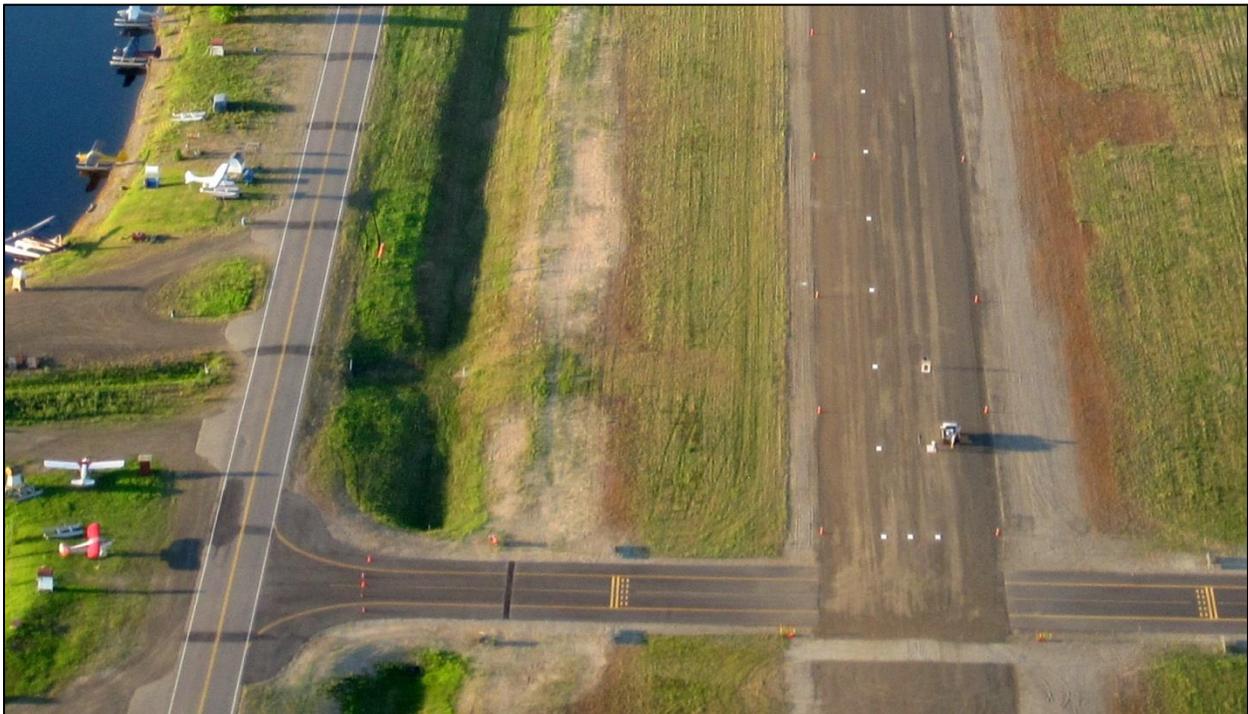


Guide to Creating a Practice Runway

This document is intended for airport owners, pilot groups, airport support groups or others interested in creating a practice runway at an airport to improve pilot proficiency. It identifies the stake holders that may be involved in the project, and outlines a series of planning, implementation and follow-up activities to successfully accomplish the project.



Runway marking in progress on the Fairbanks Ski Strip, June 2011

The guide should be viewed as a living document that will be revised as experience is gained. While the document outlines specific “how to” steps, it is impossible to anticipate the full range of situations that one may encounter at different airports. As a result, this material should be viewed as general guidelines. Additional guidance can be found at the back of this document in the reference section.

This guide is a collaborative effort among a number of organizations. Contributors to this project include the Fairbanks International Airport, Palmer Municipal Airport, Ninety Nines, FAA Airports Division, Runway Safety, Flight Standards Division, Department of Transportation and Public Facilities, Fairbanks General Aviation Association, and the Aircraft Owners and Pilots Association, UAF Aviation Technology Program, Alaska Airmen’s Association, FAA Safety Team and the FAA Fairbanks Air Traffic Control Tower.

The Need for a Practice Runway

Alaska contains a wide variety of bush strips, lakes, river bars, and unprepared landing areas. These landing surfaces seldom have the safety areas that are found at runways built to FAA design standards. Bush runways generally have not been surveyed and subjected to a review of obstructions that ensure clear approach and departure patterns, the landing surface is free of obstructions, and meets vertical curve and grade requirements. As a result, pilots that fly into these off field areas are on their own to determine the length, width and approach clearances. Consequently pilots need to be able to maintain precise control of their aircraft, including the abilities to touch down precisely at the end of the runway, maintain directional control, and stop in a short distance, perhaps over uneven terrain. The uncertainty and often high-risk nature of these operations are reflected in accident statistics. According to the FAA, between 2006 and 2010, there were 92 off field landing accidents, representing 42% of the total landing accidents reported in Alaska. In the same time frame 26 take off accidents, representing 27% of the total in that category were attributed to off field situations. While damaging an aircraft in an accident is one thing, inflicting injury or fatalities is another. In a 2010 FAA study over a five year period, 18 of 97 fatal or serious accidents involved an off airport landing or take off with the state.

