Brainstorming List – SJC Southflow Mitigations

Sunnyvale / Cupertino Airplane Noise Groups

Overall Suggestions:

1. **Full dispersion to the pre-2012 levels (Phase 1), or designation of multiple published flight paths that will accomplish similar dispersion.**
   - Sunnyvale group has possible suggestions that could provide "calculated" dispersion.

2. **The tight turn (RNP path) needs to be optimized or eliminated.**
   - Preliminary decibel meter testing is indicating that the RNP flight path (tight loop) is generating excessive noise
   - RNP needs to be optimized to reduce noise impact

3. ***FAA recommended*** - **EAST approach flight paths**
   - Planes already fly these routes, but the number of planes using these routes is reducing
   - Increasing this approach leads to significantly less residential noise impact

4. **Examine North approach into SJC from the bay**
   - Current published flight path exists, but is no longer frequently used
   - Increasing this approach leads to significantly less residential noise impact

5. **Discourage narrow concentrated (single line) flight paths**
   - These single line flight paths are causing large spikes in noise for residents
   - Discretionary paths currently being flown into San Jose Airport are being eliminated
   - This elimination needs to be stopped

6. **Stop disproportionally impacting residents**
   - Changes should consider historical use, and account for all parties involved
   - Changes should not affect any one resident over another

7. **Limit flights between 10PM and 6:30AM over high density residential**
   - Taper/alter flights prior to curfew
   - Reduce planes overhead during hours that residents are at home most

8. **Modify procedures**
   - Gliding in without power (reduces engine noise)
   - Reduce air speed (reduces airframe noise)
   - Utilize wake vortex generators (reduces engine whine)
   - Dropping/remove waypoints (creates dispersion)
   - Verify if wind speed trigger for South flow can be increased (reduces South flow flights)
   - Raising altitudes (alleviates noise)

Brainstorming List – SJC Southflow Mitigations (continued)

Strategic Suggestions:

- **Make sure the South flow flight path and any proposed changes do not disproportionally impact any one resident**

- **Initiate Technical working group**
  - Due to limited technical expertise and time, it is advised that a technical working group be created to study each of the proposals along with the FAA
  - Recommend that an aviation expert and all affected parties will be invited to participate in the working group; Sessions to be open to the public
  - The technical group will then present its' findings & recommendations during adhoc committee meetings for full discussion, findings, and final decision(s)

- **All changes should be FAA computer modelled prior to implementation in order to minimize excessive impact to single residents**
  - If forecasted impact does not match expected result, then the change may need to be rolled back and alternate mitigations considered

- **Analysis of proposed change should continue after implementation**
  - Because of time constraints, no noise studies will likely be completed before recommendations are implemented.
  - If the changes result in little or no improvement, then re-evaluation of the changes needs to take place & further mitigations will be necessary
  - Our team would like to see a marked improvement in this flight path; preserving quality of life and impacting no single resident disproportionally
  - Historical flight tracks need to be preserved.

Administrative Suggestions

- **SJC to increase fines for curfew violators**

- **Establish landing fees based on flight noise generated by the plane(s) during arrival procedures**

This AdHoc Committee has the power to really improve the South flow noise issue.

Together community leaders and residents can solve this problem.

Brainstorming list from the AdHoc Committee (in no special order): (Based on AdHoc meeting of February 23, 2018)

1. Limit planes to a maximum of 200 knots once they get to an altitude under 4000 feet
2. Increase the recommended altitude at waypoint ZORSA back to 3200 feet altitude (from the current 3000 feet)
3. Define some minimum altitudes at waypoints over the cities
4. For Airbus 320 aircraft - recommend product installation of "wake vortex generators" to quiet the whining noise
5. Somehow disperse the flights into a wider flight path or multiple flight paths
6. Have planes glide along descending paths to reduce engine noise (smooth descent to limit noise)
7. Look into modifications of the current procedures that could make them quieter without impacting safety. (Are there flight procedures that are quieter than other procedures without impacting safety?)
8. Could SFO airspace be modified, so there is more room to change the San Jose Airport flight paths
9. Move the south flow turn out over the water/bay (rather than over land) in order to reduce noise and potentially raise the altitude of the planes while over land
10. Evaluate the use of GBAS - Would it be helpful or or would it create more noise?
11. Give latitude to the pilots so they can fly with more discretion in order to minimize noise
12. Can the trigger for South flow operations be raised to 6 or 7 knots from the current 5 knot trigger?
13. Can any new flight standard take noise into consideration?
14. Move the waypoint back from ZORSA to JESEN, which might allow some dispersion again
15. Relax some efficiency standard to keep safety but potentially reduce noise
16. Financial incentives for airlines to fly quieter
17. Optimize the RNP path for noise
18. Ask for a chartered visual flight procedure, so potentially some possible dispersion can be built into the system
19. Possibility of an East approach that can be used to disperse some of the flights
20. Possibility of an East approach that can be used once a certain threshold of flights is reached over Sunnyvale

