, but obstruction evaluation points are only depicted for the closer set.
d) A future on-airport road shown on the future ALP is not depicted in the plan view. This road should be added to the plan view and the appropriate obstruction evaluation points should be depicted.

B-103) **Future Runway 27C (Sheet #15)**

a) Ensure the alignment of obstruction evaluation points between the plan and profile views (i.e., R7)
b) What is the proposed method for lighting the future automobile parking area depicted under the Runway 27C approach surface (facility P2 on the future ALP) if all of the light

poles are to be removed? (See comment #B-93 for removing parking outside of extended OFA.)

c) There are at least two required obstruction evaluation points (existing Bessie Coleman Drive) that are not depicted.
d) Several future roads shown on the future ALP are not depicted in the plan view. These roads should be added to the plan view and the appropriate obstruction evaluation points should be depicted.

PHASE 2C - RUNWAY 10R/28L

B-104) **Runway 10R Instrumentation:**

a) The 10R Approach the Glide slope is incorrectly distanced from threshold, instead of the nominal 1,050 feet. Corrective action will be required to meet Glide slope FAA standard siting criteria.
b) The future ALP incorrectly depicts the proper location for the glide slope facility in relation to the Runway centerline. FAA Order 6750.16C, Siting Criteria for Instrument Landing Systems, Paragraph 27.c. CAT II and III glides slopes should be located at a minimum distance of 400 feet from the runway centerline. It has been observed that to make all elements of the glide slope facility (antenna mast and building) clear the runway OFA the facility would have to be centered 407' off runway centerline. This siting would make the facility encroach upon the taxiway OFA of an Airplane Design Group VI taxiway whose centerline is 600' from runway centerline. This conflict must be resolved.

   The Runway 10R glide slope, shown 325' off runway centerline, must be sited not less than 400' off centerline. The height of the glide slope antenna mast is limited by the height-limiting formula in FAA Advisory Circular 150/5300-13, Airport Design, Paragraph 306c (2)(b). By this formula, the maximum height of an antenna 400 feet from runway centerline is x feet above the elevation of the crown of the runway abeam the glide slope antenna mast. If the finished grade elevation at the glide slope antenna mast is 4.0 feet below the runway crown elevation abeam the mast, then the maximum allowable antenna mast height is x' + 4.0', or (x ft.+ 4 ft) above finished grade. Moving the Runway 10R glide slope out to 400' might require moving the fence and the ditch respectively. In addition, there is a problem with the traffic on Irving Park Road and the fence, where they curve northerly.

c) Runway 10R ALSF-2. The future Bensenville ditch, the airport security fence, future relocated Irving Park Road, and rerouted railroad tracks are all shown crossing through the ALSF-2. These items must be designed to accommodate standard stationing of the ALSF-2 light bars.

   i) If possible, reroute the railroad tracks around the end of, instead of through, the ALSF-2. Ideally, the tracks should amply clear the outermost light bar tower of the ALSF-2. If the tracks must cross the ALSF-2, the track design must include ALSF-2 ducts under the tracks, and a grade crossing for the access road.
   ii) The future Bensenville ditch must be culverted near the Runway 10R ALSF-2. The culvert top should extend to at least 50 feet from runway centerline measured in a

direction perpendicular to runway extended centerline. Either the culvert must have cable ducts constructed over it, or there must be a 48-inch depth of soil over the top of the culvert for the later construction of cable ducts. These provisions will give sufficient room to construct an access road and cable ducts over the culvert.

iii) Irving Park Road has an ample median today. That median should continue in the design of rerouted Irving Park Road. Irving Park Road and its median should be designed to place the ALSF-2 16+00 light bar in the center of the median. The median must have guardrails and a paved pull-off for maintenance personnel safety. The median must be designed with a level crushed rock surfaced area for maintaining the light bar tower in the tilted down position. The Irving Park Road design must include ALSF-2 cable ducts running from "right of way" line to "right of way" line, with an electrical handhole at each end, and in the median.

iv) The ALSF-2 as proposed, will cross over Irving Park Road about 300 feet south of the junction of Irving Park Road with the future airport access road. This junction must permit a left-hand turn from the future airport access road onto Irving Park Road. There must be an access road for the maintenance of the ALSF-2 segment southwest of Irving Park Road. This ALSF-2 access road must enter the southwest side of Irving Park Road. This entrance must be co-linear with the future airport access road on the northeast side of Irving Park Road.

B-105) **Runway 28L Approach:**

a) Runway 28L Glide Slope. The distance from the runway centerline requires correction. The future ALP incorrectly depicts the proper location for the Glide slope Facility in relation to the Runway Centerline. FAA Order 6750.16C, Siting Criteria for Instrument Landing Systems, Paragraph 27.c. Category II and III glides slopes should be located at a minimum distance of 400 feet from the runway centerline. It has been observed that to make all elements of the glide slope facility (antenna mast and building) clear the runway Object Free Area (OFA) the facility would have to be centered 407 feet off runway centerline. This siting would make the facility encroach upon the taxiway OFA of an Airplane Design Group VI taxiway whose centerline is 600 feet from runway centerline. This conflict must be resolved.

When the glide slope is moved farther from the runway centerline, route the fence outside the critical area. The glide slope is shown 1,050' feet from the threshold, which is acceptable.

b) Runway 28L ALSF-2:

i) Two lines 200 feet apart run parallel to the runway centerline between the end of the blast pad and Taxiway S. It is believed that these two lines represent a paved area for the facilitation of snowplowing from the end of Runway 28L to Taxiway S. If the DOA intends that the ALSF-2 between the threshold and Taxiway S be semi-flush, we request that these two lines be deleted.

ii) Frangible lights are to be installed only where they fall on runways or taxiways. The practice of installing semi-flush lights in a threshold-to-taxiway infield (see Runway 28R below) should not be repeated. The best visual guidance, the greatest facility

reliability, and the greatest ease of maintenance derive from frangible lights, not semi-flush lights.

iii) We anticipate that semi-flush:

(1) Steady-burning lights will be installed for all three light bars at station 7+00, and for at least one light bar of stations 5+00 and 6+00, in Taxiway "S"

(2) Steady burning and flashing lights will be installed at stations 13+00, 14+00, 15+00, and 16+00, in Taxiway S2 and Runway 4R-22L.

(3) In crossing Runway 4R-22L and Taxiways "S" and "S2", the ALSF-2 approach light plane will have to stay very close to the ground. (The approach light plane is the imaginary plane passing through the steady-burning lamp centerlines.) Consequently, the approach light plane will have to be very low from the 28L threshold to approximately station 16+00, just east of the southeast edge of Runway 4R-22L. Only east of that point can the approach light plane rise, and at that point, it will rise at 2.0 percent to the east. It appears that the approach light plane will clear over Irving Park Road by well more than the required 15 feet.

iv) To avoid approach light penetration by the Runway 10R Localizer antenna array, see the discussion for the Runway 10R Localizer below.

c) The Runway 28L Inner Marker depends on the Touchdown Zone Elevation (TDZE).

i) There is a chance that the Runway 28L Inner Marker could be sited within longitudinal tolerance about 1,000 feet from threshold, and 205 to 210 feet north of runway extended centerline. The reason for the offset would be to preclude penetrating the ALSF-2 approach light plane with the IM antenna and cable antenna box. With this siting, the IM would be inside the taxiway safety area, and would be about 70 feet off the taxiway centerline. In that location, the probability of a B-747 nacelle's striking the IM antenna would be greater than an airborne airplane striking the IM antenna sited on runway centerline. Sited on runway centerline, the IM antenna would penetrate the approach light plane by about 4 feet, a non-standard condition. Corrective action will be required to meet current FAA standards.