To address this need, the FAA developed a Modification Of Standard (MOS), to allow marking of a simulated “bush strip” within the confines of a larger, conventional gravel or turf runway. The practice runway, typically 600 – 800 feet long and 25 feet wide, is created by painting a series of white marks inside a larger runway providing a margin of safety for pilots to practice takeoff and landings. It also gives them positive visual indications as to the performance they are actually achieving. It is hoped that providing an area to either acquire or sharpen precision take-off, landing, and directional control skills will better equip pilots as they transition to the more complex environment with variable surfaces, obstacles and the wider range of conditions encountered in the true off-airport environment.

Establishing a Project Team

Creating a practice runway is generally a team effort. In experiences to date, stakeholders have included the airport owner, FAA Airports Division, FAA Air Traffic Control, a pilot or airport support group and other aviation groups or organizations. Figuring out who the team members are at the start of the project is important to organizing and conducting a successful campaign. We will examine each of these partners and their prospective roles.

Airport Owner: Most public use airports in Alaska are owned either by the Alaska Department of Transportation and Public Facilities or a city or municipal government. As the responsible party for the operation of the airport, they are a key stakeholder. Most airports have limited maintenance and operational funding, and as a result may not wish to take on the project of creating a practice runway without volunteer support. If the airport was constructed or expanded using FAA Airport Improvement Program funding, they may be obligated to meet federal standards for the design and operation of the airport (see FAA Airport Division stakeholder description). Even if this is not the case for the airport you are interested in working with, the airport manager is probably the place to start with regard to creating a practice runway.

Local airport support group: Some airports have established pilot or airport user groups who take an interest in the airport. In other cases a local, state or national aviation organization may have members who take an interest in an airport, and wish to create a practice runway to improve pilot skills. These groups, whose members are often the principal users of the practice runway, may approach the airport owner requesting establishment of such a facility, and are also a source of volunteer labor, equipment

and supplies to perform the marking project. They may also be instrumental in monitoring the condition of the runway markings, and follow-up maintenance after the initial practice area is created. Unless the airport is a privately owned facility, where the airport group and management may be one in the same, the group will need to coordinate with the airport owner to approve and coordinate the project. Examples of stakeholder groups include a local airport pilot group, a chapter of the Ninety Nines, Experimental Aircraft Association, AOPA Airport Support Network Volunteer, Alaska Airmen's Association members or other ad hoc groups that may form just to undertake this project.

FAA Airports Division: This branch of the FAA not only funds airport construction projects, it is responsible for educating, ensuring compliance of the federal standards used in airport construction and operations. Consequently, the FAA Airports Division may have to issue a MOS for a proposed design as part of the approval process, before the airport is able to move ahead with the project. They are also a source of technical expertise to use when considering a project of this nature.

FAA Air Traffic Control: If your airport has a control tower, coordinating with tower staff is necessary as it will introduce a change with the normal operations, and during painting, or repainting projects. Even at uncontrolled airports, NOTAMs will need to be written, filed with ATC or a Flight Service Station to close the runway during project layout and painting, and a NOTAM should be written for the non-standard practice runway markings.

State or National Aviation Organizations: These organizations may be a source of assistance to help energize members to participate in a practice runway marking project. After runway marking, newsletters and other communication tools may be used to let the aviation community know that you have a practice facility at your airport and encourage its use.

Planning Phase

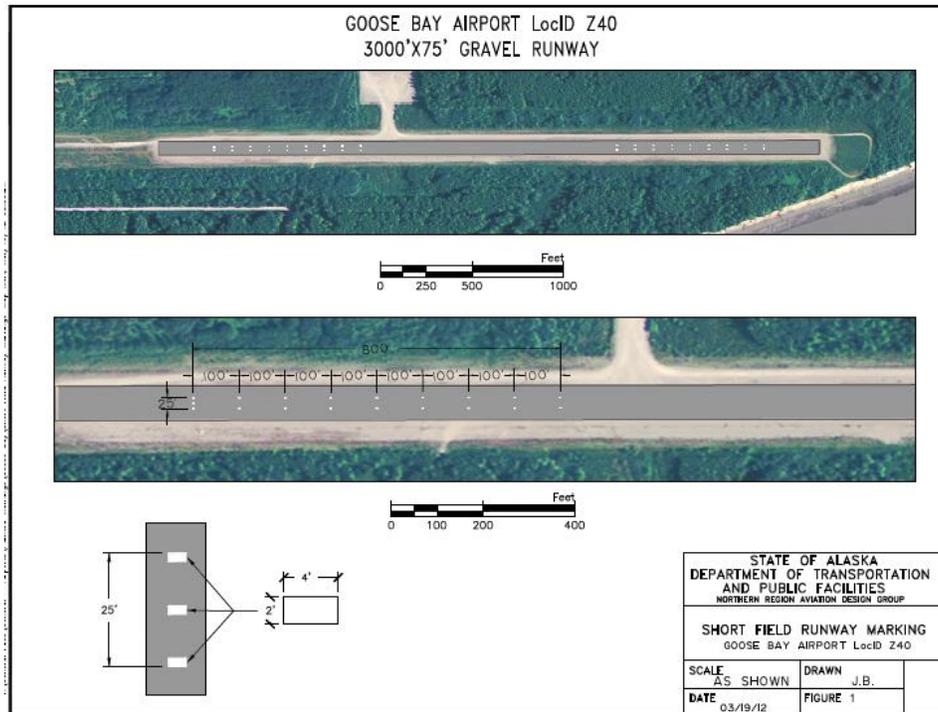
If a local airport support group is interested in establishing a practice runway at their airport, the first step is to research the feasibility of the project. The airport owner is a key contact to express an interest. The FAA Airports Division is also a resource to determine the technical feasibility of the project relative to airport standards. These inquiries should be made months before expecting to actually create a practice runway. A planning team, comprised of representatives from the different stakeholders will need to make a plan and schedule for the project. Some of the details to work out in this phase of the project include:

- Determine if the surface be graded and compacted before the markings are applied
- Identify with the airport who is responsible for safety related issues
- Prepare construction and non-standard practice runway markings, with FAA Airports Division and the Airport
- Identify when the strip be marked and when will the markings be refreshed
- Plan for posting NOTAMs, which is an airport manager's sole authority and responsibility
- Identify who will prepare and who will sign-off on any anticipated media coverage of the event
- Define how the project be monitored and documented
- Identify how weather delays will be handled
- Determine who will provide the paint and other materials

Having answers to these, and potentially other questions in advance will help prepare for the implementation phase of the project.

Current guidance for the design of practice runways includes:

1. Painted markings 2 x 4 feet on a side, twenty five feet apart (outer edge to outer edge).
2. Markings every 100 feet along the runway, for a total runway length between 600 and 800 feet.
3. Markings generally start near the runway threshold, in some cases, the threshold can be moved 200 feet beyond the actual runway threshold.
4. Markings are generally replicated on both ends of the runway, allowing use from either direction.



Sample design for a Practice Runway

Notices to Airmen

A key detail that must be attended to on a public use airport is filing a Notice To Airmen initially to close the runway while marking or re-marking operations are being conducted, and while markings are in place to let pilots know about them. During planning, the team needs to take local operations into account and try to find a time to do marking that has the least interference with routine operations. If that can't be avoided, try to communicate with routine users in advance to allow them to plan for the interruption.

The Airport Manager contacts the nearest Flight Service Station and requests that a NOTAM be issued. Typical language is:

RUNWAY 16S-34S CLOSED FROM 6PM to 6AM, WITH PERSONAL AND EQUIPMENT WORKING

Once the painting is complete, and dry enough for use, the Airport Manager needs to have the NOTAM cancelled, to avoid keeping the runway closed any longer than need be.

While markings are in place on a Practice Runway, a NOTAM needs to be issued advising pilots of the non-standard markings:

16S-34S NONSTD MARKINGS

Safety Plan

Airport safety during the painting process needs to be planned for. Letting volunteers know where to assemble, when and where to enter and exit the runway and other details should be defined, and communicated before entering the runway. See Appendix A for a sample safety plan used at Fairbanks International Airport. Non-tower controlled airports may be simpler, but require consideration of basic safety elements.

Layout, Marking and Painting

Layout and marking the runway is a critical step in the project. Coordination with the airport manager or operations staff is required to establish reference points to measure from. Establishing reference points along the edge and end of the runway should be completed in advance of the actual painting work session. This allows the initial setup to be accomplished working off the runway surface.

See Appendix B for additional information, and an alternate technique for marking prior to painting.

State runways normally have fiberglass wands (Carsonite Markers or Carsonite Delineators) marking the threshold and side boundaries of the runway. The delineators are normally spaced at 200-foot intervals. Generally, outboard runway threshold markers are sited between 2 and 10-feet from the runway threshold. Check with the airport owner to determine this detail. These markers can be used to establish the end corners and centerline of the runway from which measurements may be taken to layout the practice runway and the placement of the rectangular painted markings. Once the threshold corner of the practice strip is established and another point far down the practice runway 12.5 ft outward from the centerline, then a transit can be used to sight the straight line between the two. Alternately, without a transit, measurements can be made inward from the fiberglass delineators to establish the centerline and then outward from the centerline to establish the edge of the practice runway. Then a long “snap line” may be used to keep things aligned, and a tape measure and surveyors spray paint to mark the corner of each rectangle to be painted 100 feet apart.

Crew setting up to lay out the runway markings. Note the fiber glass delineators in the background, which are found on the end of most DOT airports. These can serve as a basis to start measurements to layout markings.



Note: Before entering the runway, it is mandatory to have a safety briefing concerning the operation.

A crew of three people should be adequate to lay out the markings for the paint crew with the following:

Layout/Marking Equipment:

- Transit or string/line at least 400 ft in length
- Tape measure at least 100 ft long.
- Stiff broom to clear away loose gravel
- Small spray can of surveyor's marking paint (upside down paint) for tick marking

Measuring the appropriate distance down and across the runway, the layout crew can use surveyors spray paint to mark opposite corners of the 2 x 4 foot rectangles. It is a good idea for the layout crew to work ahead of the paint crew. Finishing half of the layout marks wouldn't be too much of a head start. If the painters catch up and have to wait for marking, it is likely that paint sprayers will clog, and be difficult to restart. **Note: See Appendix B for more details, and a better long-term method to layout runway markings.**

Painting Equipment:

- 5-8 gallons of white latex paint (subsequent re-painting used less)
- Paint sprayer (and backup, if possible)
- Generator and fuel (and backup)
- Templates, two each, 2'X4' opening
- Flashing beacons for any vehicle on the runway
- Hand held radio to monitor tower or CTAF frequency
- Pickup truck for hauling generator and sprayer
- Gloves
- Bug dope
- Water and after-task snacks

The painting team typically uses a template (two is more efficient, to leap frog ahead of the paint crew) that are aligned over the corner marks left from the marking crew. Preferably, the surface should be graded and compacted at the beginning of the season before paint is applied.