Robert Holbrook
March 8, 2018

Proposals for Relieving Noise Complaints for South Flow Arrivals to SJC

Background

South flow flights arriving to SJC have exhibited three phases of concentration. Phase I, before March 2012, dispersed flights fairly evenly over an east-west line across Sunnyvale almost two and a half miles wide. Phase II (March 2012-March 2015) concentrated flights into a narrower corridor, anticipating the Phase III 'rail' laid down in March 2015. If the fleet mix has not changed much since 2012, aircraft should be capable of reverting to traffic patterns that existed before March 2012. The question is how to do it.

Guiding Principle

People need the ability to plan, especially when making big decisions. People who aren't bothered by airplane noise can choose to live near it, perhaps getting a better house price. People who don't like airplane noise can avoid it. Public officials should not break faith with the homeowners and residents who made housing decisions over the years based on long-standing air traffic patterns.

Priorities

- First priority: Disperse noise over the historic flight corridor - as it existed before March 2012.
- Second priority: Minimize single-flight noise.

Suggestions

The suggestions below are discussed in the next section. Many of these suggestions could be used together. The Appendix contains a map with the waypoints named.

First Priority: Disperse Noise Over the Historic Flight Corridor (roughly in priority order):

- Create a Charted Visual Approach.
- Dispersion to the East: Recast ZORSA as a 'fly-by' waypoint…
    - … and relocate HITIR to be as close to JESEN as possible to re-enable Phase I dispersion.
- Dispersion to the West: Vector airplanes by varying their course headings to the Bay.
- Define different approach paths for large and medium-to-small airplanes.
- Pivot the flow of traffic to overlay its historic pattern of flow.
- Develop two sets of procedures: one set for when efficiency is demanded, another for when it is not.
- Revert the final waypoint on the STAR procedure to PUCKK.
- Revert the final waypoint on the STAR procedure to JESEN. Also,
    - Remove HITIR and ZORSA from airplanes' Flight Management Systems for approaches other than RNP;
    - Encourage Air Traffic Control (ATC) to disperse airplanes as in Phase I.
- Define multiple flight paths across the historic corridor and rotate airplanes between them.

Second Priority: Minimize Single-Flight Noise (roughly in priority order):

- Minimize 'level-flight' segments.
    - Enable pilots to arrive HITIR at altitudes and speeds that allow them to reach the Bay without flying dirty or using thrust.
    - Relax the altitude requirement at HITIR from exactly 4000' to at or above 4000'.
    - Enable pilots of vectored flights to optimize their descent profile by telling them where they will turn early enough so that they can choose the best altitude at HITIR.
- Defer noisy maneuvers until overflying compatible land adjacent to the Bay (Moffet Field, industrial parks).
- Optimize all approach procedures for noise. Bring focus to the 75% of flights that do not fly the RNP approach.
- Other things being equal, encourage airplanes to fly slower and cleaner.
- Other things being equal, raise altitudes.

Other Suggestions

- Fine-tune the trigger for South Flow.
- SJC to persuade airlines to install vortex generators on planes that emit a 'whine', perhaps in consideration of other benefits.
- For flights that will arrive after the curfew, require pilots to state online what has caused them to violate the curfew - in advance of landing.
- Revisit arrival procedures in the future as noise modeling tools improve.

Discussion

First Priority: Disperse Noise Over the Historic Flight Corridor

Create a Charted Visual Approach

This suggestion was made by Ms. Thann McLeod of TRACON at the last meeting of the Ad Hoc Advisory Committee. The Committee was told that a Charted Visual Approach is more likely to be endorsed by airlines and used by pilots. Pilots have more discretion when flying a visual approach than when flying RNAV approaches, so this should contribute dispersion.

This approach could better align with the historic flight corridor because, if I understand correctly, an RNAV visual approach permits a sharper 'turn to final' than precision RNP does (30° vs 15°). I will say more about this later.