ii) The antenna feed cable conduit would have to run to the Inner Marker cable transition box at the antenna from the Runway 10R Localizer/28L ALSF-2 building. The Federal Aviation Administration (FAA) is currently researching to find a length of coaxial cable that would need only one splice in the run, the conduit can run straight from box to building, a distance between 1,200 and 1,300 feet. The conduit would have to be bored and pulled under Runway 4R-22L.

d) <u>Runway 10R Localizer:</u>

i) The Runway 10R Localizer antenna array is shown about 1,880 feet from threshold. At this location, the array might not clear under the ALSF-2 approach light plane. Corrective action will be required.

ii) Moving the array back to 2,150 feet would place it well under the approach light plane, outside the OFA, and abeam the 10R Localizer/28L ALSF-2 building.

iii) Taxiway routes Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) east flow (Exhibits V-31 and V-35, respectively, of the Airside Simulation Analysis) do not route any airplanes through the localizer critical area except airplanes landing on Runway 10R.

e) South Air Traffic Control Tower:
The requirements for two additional Airport Traffic Control Tower (ATCT) facilities are valid from a line of sight perspective. The Air Traffic Division, AGL-510 and the Chicago NAS Implementation Center, ANI-400 will determine and approve the appropriate locations.

i) The new ATCT site must meet FAA Order 6480.4, Air Traffic Control Siting Criteria.
ii) The City of Chicago, Department of Aviation must submit an ATCT Siting report indicating the following information:

(1) Distance and depth perception to runway ends.
(2) Maximum to Avoid (MTA) elevations at each site.
(3) Shadow studies at each site.
(4) Look down angle radius at each site
(5) A narrative for each site addressing sunrise and sunset impacts, glare and light reflection impacts and employee access
(6) The new site must be large enough (2+ acres) for employee parking, Government Owned Vehicle (GOV) parking a base building and support equipment.

B-106) **See "General Technical Comments #A-46" in this document on runway/taxiway separation for Runway 10L/28R.**

B-107) **Runway 14R-32L will be decommissioned when Runway 10R-28L is commissioned as implied in information provided.**

B-108) **Provide information on the future plans for the existing Main Cargo Road.** Will it be removed between the future Taft Road and the South Access Road?

B-109) **Main Cargo Road should be depicted as a future tunnel.**

B-110) **Evaluate the south taxiway entrance to Runway 28L where it crosses through the 4R Hold Pad to determine (what if any) aircraft can be held inside this pad while providing adequate wingtip clearance for taxiing and holding aircraft.**

B-111) **Ensure tunnel headwalls are outside of the Runway 28L/10R RSA.**

B-112) **Remove the portion of the relocated Irving Park Road that penetrates the Runway OFA.**

B-113) **Existing airport buildings in gray should be depicted as being removed.**

B-114) **City should evaluate whether or not there is adequate taxiway turn-offs associated with Runway 10R-28L in order to minimize runway occupancy time.**

PHASE 2 WEST TERMINAL

No comments except those found under the Project Definition Report, Concept Development/Refinement Report, and Airside Simulation Analysis Section.

RUNWAY 4L/22R

B-115) **The intersection of existing Taxiway C, Taxiway Z, the new parallel taxiway to Runway 9C-27C and Runway 4L-22R creates a potentially confusing situation. Do we need existing Taxiway Z for arrivals on Runway 22R, due to simultaneous arrivals on Runway 27L and concern about the use of Taxiway C? How about a large fillet in the northwest corner of the Runway 9C-27C parallel taxiway intersection with Runway 4L-22R to create a high-speed exit onto the parallel taxiway?**

B-116) **Remove of Taxiway R southeast of Runway 4L, where it connects Taxiway B to Runway 4L-22R.** This would create a 4-corner intersection at Runway 4L-22R.

B-117) **Remove Taxiway W between Taxiway J and the Runway 4L threshold, to eliminate a confusing intersection with Taxiway E and Runway 4L-22R.**

B-118) **No runway to taxiway separation distance depicted for Runway 4L/22R.**

B-119) **Remove all penetration to the Runway 4L Safety Area or perform a practicability determination. Table 8 indicates a RSA penetration 800' beyond the runway end. What causes this penetration? It appears that the relocated localizer is approximately 890 feet from the runway end.**

B-120) **Remove all penetrations to the Runway 22R Runway Safety Area. Table 8 indicates two RSA penetrations: a localizer at 720' beyond the runway end, and a service road at 627' beyond the runway end. The table says that the service road is to be relocated, but this is not depicted on the future ALP.**

B-121) **Depict the PAPI on Runway 22R future It is included in the Airport Data Sheet.**

B-122) **Elevation for future Runway 4L (656.0') does not match the elevation in the RPZ table (655.5') or the existing end elevation (655.5')**

B-123) **Airport Data Sheet (Sheet #4)**

a) Runway end elevation discrepancies:

i) Future 4L: 655.5' in Airport Data Sheet and RPZ table; 656.0 on future ALP.
ii) Existing 36: 652.7 in Airport Data Sheet; 653.4 on RPZ table and future ALP.

b) Depict the Future Runway 22R PAPI on the future ALP. It is included on the Airport Data Sheet.

B-124) **Existing / Future Runway 22R (Sheet #8)**

a) Depict the existing property line.
b) Depict planimetrics for the area beyond Interstate Highway I-90.
c) The future realignment of Bessie Coleman Drive and the secondary connecting roadway shown on the future ALP should be depicted in the plan view and appropriate obstruction evaluation points should be added.
d) An additional smaller future road splits from the realigned Bessie Coleman Drive. This road should be added to the plan view and the appropriate obstruction evaluation points depicted.
e) Add appropriate obstruction evaluation points for the existing Interstate Highway I-90.
f) The future on-airport road traversing the approach surface should be added to the plan view; however, the required obstruction evaluation points are depicted on the sheet.

RUNWAY 4R/22L

B-125) **Remove all penetration to the Runway 4R Safety Area. Table 8 indicates a RSA penetration 675' beyond the runway end. What causes this penetration? From the runway end, it appears to be approximately 750' to a road, and approximately 860' to the localizer.**

B-126) **Remove all penetrations to the Runway 22L Runway Safety Area. Table 8 indicates a RSA penetration 500' beyond the runway end. The localizer appears to penetrate the RSA approximately 530' from the runway end.**

B-127) **Existing/Future Runway 4R (Sheet #9)**

a) Provide a note concerning the use of "representative" obstruction evaluation points over the existing rail yard as not every railroad track was evaluated separately.
b) There are at least four required obstruction evaluation points (existing roads) that are not depicted.

B-128) **Existing/Future Runway 22L (Sheet #10)**

a) Delete the Runway 28R end elevation from the plan view.
b) There is at least one required obstruction evaluation point (existing road) that is not depicted.

C-INDIVIDUAL SHEET COMMENTS

GENERAL

C-1) **The future ALP drawing set should have additional pages in order to more clearly depict the stages of airport development.** At a minimum the future ALP drawing set should show the currently approved airport layout (May 2002), construction sheets by phase, and a future airport layout.

C-2) **The base map of the RPZs should be an aerial photo.**

C-3) **Depict all mandatory runway hold lines and instrument hold lines.** These lines will assist in determining if aircraft holding positions affect ground movement operations and protect the future instrument approach procedures.