A template was cut from a sheet of plywood, with rope loops attached to the corners to make them easy to pick up and move. The template was hinged for easy transport and storage. In some cases, loose rocks were brushed away from the painting surface.



The paint crew typically consists of one painter, one equipment operator to run the generator and filling the sprayer. One driver to run a pickup with the equipment along the marking area, and two people to move each template.



In summary, suggested staffing includes:

<u>Task</u>	<u>Staffing</u>
Safety briefing prior to entering the runway	1
Layout and marking crew	4
Includes sweeping gravel off area to be painted	
Truck driver	1
Equipment operator for generator and filling sprayer	1
Sprayer operator	1
Template team – two each per template	4

After painting has been completed, and paint deemed dry enough for operations, the NOTAM is cancelled to re-open the field for use.

Getting the Word Out

With the painting done, the airport needs to let the aviation community know that there is a Practice Runway available for use. Coordinating with the airport owner, a press release, or brief description of the facility should be drafted that may be shared with local airport or pilot user groups, businesses or tie-down holders and posted at refueling stations, FBO's or other businesses on the field. In addition, the Alaska Airmen's Association, Ninety Nines, AOPA, EAA and other aviation groups are normally happy to get the word out to their members. Notices of this nature should be issued by the airport, as they are the entity ultimately responsible for the operation of the facility.

Finally, the local press may be interested. This may be an opportunity to bring some attention to your airport and the community it serves. You may wish to contact them before runway painting, in case they wish to send a photographer or reporter to cover the event, and report it as a news story. Coordination with the airport owner/operator is important to make sure everyone is sending the same message.

Feedback is invited

This document will be revised as experience is gained. If you have comments or suggestions, lessons learned or other information you would like to share please contact: Tom George tom.george@aopa.org or Ron Dearborn rkdearborn@acsalaska.net

References

Alaskan Region Airports Division
Matt Freeman, Project Manager
Matthew.Freeman@faa.gov
907-271-5455

Airport Information:
<http://www.gcr1.com/5010Web/>



Skis Strip 2 at Fairbanks



Setting up the paint trailer



Laying out the marks



Marking the corner



Applying the paint



Finished Mark

Appendix A Sample Safety Plan

The complexity of a safety plan will vary depending on the nature of the airport. As an example, the following is the safety plan used for the 2014 painting of the Ski Strip at Fairbanks International Airport.

June 03, 2014

Fairbanks International Airport

To Fairbanks International Airport User Group,

Safety Plan

Volunteer Painting on Ski Strip 2/20

Scope of work: Volunteer help will survey and paint 2'x4' white blocks on the Ski Strip at both ends so pilots can practice short field work. Painting could be delayed at anytime because this work is weather dependent. If delayed we will reschedule in the following days. This work should only take approximately 2-4 hours to complete. The Ski Strip will be closed overnight until 0600L the following morning for the paint to dry.

Tentative Date:

The work is scheduled to start on the evening of Tuesday June 10, 2014 at 1830L (6:30 PM). Note volunteers will show up at approximately 6:15 pm at the Airpark location on map.

Volunteers:

The volunteers will meet in the Air Park staging area on the left side as you enter the park on the evening of the scheduled work. Please park only in the designated area. There will be a meet and greet followed by a safety briefing prior to work starting. No more than two volunteer vehicles equipped with beacons/strobes will be on the closed runway (ski strip) at any time. Beacons/strobes and headlights shall be on at all times while on the ski strip.

Operations:

Operations will conduct a safety briefing with the volunteers at the Air Park so everyone knows where they can and can't go on the airport. Volunteers will be shown the safety plan for the work scheduled. Appropriate Notam's will be issued & cancelled to include closing the Ski Strip to all aircraft traffic. They will also co-ordinate with ATCT prior to starting the work and monitor ground frequency during the work. **Bring portable strobe/beacon for paint truck and covers for delineators.**

ATCT:

Will advise Airport Operations (via Airport Dispatch 474-2530) of any concerns or problems they encounter during the work. Will not allow any aircraft to taxi across the ski strip at Twy U, V, or W.