Dispersion to the East: Recast ZORSA as a 'fly-by' waypoint

A 'fly-over' waypoint requires airplanes to overfly that waypoint before they begin their turn, forcing concentration at the waypoint, as with ZORSA today. The location of ZORSA can accommodate the turning radius of the largest airplanes that can land at SJC. A 'fly-by' waypoint permits airplanes with smaller turning radiuses to turn before reaching it, 'cutting the corner'. This change would reintroduce dispersion by optimizing for each airplane's turning radius, which varies across the fleet mix. The timing of the turn is driven by the flight management system of each airplane, based on its capabilities, so this should be compatible with Nextgen. The location of HITIR might need to be moved closer to JESEN, or eliminated, to reintroduce the maximum amount of dispersion after JESEN.

Dispersion to the West: Vector airplanes by varying their course headings to the Bay

Vectoring is used to adjust the spacing between airplanes approaching the airport. Today, arrivals to SJC are vectored by flying further along a fixed rail, creating a 'trombone' effect after ZORSA. Instead, airplanes could be vectored by pointing them at different locations along the Bayshore, introducing dispersion. (Arrivals to SFO using SERFR STAR are dispersed by this latter sort of vectoring.) Ideally, airplanes would begin their turns as close to compatible land use as possible, hopefully after crossing Highway 101.

Define different approach paths for large and medium-to-small airplanes

As noted above, smaller aircraft can execute narrower turns. An approach path could be created after JESEN suitable for small- and medium-sized aircraft, with the approach path crossing ZORSA reserved for the largest aircraft. Such an approach path would better align with the historic corridor over Sunnyvale. Notice the narrow turning radius of the Boeing 738 in the following vector map and where this positions the airplane relative to PUCKK, shown in figures 2 and 3.

