

**Runway-Taxiway
Construction
Best Practices
&
Lessons Learned**

*Revised for
2014 Construction Season*

No.	Best Practice / Lesson Learned	Loc.
1	Construction equipment shall not be staged for overnight parking or non-operational use on the edge of active runways. This facilitates the need to have associated support equipment and personnel also operating in the vicinity increasing the likelihood of an incursion. By staging equipment in a benign midfield area, any danger of a movement area transgression was minimized.	BDL
2	Runway guard lights were utilized under all meteorological conditions to serve as an additional warning mechanism to construction operators to be mindful of potential "hot spots" of high traffic zones.	BDL
3	Isolate construction area: Turning construction area into "landside" property reduces interface with "airside" operations; active control of adjacent roadways with flagmen and active barricading systems reduces the likelihood of errant vehicles entering the movement area; lit jersey barriers and barricades were placed at taxiway and runway intersections beyond which no vehicle could proceed beyond; it was emphasized with great fervor to all contractors that this was the "point of no return" - any vehicle driver that crossed beyond this point without direct approval would be immediately removed from the construction site.	BDL JFK
4	ASDE-X configuration map filtered to eliminate safety logic processing of construction vehicles located within barricaded areas; filtering selected zones requires assistance from the Program Office (MMAC) so allow sufficient coordination and response time	BDL JFK, HNL
5	To avoid jet-blast to workers/equipment, all engine run-ups shall be coordinated with Airport Operations prior to the aircraft accessing the movement area; all aircraft operators have been informed that they shall coordinate with Ops prior to calling GC.	BDL
6	ARFF access must be considered when planning construction activities	BDL
7	Planning as far as possible in advance allows for input and ideas to be incorporated before the sponsor signs contracts. Define project, restrictions. It is important to involve the air traffic personnel, airport operator, airline representatives, and airport certification personnel. A diverse group (pilots, dispatchers, FAA groups, adjacent facilities) yields diverse ideas.	ORD JFK

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8	<p>Refine operating concept, and break projects down into phases. Integrating projects into single plan ensures that the cumulative effect of projects is considered, rather than projects being evaluated as stand alone. Matrix/Timelines provide a good visual reference of project overlap and/or influence on other projects. Identify critical stages needing completion prior to next phase: i.e. a taxi route needed for completion of one phase might be eliminated by the next phase; always look into each construction phase carefully to identify critical events that could ripple into the next phase(s)</p>	<p>ORD JFK</p>
9	<p>Once the phases and timeline have been broken down, involve Sys Ops. Start to develop impact statement.</p>	<p>ORD</p>
10	<p>Airlines and airport operator work together on publicity campaign; start of the communications campaign is driven by the ability to get the information out to the aircraft operators; typically, information is published about 1 month prior to actual work; make sure to involve air carrier Certificate Management Offices (CMO); Begin outreach with customers at least one year in advance, sooner if possible. They also have a tremendous amount of planning to do, especially if they are planning to adjust schedules and marketing plans for the construction period. This involves major airlines, dispatchers, chief pilots, scheduling, marketing, and user groups such as ALPA, NBAA and AOPA.</p>	<p>ORD MSP</p>
11	<p>Conduct hands on classroom and simulator training. Simulator modeling of runway/taxiway closures allows development of safe options and is significantly more effective than R&I briefings; We worked with airport authority Engineers developed simulations of ground movement and provided SIMMOD showing what normal surface traffic movements look like. This allows us to see where bottlenecks may develop with the impacted construction areas. Have Tower personnel provide suggestions and allow engineers to update; (same type of modeling is available at the Technical Center in Atlantic City). If feasible, have subject matter experts from the CPC ranks provide the construction training with management oversight. Keep a list of Frequently Asked Questions from the training. Use the FAQs as training continues and also publish the QAs in the R&I for all employees.</p>	<p>JFK MSP ATSAP</p>
12	<p>We typically try to brief controllers/operational staff on all changes anticipated as far in advance as possible; this offers front-line employees their first peek at what is coming on a broad scale.</p>	<p>ORD</p>