-Sample Notams-

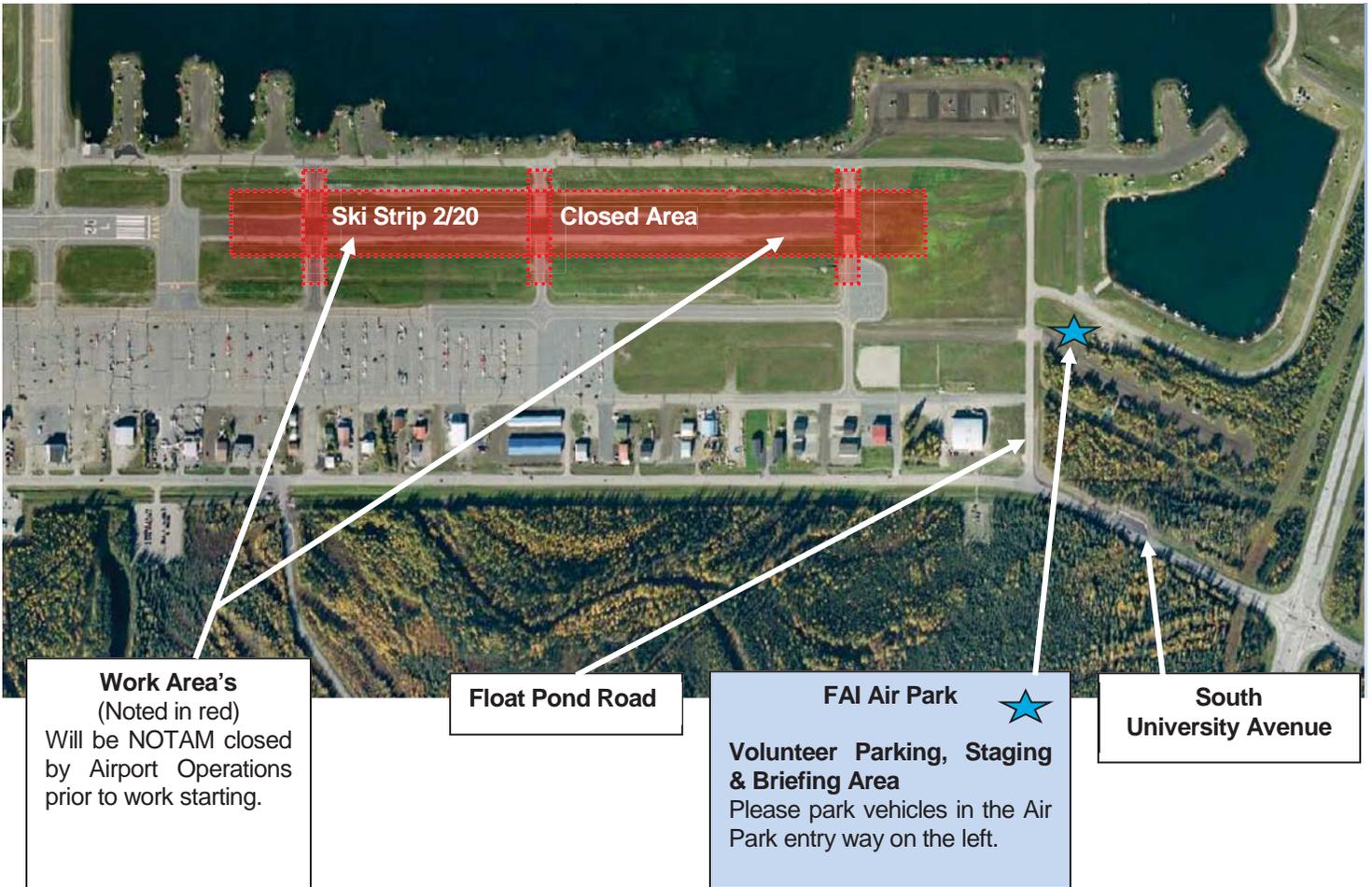
These closures are to all traffic, including taxing aircraft.

! FAI FAI RWY 2/20 SKI STRIP CLSD 1406110230-1406111400.

! FAI FAI RWY 2/20 SKI STRIP WORK IN PROGRESS MAINTENANCE PAINTING 1406110230-1406110530

! FAI FAI TWY U, V, W CLSD 1406110230-1406111400

Safety Plan Diagram

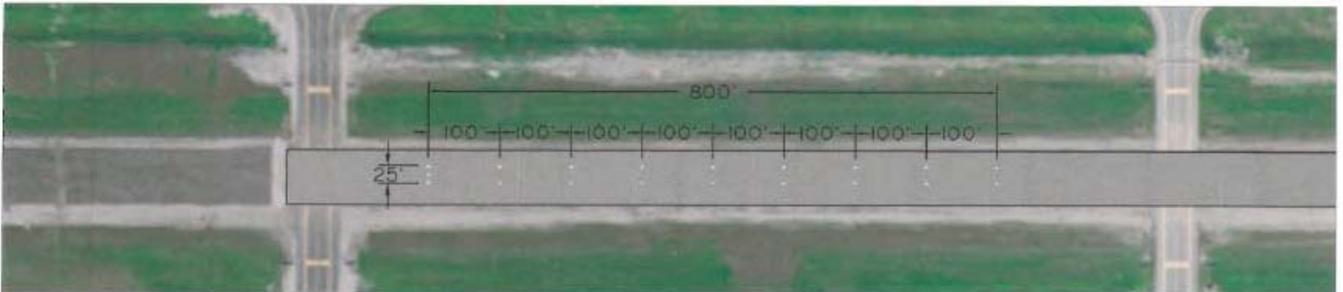


Painting Layout Diagram

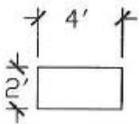
FAI SKI STRIP 2-20
2900'X75' RW



0 100 200 400 600 800
SCALE IN FEET



0 50 100 200 300 400
SCALE IN FEET



NOTE: 200' DISPLACED THRESHOLD AT EACH RW END

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
NORTHERN REGION AVIATION DESIGN GROUP