C-4) **Base mapping inconsistencies**

a) Hold lines depicted at "M4", "F", "M3"/9R/27L and on "T"/32L, but not at other locations.
b) Runway/taxiway shoulder (incomplete at 4R end; all existing runway shoulders are gray vs. black on the existing ALP).
c) Inconsistency with depiction of taxiway centerlines (i.e., shown for Taxiway T12).

C-5) **Consider using color-coding to depict each airport component and its associated areas**. An example would be all runways would be green and the associated OFA, RSA, POFA would be green with a variation in line type.

CONTENTS SHEET (SHEET #1) (REFERENCE APPROACH SURFACE SHEET COMMENTS)

C-6) **Rename Sheet 7 to "Existing/Future Runway 4L Approach Surface"**

C-7) **Rename Sheet 8 to "Existing/Future Runway 22R Approach Surface"**

C-8) **Rename Sheet 9 to "Existing/Future Runway 4R Approach Surface"**

C-9) **Rename Sheet 10 to "Existing/Future Runway 22L Approach Surface"**

C-10) **Rename Sheet 17 to "Existing Runway 27R/Future Runway 27L Approach Surface"**

C-11) **Rename Sheet 19 to "Existing Runway 27L /Future Runway 28R Approach Surface"**

C-12) **Add a sheet entitled "Existing Runway 9L Approach Surface"**

C-13) **Add a sheet entitled "Existing Runway 9R Approach Surface"**

EXISTING AIRPORT LAYOUT PLAN (SHEET #2)

Use the currently approved ALP dated May 2002, if unable apply the following comments to the plans submitted December 2002.

C-14) **List all modifications to FAA Airport Design Standards and list all non-standard conditions (list standard and existing condition).**

C-15) **Depict Runway 18/36 and Runway 4L/22R intersection elevation.**

C-16) **Depict runway high and low point elevations.**

C-17) **Depict runway true bearings** (azimuths, not bearings, presented on the Airport Data Sheet).

C-18) **Depict Precision Object Free Area (POFA).**

C-19) **No OFZ penetration data is given** (either specify "No OFZ Object Penetrations" in a general note on the sheet or show object penetrations and indicate how they will be eliminated).

C-20) **No Threshold Siting Surface penetration data is given (either print "No Threshold Siting Surface Object Penetrations" in a general note on the sheet or show the object penetrations and indicate how they will be eliminated).**

C-21) **Depict Airport Reference Point symbol in the legend.**

C-22) **Legend Issues**

a) There is no PAPI symbol, nor is there a PAPI symbol in the legend. The only indication of existing PAPI's is from the base mapping.
b) No road symbol in the legend
c) No rotating beacon symbol in the legend
d) No topographic contour symbol in the legend
e) No wind cone symbol in the legend

C-23) **Depict the Building Restriction Line (BRL).**

C-24) **Remove runway edge lights.**

C-25) **Depict key runway stationing.**

C-26) **Provide note to describing how monuments are protected**

C-27) **Label runway to aircraft parking separations.**

C-28) **Depict the location of Spine Road**

C-29) **Depict OFZ dimensions (more appropriate for data tables).**

C-30) **Depict taxiway to aircraft parking separation distances (more appropriate for terminal area plans).**

C-31) **Depict taxiway to object separation distances.**

C-32) **Depict apron dimensions.**

C-33) **Depict FAA Airspace Review number.**

C-34) **Where is the Runway 36 threshold location (runway length is inconsistent with depicted end elevation arrow)?**

C-35) **Runway 22L and 9L glideslope critical areas are longer than the others. Is this due to different equipment?**

C-36) **Verify the dimensions for the Runway 14L/14R CAT III localizer critical areas.**

C-37) **Existing Runway 4L end coordinate listed in the table is inconsistent with the coordinate depicted in the Airport Data Sheet (53.86" on existing ALP vs. 53.88" in data sheet).**

C-38) **A VASI-4 is depicted on Runway 4L. This VASI is not listed on Airport Data Sheet and is not listed on the Airport's 5010 form.**

C-39) **Include avigation easement hatching in the legend and remove individual labels.**

C-40) **Label for Runway 9R/27L is incorrect (says 9L/27R).**

C-41) **Is the runway marking precedence correct in the intersection of Runways 9R/27L and 14R/32L, and in the intersection of Runway 4L/22R and 9L/27R?**

C-42) **Base mapping inconsistencies:**

a) Hold lines depicted at "M4", "F", "M3" at 9R/27L and on Taxiway "T" at 32L, but not at other locations
b) Runway/taxiway shoulder (incomplete at 4R end; black vs. gray)

C-43) **Why is the approach category depicted within the runway outline? The approach category is runway end specific. For example, existing Runway 14R is Category III, but 32L is only Category I.**

C-44) **The Airport Reference Code (ARC) for Runway 18/36 is not consistent between the RPZ table on the Existing ALP (B-I) and the Airport Data Sheet (B-III).** The narrative must support the ARC and approach category for all facilities.

C-45) **Elevations are depicted approximately 500' from each runway end. What does this elevation represent? They do not match the touchdown zone elevations depicted in the Data Tables.**

C-46) **Approach visibility minimums contained in the Runway Protection Zone Table do not match those listed on the Airport Data Sheet for the following runway ends: 27R, 9R, 27L, 32R, 32L (1800 RVR vs. ½ mile).**

C-47) **Consider depicting taxiway-to-taxiway separation distance for Taxiways "A" and "B" in the vicinity of the existing core terminal.**

C-48) **Consider depicting Taxiway "A" OFA in the vicinity of the existing core terminal.**

C-49) **Consider renaming "Runway Protection Zone Table" to "Runway Surfaces Table" as it contains more than just RPZ dimensions.**

C-50) **"Trimming" the RSA/ROFA to remove interior line-work could help improve overall clarity.**

C-51) **Use color or alternative method to enhance legibility of labels on the exhibit in the Runway Protection Zone Table (i.e., A, B, X, Y).**

C-52) **Small text in the facility legend is difficult to read.**

C-53) **Bring all text to the front (some text is behind other layers and difficult to read).**

C-54) **Topographic contour elevations are illegible.**

C-55) **The Runway Protection Zone line color used does not match that depicted in the legend (red in legend and black on the Existing ALP).**

C-56) **Glideslope critical area line type used does not match that depicted in the legend.**

FUTURE AIRPORT LAYOUT PLAN (SHEET #3)

C-57) **Disposition of all pavement should be clearly shown and not just portions of pavement (areas in OFA).**

a) Taxiway R, Z, P, P3 & P2, M7 and D, hold pad for Runway 28R and Runway 22L.
b) It appears that the eastern portion of existing Runway 14R/32L will be retained as a future taxiway. However, there appears to be future non-taxiway sections of the existing runway within future ROFA/TOFA's (i.e., future 10C/28C, future 10L/28R) that are not hatched to depict removal. Depict if this pavement is removed.
c) Remove the existing pavement outside the limits of the future 75' wide and 100' wide taxiways for the conversion of the existing Runway 18/36 to a taxiway?

C-58) **A green rectangle is mistakenly shown about 350 feet east of threshold and 200 feet south of runway 27C centerline.**

C-59) **Navigational aid building color should be changed and all buildings should be numbered.** Future FAA buildings are shown in green. The legend indicates the color green as an "Existing Airport Building in AOA to be relocated." Therefore, green NAVAID buildings are misleading. A color change is required. In addition, future navigation aid buildings should be numbered to assist in long-term use and evaluation.