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13	Start final briefing to controllers prior to construction commencing about 1 month prior to change; face-to-face whenever possible, mandatory briefing item, read-and-initial	ORD
14	Publicity campaign in tower about 2 weeks before change.	ORD
15	Personnel in tower to remind controllers the day of change.	ORD
16	Identify a single P.O.C. for Air Traffic. Using multiple contacts increases chance of "I cleared it with ____". Single point of contact maintains single point of accountability.	JFK
17	ATM needs to be involved and show presence. Let's other entities know how serious we take these issues. If it is important to the ATM, it will be important to all.	JFK
18	Schedule "FAA only" meeting prior to attending first construction meeting with others. Any disagreement between Air Traffic and Airports, Tech Ops etc needs to be resolved prior to meeting with external entities. FAA presents one unified position.	JFK
19	Schedule frequent follow up meetings during project. This allows for modifications to op plan as needed; recommend weekly during the beginning and ending segments; as required during the construction periods where no reconfigurations are occurring	JFK
20	Short-notice or immediate projects/closures require increased scrutiny. Changing starting dates and spot closures need to be looked at with the same level of assessment as a planned project. Same risk being introduced without planning meetings; "just say, NO"	JFK
21	The number one ingredient for a successful closure is communication both internally and externally (with the customers). We have worked for many years to solidify relationships with customers (both pilots and dispatchers), the airport authority, airport authority's engineers and consultants, adjoining Air Traffic facilities; transparent, open communications and a good working knowledge of everyone's role is essential for a successful outcome.	MSP
22	Work with airport authority and their contractors to determine best time of year to complete the work based on traffic levels and historical weather data. Also discuss and determine the general scope of the project including potential impact to traffic flows in the air and on the ground.	MSP

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23	<p>If there will be special requirements for aircraft such as LAHSO, this is the time to get engaged with the individual carriers. We were able to get one air carrier to change their LAHSO procedures in time for our construction. Be prepared to show them the impact on them and also the overall system.</p>	MSP
24	<p>Get AJW onboard. They will be a major player, especially when you near the end of construction and the final work is needed to restore nav aids and get the runways flight checked; When will Flight Check take place, what are the requirements and timeframe, when will NAVAIDS and other facilities will be returned, when will runway painting take place, etc. The runway/taxiway will open on a specific date but it may be only for VFR operations. Cat I, II, and III will be dependent on the flight-check outcomes</p>	MSP
25	<p>Form airspace working groups comprised of Managers, FLMs, Support Staff, and CPCs. Tower, TRACON, and Center generally meet separately and start to determine required airspace and procedural changes, i.e. develop potential taxi routes to accommodate construction impacts or develop traffic patterns and airspace to accommodate new airborne flow patterns.</p>	MSP ATSAP
26	<p>Have joint Tower/TRACON/Center meetings when airspace/procedural issues are identified which impact all concerned. Have these on a regular basis---monthly at a minimum.</p>	MSP
27	<p>Develop AARs and ADRs for the potential runway configurations to be used. Look at any impacting issues surrounding configurations such as weather minimums, converging approaches, LAHSO, etc. Also identify any required equipment, automation, or procedural concerns that may have long-term resolutions.</p>	MSP JFK
28	<p>If tools such as Converging Runway Display Aid (CRDA), Arrival Distance Window (ADW), or Departure Decision Aid (DDA) are needed, now is the time to get started on those procedures. They have very specific parameters and it takes time to get the ARTS/STARS updates, maps changed, and the preciseness figured perfectly. MITRE was a great help in assisting with our timing/distance issues on the ADW.</p>	MSP