SHORT FIELD RUNWAY MARKING
FAIRBANKS INTERNATIONAL SKI STRIP

SCALE AS SHOWN	DRAWN T. HENRY
DATE 11/08/11	FIGURE 1

Appendix B Laying Out the Practice Runway

Designed by Pete VanDeHei, Fairbanks International Airport

This section describes how to initially layout the markings for a Practice Runway using a string line and measuring tape. The initial layout is time consuming. If you plan to re-mark your runway in subsequent years, a method is described to place permanent reference points which greatly speed up the marking process during subsequent painting projects. If your airport has the resources to engage the services of a surveyor, providing them with your layout would be the most precise way to layout the marks. An alternate method with commonly available equipment is the String Line Method, described below. The example used is the Ski Strip at Fairbanks International Airport, however your airport may have a different set of dimensions approved by the FAA in a *Modification To Standards* needed for painting these non-standard markings on a runway surface.

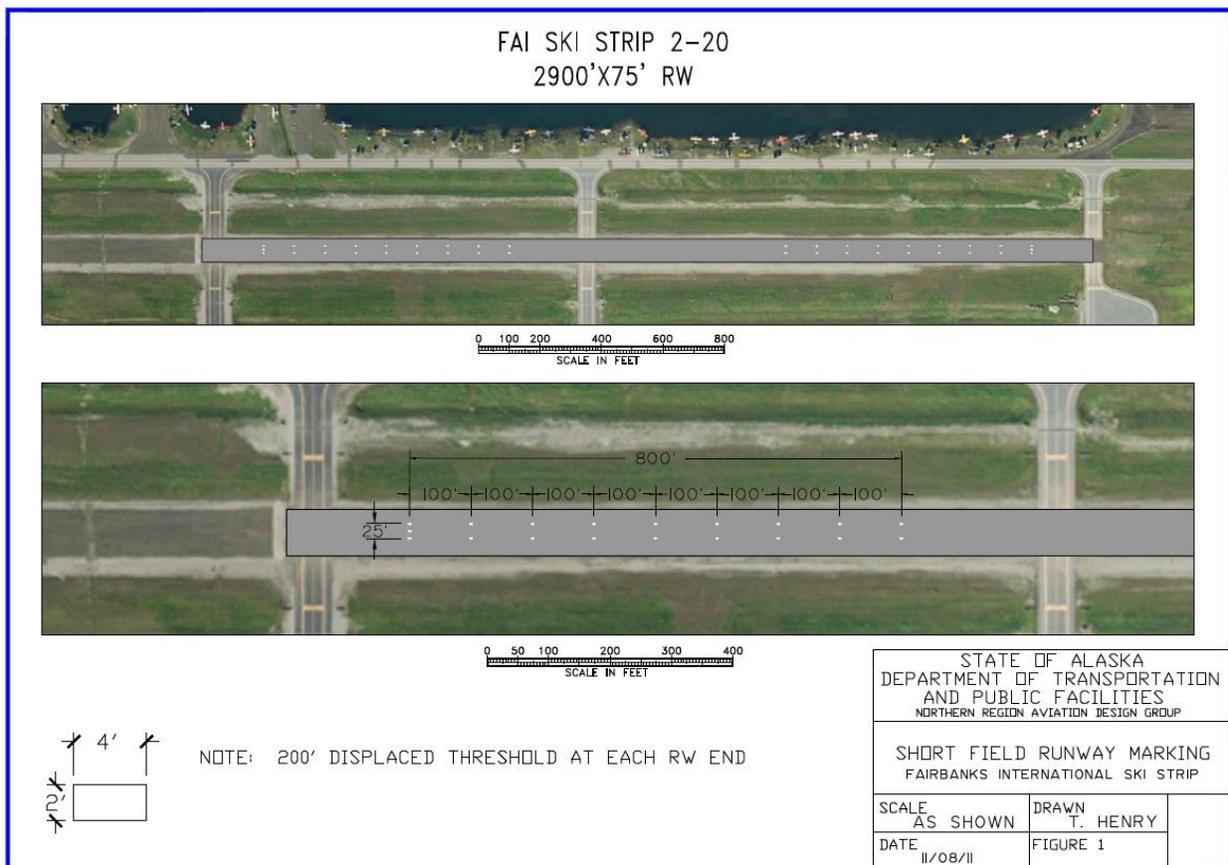


Figure B-1. Marking layout approved for layout of markings on the Ski Strip at Fairbanks International Airport. Lengths of practice runways may vary based on the overall length of the runway.

String Line Method

The first step is to find the runway center line, and establish reference marks at three points along the runway: one at the runway end, another half way down the practice runway and a final mark just past the end of the last set of marks to be painted. This example uses the layout at Fairbanks (see Figure B-1). If your layout is different, adjust the calculated points accordingly. Usually a runway will have some

kind of runway end markers (delineators, cones or other markings that show the runway threshold, see Figure B-2). If you have good edge markings, they may also be used.