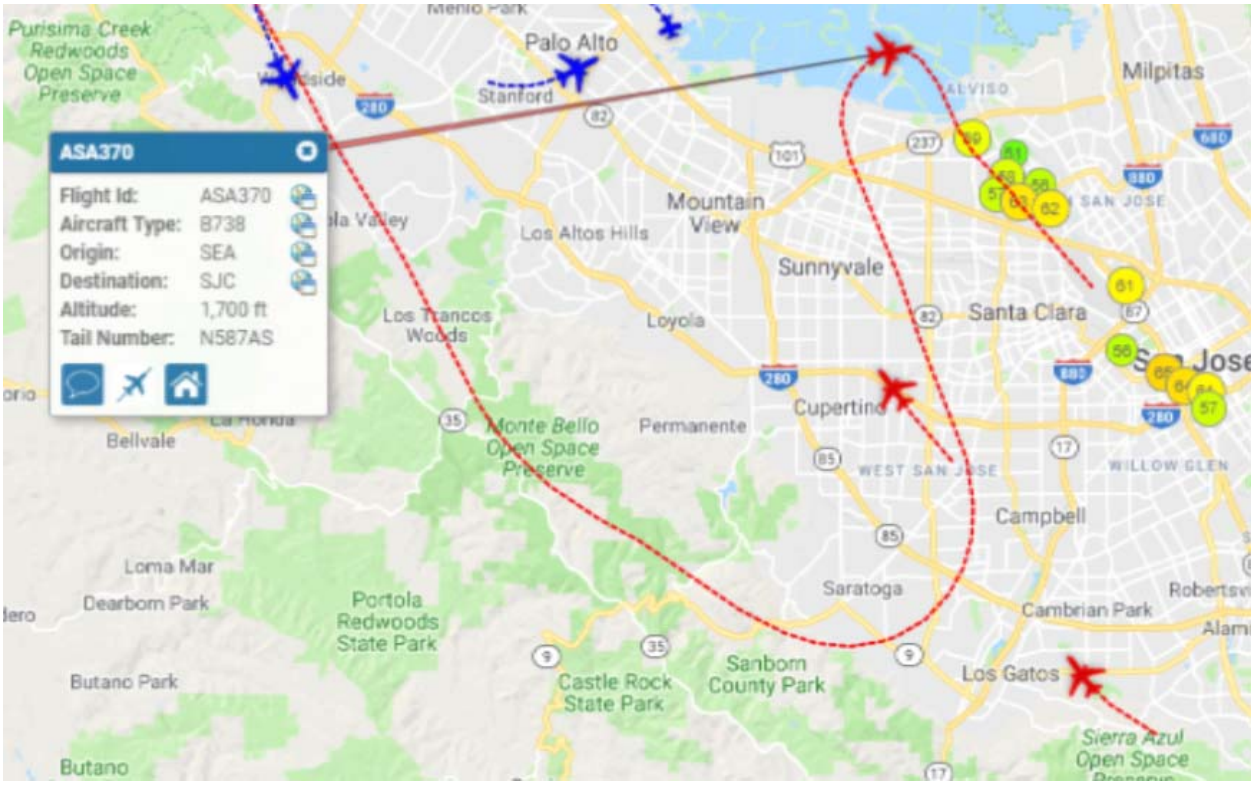


Figure 1. Approach path taken by a Boeing 738 (March 2, 2018 10:49:45am)
Note the narrow turning radius and the slight turn to the final approach

Pivot the flow of traffic to overlay its historic pattern of flow

This idea is meant to complement the three suggestions for introducing dispersion mentioned above: dispersion to the East, dispersion to the West and multiple flight paths based on aircraft size. The transition from Phase I to Phase II pivoted the flow of traffic counter-clockwise several degrees, on average, and the transition from Phase II to Phase III pushed the Phase II center of flow still further west. This suggestion is to pivot traffic back over its historic path of flow, dispersing it with the techniques described above. See the chart below for the flow immediately before Phase II ended, noting how the dotted white line, which approximates the center of flow, is pivoted from the solid and dashed yellow lines.

This clockwise pivot could be achieved by requiring airplanes to turn less than 180° to reach the final approach. If, for some reason, planes must make a 180° turn, they could compensate by turning the other way just before the final approach, as the plane in Figure 1 did.

I have been told that allowances for ‘turn-to-final’ are 15° for precision RNP and 30° for RNAV. If this is correct, the 'rail’ over Cupertino, Sunnyvale, Mountain View and Palo Alto could pivot clockwise by 15° or 30°, toward its historical center, enabling dispersion to the west using varying course headings.

While this idea might not be workable for the largest aircraft, it might be workable for medium-to-small aircraft.