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29	Take every opportunity to share the basic plan and information with the customers. Do it as often as possible. Runway configurations, LAHSO, AARs/ADRS, etc. If you do not get an invitation, send them the information and stress how important it is to get the word out to their employees, groups, and membership. Include power point presentations so they can self-brief their employees internally, such as Dispatcher groups; Outreach is extremely important – be as transparent as possible – do it often!	MSP
30	Prior to the runway closing we “practiced/tested” the ADW procedures on live traffic. It gave the FLMs and CPCs an opportunity to become familiar with the RADAR maps and get comfortable with the timing that was necessary to be successful; TRACON had to use Converging Runway Display Aid (CRDA) for the first time on both the north and south operation. We provided ETG training four months prior to construction and then a brief ETG refresher just prior to the closing of the runway.	MSP
31	Also advise the air carriers that they need to fuel for unusual circumstances. Any minor hiccup can cause major airborne or ground delays and the additional fuel may be necessary for holding.	MSP
32	Develop an Operational Impact Statement (Significant Impact Statement) to be shared with Center, The ATCSCC, and the Customers. Send the initial OIS 4-6 months in advance. Resend an updated version of the OIS or SIR 2-3 weeks prior to the closure. In 2009 we included a power-point presentation along with the OIS to be used by the ATCSCC and the customers for internal training and briefings.	MSP
33	Make sure you have completed the SRM process and have the SRMD’s that you need complete and in place; don’t hesitate to request assistance	MSP
34	Consider quick reference cards or “cheat sheets” as necessary to depict changes in airspace, frequencies, and other operational items. Have these laminated and posted at the affected positions. Again, update as needed.	MSP
35	Staff additional coordinator/oversight positions for the “extra set of eyes.” We employed a crossing coordinator and a local assist in the Tower. These positions saved a number of potential OEs.	MSP
36	Consider a moratorium on developmental training. MSP/M98 curtailed training for the construction period. In addition, work with the FLMs on keeping positions split for longer periods to alleviate volume and complexity.	MSP

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37	Be flexible and available. Operationally we need to be very flexible. If the plan is not working don't stop! Just slow the problem down, make the necessary adjustments, and move one. Be transparent, open, and honest with all entities concerning changes and adjustments. It could very well impact their planning processes as well.	MSP
38	Hold daily telcons with local facilities and customers. We held a brief telcon at 0730 and 1330 each day to cover weather forecasts, runway configurations, general outlook, and unusual operations, etc. This does not take long, but reaps huge benefits. It also keeps phone calls and operational communications that may come later to a minimum.	MSP
39	Do regular R&I updates for the CPCs. Include construction progress, good practices, pitfalls to look out for, etc. This can also be fodder for team meetings; (airport authority had a website that updated construction progress on a regular basis – including pictures.) Employees like to see this---it makes what they are doing real and meaningful.	MSP
40	Construction normally happens during the summer when many of our employees are on leave. Be prepared to re-brief these employees when they return from one to two weeks away from the operation. It is very easy to let this slip through the cracks.	MSP
41	Don't be too anxious to get to your full expected capacity. Go slow and advance in increments until everyone is comfortable and has adjusted to the new flows. BE SAFE!	MSP
42	<p>Anticipate runway/taxiway name changes:</p> <ul style="list-style-type: none"> • Allow at least 2 charting cycles <u>before re-using</u> a runway designation (e.g. 9R changes to 10, 112 days later, 9L changes to 9R) • Allow taxiway names to be out of service for 1 year <u>before re-using</u> them in a different location on the airport. 	ORD
43	Make sure that contractors are aware of lateral limits of the runway safety areas; flags, signs, or snow fence are examples of markers which are intended to prevent incursions into the lateral RSAs	MLI

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44	<p>Make sure that vehicle operators are aware of surface limits of the runway safety areas, including other closed movement areas. While a runway or taxiway is closed, movement on the closed surface may penetrate the safety area of another movement area, and any movements on the runway are FAA responsibility based on the airport LOA. Training and diagrams in vehicles of some type are needed to prevent incursions into the RSAs; (Technical Operations, airport authority, contractor, Airports, Terminal Services)</p>	<p>MLI SFO</p>
45	<p>Continue weekly meetings throughout the construction period to validate and ensure cooperation with airport authority, Technical Operations, and NATCA</p>	<p>MLI</p>
46	<p>“Sim-Fast” can be a good training aid for construction driven configuration change training</p>	<p>MLI</p>
47	<p>State and county may support communications of any planned construction closure(s) and opening(s)</p>	<p>MLI</p>
48	<p>Use the ACAC checklists; very helpful throughout your project(s)</p>	<p>CLT LNK ADS</p>
49	<p>Trust the info from airport authority . . . but verify it, too.</p>	<p>DAL</p>
50	<p>Continue to ask questions of your airport authority; probe for worst-case situations, anticipate “Murphy” appearing during construction; do not allow them to hold-back any information; ask the airport for what you need!</p>	<p>DAL</p>
51	<p>Request the Construction Notice (closure diagram) from the ACAC; help distribute the website address and the diagrams to local FBOs, chief pilots, user groups, military units, and of course your own employees</p>	<p>CRW LNK CLT DAL</p>
52	<p>Continue to issue NOTAMs and broadcast on ATIS that Runway XX is closed, even if you are operationally using the closed runway as a taxiway</p>	<p>ATSAP</p>
53	<p>Consider table-top exercises for each phase of construction if a tower simulator (TSS) is not available</p>	<p>ATSAP</p>