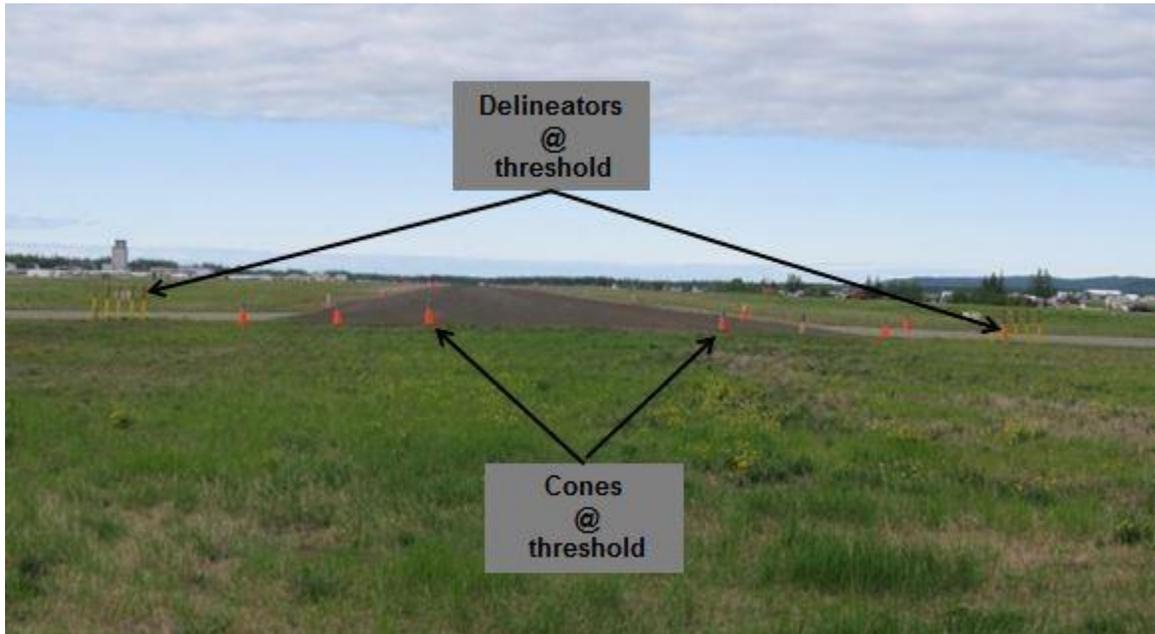


Figure B-2. Threshold markers on the runway, used to find the center line of the runway.

Centerline Markings

Runway end: Run a string between your runway end markers, measuring the distance between the end markers and divide by two to establish the center line. Then measure back 12 ½ feet on each side of center line. Drive a nail in the ground at this point to use as the starting point for a string line. These marks should be 25 feet apart and will be the outside line of the blocks to be painted. Refer to points 1 & 4 on Figure B-3)

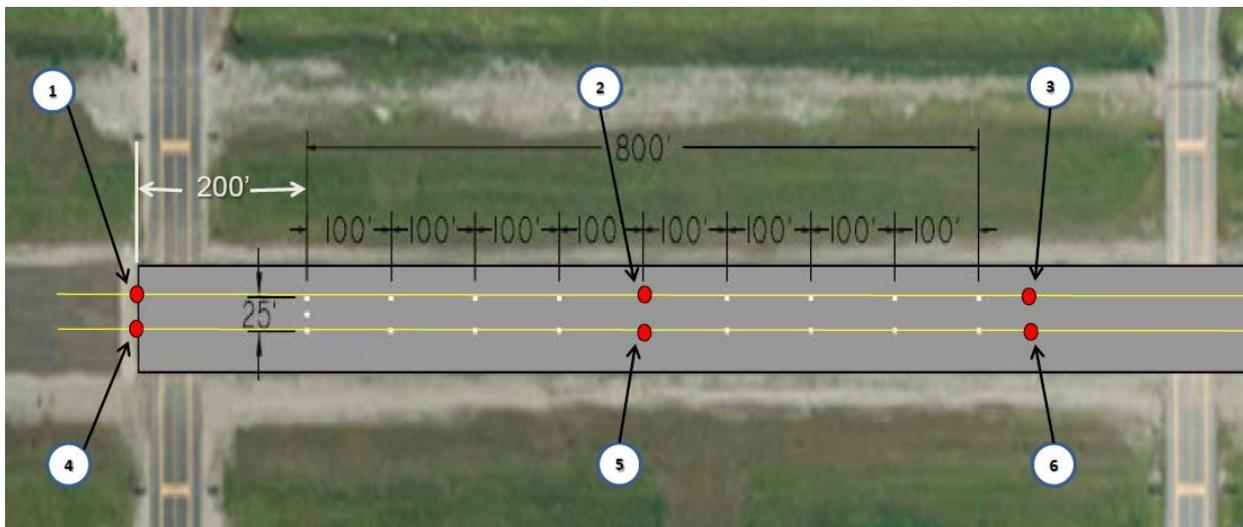


Figure B-3. Points to establish on the runway, used for initial layout of marking.

Half-way down practice runway

Find the edges of your runway, and measure in $\frac{1}{2}$ the width of the runway from each side. If these two points are not the same location, split the difference and mark it as the center line. Measure back 12 $\frac{1}{2}$ feet each side of center line, making sure you are perpendicular to the runway center line, and mark these points. Drive a nail in the ground at these locations to attach string line. (Refer to points 2 & 5 on Figure B-3)

Just past the last block to be painted

Duplicate the process just completed at the half-way point, and drive a nail at points 3 & 6 on Figure B-3.