C-60) **Depict the location of Spine Road.**

C-61) **Symbolology for future creek/culverts is unclear. What is the blue dash versus the non-dash versus blue fill indicate (i.e. Willow and Bensenville and End of Runway 27R/9L)? This should be clearly depicted in the legend.**

C-62) **Verify that all buildings present on the airfield are depicted.**

C-63) **The disposition of existing non-airport buildings to be located within the future south and north airfield areas (under future 9L/27R and 10R/28L development) need to be shown (i.e., demolition).**

C-64) **It appears that the relocation of Willow Creek in the northwest quadrant of the Airport is not fully depicted.**

C-65) **Consider including existing avigation easement hatching in the legend and remove individual labels.**

C-66) **Include a list of future/planned modifications to FAA Airport Design Standards.** Limited information describing existing deviations from standards is provided in Section 11 of the Project Definition Report.

C-67) **Depict runway true bearings** (azimuth, not bearing, presented on the Airport Data Sheet).

C-68) **Depict the parallel runway separation distance between Runway 4L/22R and 4R/22L.**

C-69) **Depict the POFA.**

C-70) **No OFZ penetration data is given** (either specify "No OFZ Object Penetrations" in a general note on the sheet or show object penetrations and indicate how they will be eliminated).

C-71) **No Threshold Siting Surface penetration data is given** (either print "No Threshold Siting Surface Object Penetrations" in a general note on the sheet or show the object penetrations and indicate how they will be eliminated).

C-72) **Depict mandatory hold line distances from runway centerline.**

C-73) **Legend Issues:**

a) No ARP symbol in the legend.
b) No future PAPI symbol in the legend (but used on the plan).
c) No wind cones depicted on the drawing or symbol in the legend.
d) No road symbol in the legend (see specific comment under "Supplemental Comments/Observations" pertaining to the depiction of existing roadway removal).
e) No rotating beacon symbol in the legend.
f) No topographic contour line in the legend.

C-74) **No Building Restriction Line (BRL) is depicted. The following general note describes the BRL:** "Building Restriction Lines (BRL) adjacent to taxiways are defined by object free areas (OFA). BRL adjacent to runways are defined by Part 77 transitional surface contour 35' AGL (above closest runway centerline)."Consider depicting the BRL on the plan view to supplement this note.

C-75) **Depict survey monuments or note depicting how the monuments are protected.**

C-76) **Remove the depicted runway edge lights.**
C-77) **Depict key runway stationing.**

C-78) **Depict runway to aircraft parking separation dimensions if appropriate.**

C-79) **Depict OFZ dimensions – may be appropriate for data tables.**

C-80) **Depict taxiway to aircraft parking separation distances (may be more appropriate for terminal area drawings).**

C-81) **Depict taxiway to object separation distances as appropriate.**

C-82) **Depict apron dimensions.**

C-83) **Taxiway OFA depiction appears inconsistent; it may be helpful to show the taxiway OFA for taxiways in the vicinity of future buildings/terminal areas, and also for areas where a taxiway OFA is being utilized to define the boundary for existing pavement demolition.**

C-84) **Consider renaming "Runway Protection Zone Table" to "Runway Surfaces Table" as it contains more than just RPZ dimensions.**

C-85) **Use color or alternative method to enhance legibility of labels on the exhibit in the Runway Protection Zone Table (i.e., A, B, X, Y).**

C-86) **"Trimming" the RSA/ROFA to remove interior line-work could help improve overall clarity.**

C-87) **Small text is difficult to read.**

C-88) **Bring all text to the front (some text is behind other layers and difficult to read).**

C-89) **Topographic contour elevations are illegible.**

C-90) **Glideslope critical area line type used does not match that depicted in the legend.**

AIRPORT DATA SHEET (SHEET #4)

C-91) **Runway azimuth depicted in Airport Data Sheet, not runway true bearing.**

C-92) **No analysis/depiction of wind coverage for the existing airfield configuration is provided.**

C-93) **No runway end coordinates for existing Runway 18/36 are provided** (cannot verify existing Airport Reference Point without 18/36 coordinates).

C-94) **Depict POFA dimensions.**

C-95) **Depict taxiway lighting type.**

C-96) **Depict OFZ dimensions.**

C-97) **Aircraft Design Group for existing Runway 18/36 is labeled as "III" in the Airport Data Sheet and "I" in the Existing ALP RPZ table.**

C-98) **Type actual data in future blocks instead of "same".**

C-99) **Consider adding pavement strength for double-dual tandem (DDT) aircraft.**

C-100) **Consider adding "NPI" to "airport related abbreviations" table.**

C-101) **Consider adding "ASDE-X" to "airport abbreviations table".**

C-102) **Approach visibility minimum inconsistencies between the Airport Data Sheet and the RPZ table on the existing ALP for Runways 27R, 9R, 27L, 32R, and 32L: RPZ table indicates 1800' RVR, while Airport Data Sheet indicates ½ mile.**

EXISTING AND FUTURE TERMINAL PLAN (SHEET #5 & 6)

C-103) **Existing Terminal Area Plan (Sheet #5) and Future Terminal Area Plan (Sheet #6)***NOTE: All comments pertaining to the future ALP also apply to the Terminal Area Plan(s) base drawing

a) No building data table to identify structures. Structure Identification Numbers are presented, but the associated building identification information is only presented on the Future ALP (Sheet #3).
b) No top elevations of structures are presented (on the terminal area plan(s) or the Future ALP.
c) No legend is present.
d) Scale is 1:300 (existing) and 1:400 (future). According to ALP standards, a maximum scale of 1:100 is recommended.
e) No obstruction marking (existing and planned) data is presented.
f) At a minimum, add a legend and facility list information to the future terminal area plan. (Possibly utilize information presented on Exhibits 16-19 of the *Project Definition Report.)*
g) Depict aircraft parking position locations on the future terminal area plan. (Possibly utilize information presented on Exhibits 16-19 of the *Project Definition Report.)*
h) Provide larger-scale sheets providing greater detail for individual terminal components (i.e., separate sheets for the future core terminal, the future east, and the future west terminal. (Possibly utilize information presented on Exhibit 17-19 of the *Project Definition Report.*)
i) Consider adding individual large-scale terminal area plan sheets depicting the future south airfield area and the future north airfield area. (Possibly utilize information presented on Exhibits 20-21 of the *Project Definition Report.*)
j) Consider depicting the Aircraft Parking Limit (APL).
k) Clearly show service roads.
l) Show tail heights and wing spans for parking areas.
m) Show separation distances.

FUTURE AND EXISTING RUNWAY APPROACH SURFACES (SHEET #7-34)

(These comments are based on the review of collective comments from each of the individual Approach Sheets (sheets #7-34) and serve to summarize those observations that were reasonably consistent on at least several sheets. Comments specific to each sheet are addressed under individual runways in the "Phasing Comments" section.)