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54	If a runway is inactive due to construction, confirm that your SOP properly describes which position controls the runway surface (i.e., LC or GC); if SOP is silent or unclear, publish and train for the necessary update	ATSAP
55	Obstructions and barriers installed as part of construction must be properly marked and lighted	ATSAP
56	If runway/taxiway construction includes night-time periods, ensure that runway/taxiway lighting is OFF; electrical maintenance done on runways at night that involves on/off cycling of the lights should be accompanied by installation of lighted Xs	ATSAP
57	Consider labels for non-standard locations for construction and non-standard movement routes for construction vehicles moving over active movement areas	ATSAP
58	When conducting your intelligence in advance of your SRM panel meetings, benchmark safety events that reflect similar conditions to those that you expect will result from your construction; search thoroughly as similar events have occurred worldwide; be careful to include all appropriate stakeholders on your panel; assume <u>nothing</u> .	LFPG
59	On runways shortened by construction, allow no significant equipment on the closed portion whenever you are conducting operations on the remaining (shortened) runway.	LFPG
60	On runways shortened by construction, force aircraft to the taxiway at the end of the runway, closing and barricading all other intersecting taxiways to prevent inadvertent departures on less than expected runway lengths; close the taxiways on ASDE-X as well; consider renaming the taxiway that leads only to the end of the runway to enhance pilot understanding and situational awareness.	LFPG
61	Work closely with your airport operator to arrange frequent inspections of the work area to ensure that the work is progressing as expected and to evaluate the durability of your SMS mitigations.	LFPG
62	On departure runways shortened by construction, require pilots to confirm their ability to use the new and shortened TORA/TODA/ASDA with clearance delivery prior to taxi.	LFPG

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63	On runways shortened by construction, coordinate with your Automation technicians to adjust MSAW/LAAS parameters to account for the new touchdown point on the runway; this will give controllers low altitude alerts for aircraft that are descending in a manner that might result in a premature touchdown in the closed portion of the runway.	LFPG
64	On runways shortened by construction, consider whether heavy (and perhaps other types of aircraft depending on the distance available), should be restricted from using the runway; pilots and Flight Standards personnel included on your SMS panel can assist you with making this determination.	LFPG
65	Pilot and controller comprehension of the construction NOTAMs is critical and for various reasons, is often insufficient; to assess pilot understanding of your NOTAMs, work with your local Flight Standards Office to see whether ramp checks (or Operations Area checks) can be accomplished on the first day of the closure and randomly thereafter; to evaluate controller understanding, have your Quality Control (or other Support) personnel do random tower checks on the first and subsequent days of the project.	LFPG
66	Monitor frequencies to assess overall operational comprehension of NOTAM information; multiple instances of questions and comments that indicate a basic lack of awareness may reveal operators (pilots, air carriers, and controllers) that require follow up assistance.	LFPG
67	Air traffic controllers are the last line of defense and therefore most in need of the best and most comprehensive training in all aspects of the construction project; there are numerous documented cases in which NOTAMs, charts, ATIS information and other lines of defense have broken down, and sometimes with catastrophic results; ensure that the last line of defense does not!	LFPG
68	Avoid entering expiration dates/times for construction project NOTAMs; variability in construction pace makes the “end-date/end-time” a liability; NOTAM expiration date/time <u>may</u> occur before all construction related activities are completed (clean-up, inspection, etc.) and now users may plan operations based on a closed surface; better to have an end date/time in the <u>future</u> , forcing a manual cancellation (human-in-the-loop) rather than an automated (unmonitored: e.g. midnight) cancellation.	DTW