Now you have six points defining the edge of the practice runway. Run a string between points 1 and 2, and stretch it tight. Measure along the string line and mark the corner of the block to be painted. You may want to put a mark 4 feet past this point to mark the other end of the painted block. Repeat this procedure between points 2 and 3. Use the same technique on the other side of the runway between points 4, 5 and 6. The paint crew will use these marks to align the 2 by 4 foot template prior to the application of paint.

While this process works, it is time consuming when it comes to re-marking when paint marks wear off, or during subsequent seasons. The following section describes a more permanent marking scheme, which greatly reduces the time required to layout the locations to be painted.

Establishing Permanent Reference Markers

After using the string method during several painting projects, the decision was made to install more permanent markers off to the side of the runway. This greatly speed up the marking process, and shortened the time needed to conduct the entire project. Twelve inch pieces of $\frac{1}{2}$ inch pipe were driven flush with the ground off to the side of the runway, which allows the marking crew to easily pull a tape across the runway and mark the locations for the painting team to layout of their template.



Figure B-4. Tools used to install permanent markings reference points.

At Fairbanks, placing the markers 75 feet off center line worked quite well. Even though this grassy area is mowed in the summer, the pipes are flush with the ground, and not affected by mowing operations.

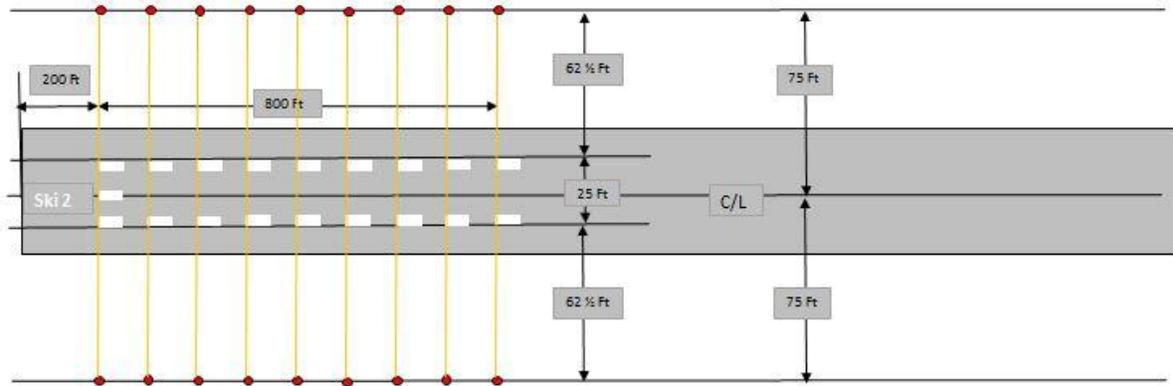
Be sure to check with your airport maintenance personnel to see if this works at your airport. See figure B-5 and B-6 for more details on how to establish and use these reference markers.



Figure B-5. Driving pipes off the edge of the runway to permanently establish reference points greatly speeds up the marking process during painting projects. The bolt stays in the pipe, and is marked with flagging to make it easier to find.

Once an array of permanent markers are established, a four person crew can rapidly layout out the locations for painting. A tape is pulled between the reference markers, and spray paint is used to mark two corners to guide the positioning of the templates. This also allows the painting to proceed more quickly by painting marks on both sides of the runway at the same time, as opposed to having to work down and back along each side of the runway. With these revisions to the layout and painting process, the time on the runway at Fairbanks was reduced from several hours to less than one hour.

How to locate your painted blocks in the future years

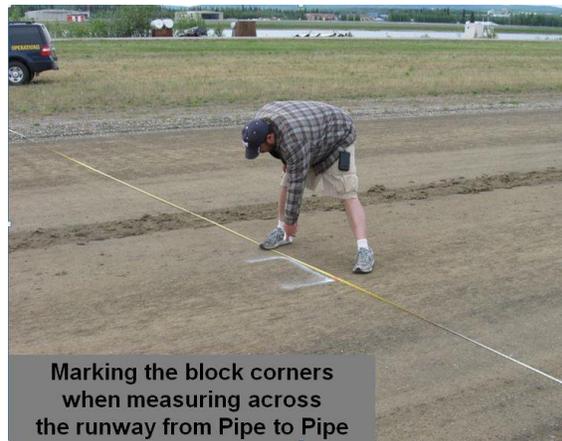


- The red dots indicate the location of a pipe 75 feet off centerline adjacent to the start of each painted block. A one foot long piece of $\frac{1}{2}$ inch pipe is installed in the ground at each location. With these pipes in place just run a long tape measure (yellow line) across the runway from pipe to pipe to find the end of your painted block. Measure in $62 \frac{1}{2}$ feet from each pipe to find the out side edge of the painted block, an additional 2 feet will mark the other side of the block.

Figure B-6. Layout of an array of permanent markers to speed up the marking process during painting projects.



Measuring from pipe to pipe across the runway
Bolt holds tape measure in reference marker.



Marking the block corners
when measuring across
the runway from Pipe to Pipe
Spray paint used to mark location to place
template for painting the 2 x 4 foot mark.