C-104) **Traverse ways should be evaluated per the criteria outlined in 14 CFR part 77 [§77.23 (b)] to ensure that the passage of mobile objects will not penetrate Part 77 surfaces. If a penetration exists, a disposition should be noted.**

C-105) **At a minimum, all existing and future man-made and natural features should be depicted (i.e., roadways, railroads, waterways, fence lines, etc.) in the plan view on the Approach Surface sheets, as applicable. All proposed future development depicted on the Future ALP should be depicted consistently on Approach Surface sheets that evaluate future conditions.**

C-106) **Depict all obstruction evaluation points for both existing and future traverse ways, showing the traverse way elevation and vertical clearance between the traverse way and the approach surface at the approach surface edges and the extended runway centerline.**

C-107) **Existing runway ends that will remain unchanged in the future should have their approach sheets labeled "Existing/Future" instead of simply "Existing" or "Future" or, alternatively, split into two separate Existing and Future sheets. In addition, the runway ends in the profile view on these sheets should be labeled as "existing/future". This comment applies to the following:**

a) Existing Runway 4L
b) Existing Runway 22R
c) Existing Runway 4R
d) Existing Runway 22L
e) Future Runway 27L (Existing Runway 27R)
f) Future Runway 28R (Existing Runway 27L)

C-108) **The following existing runway ends are not evaluated with an Approach Surface Sheet:**
a) Existing Runway 9L
b) Existing Runway 9R

C-109) **Label or depict the threshold-siting surface when applicable.**

C-110) **Show the Approach Surface to a 100-foot elevation above the runway end to fully evaluate the impact of potential obstructions to the approach surface.**

C-111) **Consider depicting transitional surfaces to better evaluate airspace protection needs**

C-112) **Label road names, where applicable.**

C-113) **Provide a legend for each sheet describing the line types and hatching styles to clarify symbology utilized in the plan view.**

C-114) **Add light-colored intermediate grid on the profile section.**

C-115) **Depict/label NAVAIDs and future NAVAID buildings in the plan view.**

C-116) **Depict/label the OFA and RSA on all sheets.**

C-117) **Remove dimensions of pavements from plan view to reduce clutter.**

C-118) **Remove all RPZ line work to further simplify the plan view.**

C-119) **Consistently label the extended runway centerline and standardize the runway centerline line type on all Approach Surface sheets.**

C-120) **Ensure that leaders in the profile view point to an object and that all leader lines have arrowheads.**

C-121) **Consider depicting elevation lines perpendicular to the centerline of the approach surface in the plan view at intervals of no more than every 50 feet.**

C-122) **Reduce the thickness of the property lines on the plan view and ensure that the property line layer is secondary to obstruction points, leader lines, and numbers.**

C-123) **Consistently depict future and existing pavement hatching/coloring on all Approach Surface sheets.**

C-124) **Depict contour elevations in a legible manner.**

C-125) **Add titles to all obstruction tables.**

C-126) **Center runways laterally in plan view.**

C-127) **Remove profile view panels if they are not populated with data (i.e., sheets #26 and #27)**

C-128) **Ensure that the North Arrow is depicted with the correct orientation as the actual plan view for the following sheets:**

a) Runway 4L
b) Runway 22R
c) Runway 4R
d) Runway 22L
e) Runway 14L
f) Runway 32R
g) Runway 14R
h) Runway 32L
i) Runway 18
j) Runway 36

C-129) **Future Runway 9R (Sheet #16)**

a) It appears that obstruction evaluation point FW1 delineates a future waterway. If so, depict this waterway on the plan view and on the future ALP
b) Verify the correct depiction of trees T124-T132 on the plan view.
c) Depict the future property line
d) A future on-airport road shown on the future ALP is not depicted in the plan- view. This road should be added to the plan view and the appropriate obstruction evaluation points should be depicted.
e) There are two sets of parallel railroad tracks crossing under the approach surface, but obstruction evaluation points are only depicted for the closer set.

C-130) **Existing Runway 27R/Future Runway 27L (Sheet #17)**

a) There are at least three required obstruction evaluation points (existing Bessie Coleman Drive and an on-airport road) that are not depicted.

b) Obstruction evaluation points are not depicted for an existing north-south railroad (ATS) that traverses the approach surface where it meets the approach surface edge.
c) The future ALP depicts several future roads near I-90, which appear to be on and off ramps. These roads should be depicted in the plan view and the appropriate obstruction evaluation points should be depicted.

C-131) **Future Runway 10R (1 of 6) Approach Surface (Sheet #22)**

a) The relocated railroad and other future development (i.e., roads) are not depicted in the plan view. (This comment applies to Runway 10R Approach Surface sheets 1 – 6.)
b) What is the rationale behind trimming certain existing trees on future property to be acquired by the Airport (i.e., T77, T81, T101-T121, T129-T141) instead of removal? (This comment applies to Runway 10R Approach Surface sheets 1 – 4.)

C-132) **Future Runway10R (2 of 6) Approach Surface (Sheet #23)**

a) Resolutions are missing for several trees/tree clusters (T159-167) in the obstruction table.
b) There are several required obstruction evaluation points (existing roads) that are not depicted.

C-133) **Future Runway 10R (3 of 6) Approach Surface (Sheet #24)**

a) There are several required obstruction evaluation points (existing rail yard) that are not depicted.
b) The location of obstruction point FR6 (future road) is not depicted on the plan view
c) The appropriate obstruction evaluation points for the relocated railroad should be depicted.

C-134) **Future Runway 10R (5 of 6) Approach Surface (Sheet #26)** How can obstruction points B85 and B86 (buildings) be removed when they are not within the future property that is to be acquired by the Airport?

C-135) **Future Runway 28L Approach Surface (Sheet #28)** There is at least one required obstruction evaluation point (existing road) that is not depicted.

C-136) **Existing Runway 14L Approach Surface (Sheet #29)**
a) Label Runway 14L end elevation.
b) There is at least one required obstruction evaluation point (existing road) that is not depicted.

C-137) **Existing Runway 32R Approach Surface (Sheet #30)**
a) Label Runway 32R end elevation.
b) There are several required obstruction evaluation points (existing road) that are not depicted.

C-138) **Existing Runway 14R (Sheet # 31)**

a) Label Runway 14R end elevation.
b) There are at least four required obstruction evaluation points (existing railroad and a road) that are not depicted.

C-139) **Existing Runway 32L (Sheet # 32)**

a) Label Runway 32L end elevation.
b) There are at least three required obstruction evaluation points (existing roads) that are not depicted.

C-140) **Existing Runway 18 (Sheet # 33)**

a) Label Runway 18 end elevation.

C-141) **Existing Runway 36 (Sheet # 34)**

a) Label Runway 36 end elevation.
b) There are at least two required obstruction evaluation points (existing roads) that are not depicted.
c) The Part 77 approach slope in the upper profile view is not labeled.
d) Consider re-distributing obstruction evaluation point labels over a wider area to increase legibility.

FUTURE AIRPORT LAYOUT PLAN PART 77 SURFACES DRAWING (SHEET #35)

C-142) **No dashed surfaces are provided to indicate less-demanding surfaces (i.e., where the approach surface extends above the horizontal surface)**

C-143) **Verify that no Part 77 penetrations exist other than the penetrations associated with Buildings #612 and #613 located within the South Airfield Area (FedEx and Northwest Cargo Buildings) since no other penetrations are depicted.**

C-144) **Show a note stating, "Refer to the inner portion of the approach surface plan view details for close-in obstructions."**

C-145) **Depict approach profiles.**

C-146) **The scale is 1:4000 for the plan view. A maximum scale of 1:2000 is recommended.**

C-147) **Provide information specifying any height restriction zoning ordinances/statutes in the airport environs.**

C-148) **Future runways should be depicted on the plan view.**

C-149) **Airport elevation should be 666' MSL and the Horizontal surface elevation should be 816' MSL.**

C-150) **"TBD" is not a reasonable resolution for the road penetrations with out justification.**

C-151) **Consider referencing the source of USGS base maps (quadrangles used, dates, etc.)**