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69	Operational checks of runway lighting intensity should be conducted and pilot reports should be solicited on shortened runways when a parallel runway is present; experienced crew mistook a shortened runway (for a fully open larger runway) at night simply because the shortened runway had brighter lights than the adjacent unrestricted runway!	LFT
70	Ensure tower tools (strips, maps) properly reflect the construction status of runways at beginning of each shift and incorporate into the relief briefings so that closures are not overlooked.	ATSAP
71	Ask airport authorities to refrain from simultaneously closing successive high-speed taxiways to prevent lengthy landing rollouts and go-arounds by successive arrivals due to previous arrival aircraft failing to exit (due to multiple closed taxiway exits).	ATSAP
72	Avoid temporarily moving any threshold to a point between taxiway entrance/exit points; back-taxi operations tie up a runway for excessive time, and pilots can inadvertently apply takeoff power while still in the RSA; likewise, aircraft rolling out do not have the full advantage of runway end markings/lights when thresholds are temporarily displaced and may easily roll beyond the last available taxiway exit, thereby forcing a U-turn and back taxi; (increasing occupancy time).	LFT SFO
73	Consider suspension of instrument approaches that depend on NAVAIDs in close proximity to construction activity; some NAVAIDs outside the safety area may be adversely affected by vehicles and materials staged nearby	ATSAP, HNL
74	Communications blitz and increased controller awareness is recommended to avoid safety occurrences during construction with less than the full complement of paint/lights/signs <u>for example</u> : relocated and displaced thresholds are distinguished by different markings, but construction urgency and short-duration closures are often not accompanied by the full complement of paint/lights spelled out in the advisory circular (AC); relocated threshold markings are often difficult to distinguish for taxiing aircraft	ADS
75	Removing old threshold markings (signs/paint) and disabling lights plus adding new threshold markings (signs/paint) and temporary lights is quite costly; if restricting runway operations to one-way (no takeoffs toward the construction, nor landings over the construction) is an option, this saves construction resources and less time to implement	RNT

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76	Accepting last-minute changes in the construction phasing schedule adds risk; air traffic managers (ATM) and staff should consider the safety case with each change; changes to construction plans and schedules that have not been analyzed, without operational consideration, and/or without sufficient training and communications should be avoided; communicating a minimum response time when changes are unavoidable helps to prevent future last-minute changes	ERI
77	Vehicle violations during construction should be responded to with an immediate debriefing of the <u>project lead</u> to ensure the occurrence is not repeated; (simply debriefing the violator skips the opportunity to improve construction marking, lighting, restrictions, haul-routes, and/or training); working with the project lead seems to speed implementation of corrective measures to reduce the construction hazards	ERI
78	Suspension of instrument approaches when runway edge lights are not shifted to correspond to the relocated/displaced threshold(s) avoids risk	DAY
79	Controller training for construction must include a runway safety area (RSA) refresher so that controllers can spot a violation and respond appropriately	DAY
80	Consider the visual appearance of any runway threshold during <u>each</u> phase of the construction project that includes a relocated/displaced threshold; (any displaced threshold with no change in markings/lights is going to look like an attractive touchdown zone; fresh concrete/asphalt may appear like an attractive portion of runway to an approaching pilot with excess speed, or a departing pilot with aircraft performance concerns)	TOL
81	When refurbishing a sizable runway that involves phased closures of one end followed by the other end, consider closures that permit the same declared distances to minimize the new information that must be communicated and utilized by pilots/dispatchers	HNL
82	Tower controllers should periodically check the movement areas visually during construction to verify the surfaces opened/closed, and if barricades are removed/added	ATSAP
83	Painting is a short-duration construction activity that best fit into off-peak hours; (evenings, weekends)	ATSAP

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84	Declared distance information is provided by the airport according to the advisory circular AC 150/5300-13; Airport District Office (ADO) inspectors may be consulted for questions about declared distance calculations during construction	ATSAP
85	When closing a (old) taxiway configuration and opening a (new) taxiway configuration that reuses the same taxiway label, it is recommended that a short period be planned between the closure of the old taxiway configuration and opening of the new taxiway configuration	ATSAP
86	Consider suspending operations when vehicle transiting any construction movement area goes “radio-out” (lost communications)	ATSAP
87	Have airport personnel verify that runway/taxiway lighting is adjusted (e.g., on/off/intensity) for those movement area affected by construction at sunrise/sunset for <u>each</u> phase of construction	ATSAP
88	Consider operational restrictions on movement areas that are not properly isolated and covered by a NOTAM when the mitigations contained in the SRMD (used to mitigate various hazards) are not fully implemented or compromised for any reason	ATSAP