EXISTING AND FUTURE ON-AIRPORT LAND USE PLAN AND EXISTING OFF-AIRPORT LAND USE DRAWING (SHEET #36, 37 & 38)

C-152) **Existing/Future On-Airport Land Use Drawing and Existing Off-Airport Land Use Drawing (Sheets #36, 37 and 38)**

a) Depict the Runway Visibility Zone for intersecting runways (existing (sheet 36) or future (sheet 37) on-airport drawings).
b) Depict the Building Restriction Line on the existing (sheet 36) or future (sheet 37) on-airport drawings.
c) Depict the recommended future off-airport land use to at least the 65 DNL contour (only existing off-airport land use is depicted on sheet 38).
d) The location of all public facilities (i.e., schools, hospitals, prisons, etc.) is not depicted (other than a color for "institutional" land uses) on the existing off-airport land use drawing (sheet 38).
e) Include an Airport Property Drawing with the ALP set.
f) Although the property line is obvious on the existing and future on-airport land use plans, the line type does not match that in the legend.
g) Aerial photos not used for the base map (nice aerials are used for exhibits in the *Project Definition Report*).
h) Depict the existing or future 65 DNL noise contours.
i) Existing On-Airport Land Use Drawing Comments (Sheet 36):

    i) What is the difference between the areas without color and the area shaded green and labeled as "Open and Other"?
    ii) Why are future buildings shown in the green shaded area denoted as "Open and Other"?
    iii) What is the distinction between "Open" and "Other"?
    iv) AOA line type needs to be brought to the front.

j) Future On-Airport Land Use Drawing Comments (Sheet 37).

    i) No future acquisitions/easements indicated for future RPZ areas extending beyond the airport property.
    ii) No distinction between existing and future land.
    iii) Existing buildings under future Runways 10R/28L and 9L/27R are not shown for demolition.
    iv) Series of buildings in the future Terminal 4 apron are not shown for demolition.
    v) Building #891 (City/DOA Warehouse/Skilled Trade Center) is shown as future rather than existing.
    vi) Depict future/relocated VOR and its critical area and modifying future land use, if applicable.

vii) The definition of the airfield area is inconsistent. On the existing sheet the airfield area is consistently bound by the AOA fence-line. On the future sheet, it exceeds the AOA and is at times bound by the property line, the RPZ limits, or an arbitrary location (i.e., Runway 22L end).

viii) What is the difference between the areas without color and the area shaded green and labeled as "Open and Other"?

ix) Why are future buildings shown in the green shaded area denoted as "Open and Other"?

x) What is the distinction between "Open" and "Other"?

xi) Airport Reference Point symbol is not depicted in the legend.

xii) Future on-airport land use drawing water color does not match legend

k) Existing Off-Airport Land Use Drawing (Sheet 38)

i) Source data should clarify the titles of the maps used. Are they existing or future land use maps?

ii) The plan set does not include a future off-airport land use drawing. It is assumed that the development and depiction of future noise contours would be an essential component of this plan. If future noise contours do not exist, it may be prudent to at least depict future airfield facilities and runway approach surfaces to identify off-airport impacted areas that would require land use modifications.

D-PROJECT DEFINITION REPORT, CONCEPT DEVELOPMENT/REFINEMNET REPORT, AND AIRSIDE SIMULATION ANALYSIS

D-1) Page 6 of the Project Definition Report discusses the future relocation of Runway 9R/27L to the north to provide duel ADG V taxiways around the north side of the terminal area. On page 80 it discusses a cross-airfield roadway in the same area between Runway 9R/27L and Runway 9C/27C. Discuss the co-location and dimensions of these facilities and any conflicts that may arise due to their close proximity. If the cross-airfield roadway remains as part of the discussion in the Project Definition Report without showing future location on the ALP, it will be subject to a future airspace review under 14 CFR part 77 and may impact the safe and efficient use of airspace system

D-2) Page 7 paragraph 3.1.2, states, "Taxiway Q, and exit taxiway off Runway 22R…" The reference to Runway 22R should be Runway 22L.

D-3) On page 8 of the *Project Definition Report* it discusses the proximity of Runway 10C/28C to the Southwest Cargo Area results in penetrations to Code of Federal Regulation (CFR) Part 77 Transition Surfaces. It states that to meet CFR Part 77 criteria, the center section of the runway would need to be raised approximately 23 feet or the facilities relocated at a substantial cost. Furthermore, a portion of Taxiway K would have to be raised approximately 9 feet to meet the FAA maximum runway to parallel taxiway grade criteria of 1.5 percent. Through the use of TERPS criteria, the future runway profile follows existing ground contour elevations and maintains crossing point elevations with existing runway and taxiways. The TERPS Obstacle Clearance Surfaces based on this runway profile clear the obstruction building allowing them to remain in their existing location, although nine light posts will have to be removed or lowered. Please provide clarification on whether the runway will be raised in order to clear Part 77 surfaces or are there still going to be Part 77 penetrations? Will this result in any approach restrictions? In addition it states that there will only be nine light poles removed or lowered. Sheet 35 of the ALP drawing set shows 45 poles.

D-4) The *Project Definition Report* states that departing ADG VI aircraft will access the 28C hold pad area via existing Taxiway "S" that will be upgraded to ADG VI width (page 8). Under what operational scenario will this occur? Wouldn't this conflict with inbound arrivals from 28L in the VFR west configuration (Exhibit V-33 in the ASA)?

D-5) Page 9, under the planned profile, roads and railroads in the Runway 10R approach pose penetrations to the FAR Part 77 surfaces. None of these items, however, violate TERPS obstacle clearance surfaces associated with this runway. To meet FAR part 77 criteria, the west end of the runway would have to be raised approximately 26 feet in elevation. Such a runway profile is operationally undesirable and would add significant cost to the project. Discuss what undesirable operational situations this would create and how the costs were determined to be significant so as to not increase the runway elevation.

D-6) Page 9, taxiway S is located in the east end of the Runway 10R/28L Runway Safety Area. As such Taxiway S will be restricted and/or controlled during operations on Runway 10R/28L to ensure availability of the full safety area. What impact will this have on the overall operation of the airport? Where there any other alternatives reviewed before making the decision to place this restriction on a taxiway in order to maintain a safety area?

D-7) What runways will ADG VI aircraft use for departures in the IFR East and West flows? According to Exhibits V-35 and V-37 of the *Airside Simulation Report* and Exhibit 9 of the *Project Definition Report,* only the inboard runways (Runways 9R/27L and 10L/28R) will be used for departures. These runways are only 150 feet wide; 200 feet is proposed for ADG VI runways. If ADG VI aircraft will be departing from 9C/27C or 10C/28C, what is the proposed taxiway routing for these aircraft to reach these runways and what impacts, if any, are there on the taxiway flows as simulated?

D-8) What is the proposed taxiway circulation for ADG VI aircraft to and from the Southwest cargo area? Will this traffic have any impacts on the traffic flow as depicted on the taxiway route diagrams? Also, Exhibit 9 of the *Project Definition Report* indicates that NLA aircraft will access the eastern air cargo apron via Taxiway "T12". This taxiway appears to be 75' wide on the ALP and is not shown to be widened or strengthened for A380 operations.

D-9) Page 26 Paragraph 4 of the *Project Definition Report* discusses plans for the O'Hare and/or Western By-Pass connecting I-90 and I-294 and western access through the extension of the Elgin O'Hare Expressway. This section does not state source documentation or responsible parties for the roadway development or the type and amount of traffic using the western access in relation to the capacity of York Road versus the Elgin O'Hare Expressway. The type and amount of traffic using a western access is: a) directly related to the degree of functionality of the western terminal as well as its connectivity to the eastern terminal, and b) is a major determinant of the surface transportation component of FAA's forthcoming EIS. In addition the Western By-Pass if developed at a future date will require a 14 CFR Part 77 review and its location may impact safe and efficient use of the airspace system.

D-10) Page 26 Paragraph 4.3 of the *Project Definition Report* states, "the push-back areas will be provided abeam ramp areas on the east side of the west terminal… and the west side of the satellite concourse (213 feet to accommodate ADG V aircraft)". The reference to 213 feet shows 212 feet on Exhibit16.

D-11) Page 27 Paragraph 4.3 of the *Project Definition Report* discusses the West Terminal accommodating 15 jumbo wide-body gates, but should also discuss the NLA gates as well.

D-12) Page 53 Section 8.1 of the *Project Definition Report* and Section 5.4 of the *Concept Development and Refinement Report* are inconsistent with what is depicted on the Future

ALP. The text discusses the relocation of Bensenville Ditch, Union Pacific Railroad, and Irving Park Road. The Future ALP depicts a surface parking lot.

D-13) The *Project Definition Report* schedules the West Concourse to open in 2009. On page 73 of the *Project Definition Report*, under WS-3 Automated People Mover, it is stated: "The transfer of passengers and employees between the Terminal Core area and the new West Satellite Concourse may require the construction of the Automated People Mover. Page 80 of the *Project Definition Report* states: "The O'Hare Modernization Program provides for a secure people mover connection between the West Terminal and the East Terminal area. If the Automated People Mover is not in operation by 2009, how will people and materials access the West Satellite Concourse? In addition there needs to be discussion on the use of this Automated People mover and the type of passengers using this system (connecting passengers or originating passengers)

D-14) Section IV of the *Concept Development/Refinement Report* discusses support/ancillary facilities. Does the City have any additional information on the anticipated needs of current and future tenants at this time?

D-15) Based on information in the *Concept Development Refinement Report* Section 5.2 and 5.2.1.3 Consideration should be taken in designing the western terminal access to prevent future cost and construction impact when developing the proposed Western Bypass and Elgin O'Hare Expressway.

D-16) At the top of page II-8 of the *Concept Development /Refinement Report* it refers to "Advisory Sessions held with FAA, airlines, and others…" Identify whom "others" include.

APPENDIX A - ACRONYMS

A/C- Advisory Circular

ADG – Airplane Design Group

AFC – Airport Reference Code

AGL – Above Ground Level

AIP – Airport Improvement Plan

AMSL – Above Mean Sea Level

APC – Airport Reference Code

ALP- Airport Layout Plan

ALSF-2- High-Intensity Approach Lighting System with Sequenced Flashing Lights in the Category II configuration, switchable to SSALR (Category I energy-saving configuration)

ANI- NAS Implementation Center

AOA- Air Operations Area, Airport Operations Area

APL – Aircraft Parking Limit

ARFF – Aircraft Rescue Fire Fighting

ARP – Airport Reference Point

ARTCC – Air Route Traffic Control Center

ASDE – X – Airport Surface Detection Equipment

ASOS- Automated Surface Observation System

ASR- Airport Surveillance Radar

ATCT- Air Traffic Control Tower

ATS – Air Traffic Services

BRL – Building Restriction Line

CAT- Category

CFR – Code of Federal Regulations

CY – Cubic Yards

DOA- City of Chicago Department of Aviation

DH- Decision Height

DME- Distance Measuring Equipment

DP – Departure Procedures

E/G- Engine Generator

FAA- Federal Aviation Administration

FFM- (Localizer) Far Field Monitor

FIS – Federal Inspection Services

FPO- Flight Procedures Office (FAA)

GPS – Global Positioning Systems

GS- Glide Slope

HAZMAT – Hazardous Material

ICAO – International Civil Aviation Organization

ICC- Individual Control Cabinet

IFR – Instrument Flight Rules

ILS- Instrument Landing System

IM- Inner Marker

LLWAS- Low Level Wind Shear Alert System

LOC- Localizer

MDA – Minimum Descent Altitude

NAS- National Airspace System

NAVAID- Navigational Aid

NCP- NAS (National Airspace System) Change Proposal

NLA – New Large Aircraft

NPI – Non-Precision Instrument

OFA- Object Free Area

OFZ – Obstacle Free Zone

OMP- O'Hare Modernization Program

ORD- Chicago-O'Hare International Airport

PAPI- Precision Approach Path Indicator

POFA – Precision Obstacle Free Area

R.O.W.- Right of Way

RNAV – Radio Navigation

RPZ- Runway Protection Zone

RSA- Runway Safety Area

RTR- Remote Transmitter/Receiver

RVR- Runway Visual Range

SMO- System Management Office

TCH- Threshold Crossing Height

TDZE- Touchdown Zone Elevation, the highest elevation on the runway surface within 3,000 feet inbound of the landing threshold

TERPS – United States Standard for Terminal Instrument Procedures

TIL – TERPS Instruction Letter

TOFA – Taxiway Object Free Area

TRACON- Terminal Radar Approach Control Facility

TSA- Taxiway Safety Area

USDA – United States Department of Agriculture

VFR – Visual Flight Rules

VHF- Very High Frequency

VOR- VHF Omni-directional Range

VOT- VOR Test Facility

WGP – World Gateway Program

WHA – Wildlife Hazard Assessment

APPENDIX B - GLIDE SLOPE SNOW REMOVAL AREAS

SECTION 3. SPECIAL MAINTENANCE PROCEDURES (Continued)

SUBSECTION 3. GLIDE SLOPES (Continued)

5-199. SNOW REMOVAL PROCEDURE.

a. Object. This procedure provides guidance to the maintenance specialist for various snow accumulation conditions.

b. Discussion.

(1) Signal samples used to analyze and control operation are obtained and processed to provide all indication of what the airborne user is receiving. Monitoring signals in lieu of actual far-field signals are obtained from integral samples. The integral monitor sample and far-field indication are essentially unaffected by small amounts of snow accumulation. When snow accumulation reaches a particular depth described in table 5-3, the action described for that snow depth shall be taken. Snow depth monitors located at selected glide slope facilities will alert the specialist when field accumulations approach prescribed limits.

TABLE 5-3. SNOW REMOVAL VERSUS SNOW DEPTH

ACTION TAKEN	*SNOW DEPTH*		
	SBR < 6 in (15 cm) NR, CEGS < 18 in (45 cm)	SBR 6 to 8 in (15 to 20 cm) NR, CEGS 18 to 24 in (45 to 60 cm)s	SBR > 8 in (20 cm) NR, CEGS > 24 in (60 cm)
SNOW REMOVAL (See figure 1-1)	Removal not required. Restore full service and category.	ILS Category I Remove snow 50 feet (15 m) wide at mast widening to 200 feet (60 m) wide at 1000 feet (300 m) toward middle marker. ILS Categories II and II As above plus widen the area to include a line from the mast to the far edge of runway threshold.	
NO SNOW REMOVAL	Restore full service and category.	All Categories Restore to Category I service. Category D aircraft minima raised to localizer only. Typical NOTAM text: "Due to snow on the IXXX (appropriate identifier) glide slope, minima temporarily raised to localizer only for Category D aircraft." If applicable, "Category II NA[1]," or "Category II/III NA".	All Categories Approach restricted to localizer only minima. Typical NOTAM text: "Due to snow on the IXXX (appropriate identifier) glide slope, minima temporarily raised to localizer only."

[1] NA (not authorized)

the same operating frequency, or if an interference problem exists between the glide slopes.

c. Simultaneous Operation. Parallel or dual-facing ILS systems with different operating frequencies may be operated simultaneously if suitable weather conditions exist and a proper NOTAM is issued, or without restrictions if past flight inspections have determined that no interference with the active ILS exists. The minimum weather conditions for restricted operation are a 1500-ft (460 m) ceiling and 3-mile (4.83 km) visibility. The NOTAM should state that the active ILS is unusable between the middle marker and touchdown point. The times of restricted simultaneous operation shall be logged at the facility.

d. Shared-Frequency Interlock Operation. Where multiple localizer and glide slope systems serve a common area using the same frequency allocation, interlock equipment is used to preclude simultaneous radiation from more than one system. Accordingly, should interlock control be lost and a given facility be brought up locally at the site, then all other facilities sharing the frequency will be locked out locally until such time as normal remote monitoring/interlock control is reestablished.

1-17. OPERATION OF IMAGE GLIDE SLOPES DURING SNOW CONDITIONS.

a. Policy. This paragraph provides policy for specialists who maintain image type (null-reference (NR), sideband reference (SBR), and capture-effect (CE)) glide slopes. The glide slope must be kept operational during snow and ice conditions to the maximum extent practicable. An increase of a few tenths of a degree of the path angle is better than no vertical descent guidance at all (glide slope off the air). Past modifications have provided for full integral monitoring to help keep the glide slope operational due to apparent shifts in path angle with accumulation of snow in the near field. Heavy snow and icing on the antennas can still be a problem to the monitoring system and may warrant the installation of antenna heaters. Due to the various types of systems and locations around the nation, installation and/or operation of glide slope antenna heaters has been delegated to the regional offices. However, in no case should a facility be allowed to continue operation with any flight inspection reference exceeded or monitored tolerance in an alarm condition without a special flight inspection certifying proper operation. Refer to paragraph 1-14, Emergency Operation of ILS Facilities.

b. Snow Accumulations. If the average snow and ice accumulations in the snow clearance area (see figure 1-1) exceed specified limits of table 5-3, request that minima be raised to "localizer only" until the conditions revert or are corrected.

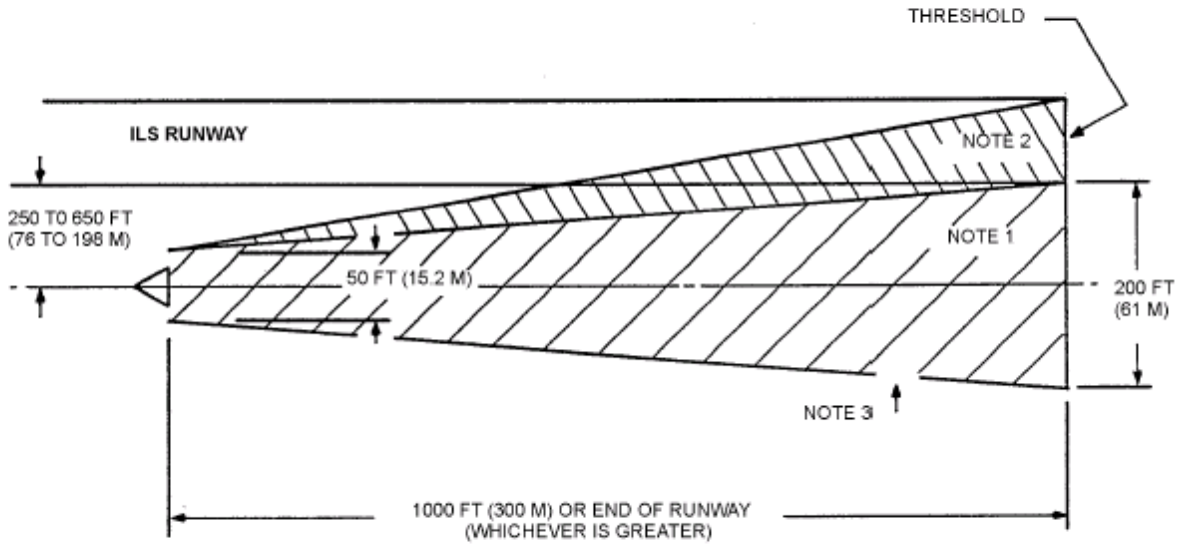
c. Pilot Reports. When notified of a second aircraft glide slope facility malfunction report, request that minima be raised to "localizer only" and follow the required action in the latest edition of Order 6000.15, Chapter 5, Section 140, Aircraft Reported Facility Malfunctions, under Service Interruption and Shutdown Procedures.

d. Implementation of Full Integral Monitors. All image-type glide slope facilities now use full integral monitoring, which is essentially insensitive to snow/ice buildup. Selected glide slope facilities located in areas that have significant snow/ice accumulations are provided snow depth monitors to alert the specialist when accumulations approach prescribed limits. Refer to paragraph 5-199 for snow removal policy.

1-18. CONFIGURATION MANAGEMENT. All ILS systems are under configuration management control as defined in the latest edition of Order 1800.8, National Airspace System Configuration Management, and NAS-MD-001. Any changes to the baseline configuration or requests for deviation from national standards shall be processed through the National Airspace System (NAS) change proposal (NCP) process. The latest edition of Order 6000.20, Waiver of Criteria for Establishment and Maintenance of Airway Facilities, does not apply to systems under configuration as listed in NAS-MD-001.

1-19. VEHICLE TRAFFIC ON AIRPORTS. All vehicles used in the performance of maintenance duties and operating on any part of an airport shall comply with Order 6000.15, General Maintenance Handbook for Airway Facilities.

FIGURE 1-1. GLIDE SLOPE SNOW CLEARANCE AREAS



NOTE 1: CATEGORY I GLIDE SLOPE SNOW CLEARANCE AREA.

NOTE 2: CATEGORY II AND III GLIDE SLOPE SNOW CLEARANCE AREA. THE AREA DEPICTED UNDER NOTE 1 SHALL ALSO BE CLEARED.

NOTE 3: THE DEPTH OF SNOWBANKS ALONG THE EDGES OF THE CLEARED AREA SHALL BE LESS THAN TWO FEET.

APPENDIX C - LLWAS STATION LOCATIONS

LLWAS STATION Locations:

Station	Latitude			Longitude			Height AGL
1	41	59	19.20	87	54	36.00	40
2	42	00	19.00	87	54	27.00	100
3	42	01	18.00	87	55	11.00	90
4	42	0	54.60	87	53	21.30	120
5	41	59	28.00	87	51	24.00	150
6	41	59	32.80	87	53	18.00	120
7	41	58	46.00	87	53	51.00	150
8	41	57	59.40	87	53	22.20	50
9	41	58	26.90	87	52	4.00	120
10	41	58	22.00	87	50	16.00	100
11	41	57	47.00	87	51	40.00	140
12	41	57	1.00	87	52	40.00	110
13	41	56	17.80	87	54	17.60	110
14	41	57	10.00	87	54	50.00	100
15	41	57	53.00	87	56	1.00	140
16	41	58	22.00	87	55	16.00	60
17	41	58	44.00	87	56	18.40	150
18	41	59	50.00	87	57	17.00	100
19	42	0	9.20	87	55	49.40	120
20	42	1	0.00	87	56	27.00	100