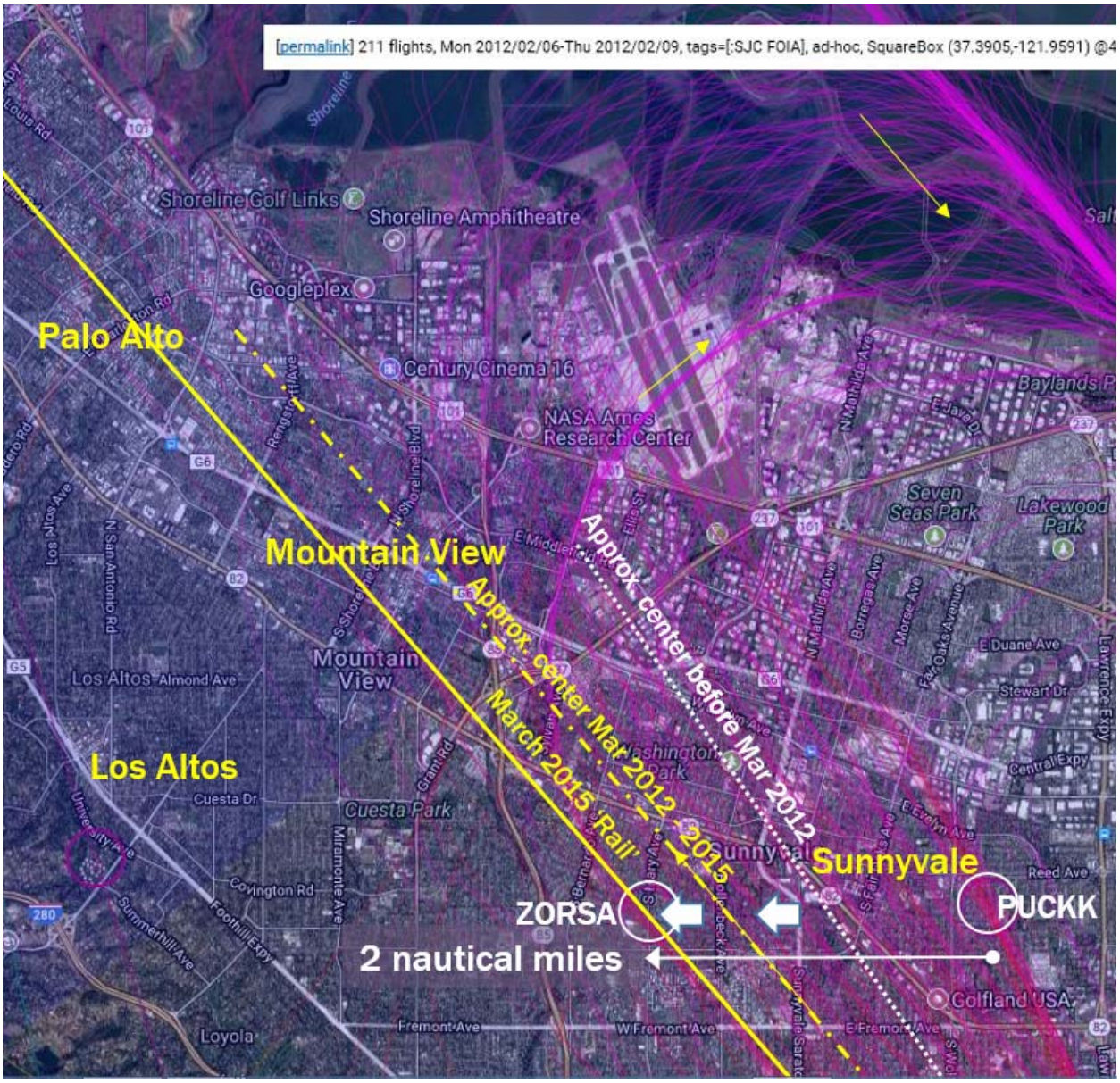


Figure 2. Flow of traffic just before Phase I ended in March 2012. Note the broad dispersion. (2/6/12 to 2/9/12 – 211 flights)

Develop two sets of procedures: one set for when efficiency is demanded, another for when it is not

During non-peak hours, noise-optimized procedures would be used.

Revert the final waypoint on the STAR procedure to PUCKK

Before March 2012, PUCKK was the final waypoint on the STAR procedure. As can be seen in Figure 2 (unless you're looking at a black and white printout!), arriving flights missed this waypoint far more than they hit it, perhaps because some airplanes needed to make a wider turn. But that was good, because

this procedure created considerable dispersion in practice. Vectoring flights can be a good way to reintroduce dispersion, as discussed above.

The intent of this suggestion is to provide a way to recreate the Phase I distribution, not to concentrate flights over PUCKK.

Revert the final waypoint on the STAR procedure to JESEN

During Phase II, the final waypoint on the STAR arrival procedure (JAWWS THREE) that brought airplanes to the vicinity of SJC was JESEN. With Phase III, the final waypoints for the STAR procedures (ROBIE and SILCN) that superseded the Phase II procedure was extended five miles past JESEN to ZORSA.

For this solution to work, the HITIR and ZORSA waypoints must be removed from the flight management systems guiding airplanes past JESEN or else the concentration will remain. The dispersion of Phase II arose because pilots had to make a slight turn after JESEN and the timing of their turns varied.

The dispersion during Phase II was broader than during Phase III, but it was not nearly as broad as Phase I. Could ATC enable and encourage more dispersion than offered by Phase II if this solution were to be adopted?

The solutions offered in this paper are presented in priority order, and reversion to PUCKK is preferred to this solution because it led to more dispersion in the past.

Define multiple flight paths over the historic corridor and rotate airplanes between them

This approach is prioritized lower than the others because it could allow the concept of 'rails' to persist. If airplanes could be 'dealt out' to the rails on a per plane basis, this becomes a poor man's form of dispersion. However, if all airplanes are routed to one corridor or another based on time of day then noise is being distributed, not dispersed. No one is going to want a flight every two to three minutes, even for a few hours, but that is what the sum of traffic to SJC is likely bring in ten years without dispersion.

Second Priority: Minimize Single-Flight Noise

Minimize 'level-flight' segments

I was told by a commercial pilot that flying level requires lift devices, like flaps and slats, and often jet thrust as well, all of which are very noisy. He also said that an airplane generally requires an extra 1000' of altitude for every 3nm to the runway to avoid using lift devices.

If all airplanes are forced arrive at HITIR at the same altitude, as they are today, and the RNP approach is optimized for noise, vectored airplanes not taking the RNP approach will need more lift because they have to fly further. Currently, 75% of airplanes reaching ZORSA do not take the RNP approach, and these flights should be optimized for sound. A data point: flights over ZORSA that continue on to Mountain View City Hall have already flown 2.17nm past ZORSA, which, per the pilot's rule, should require a drop of 725' to avoid noisy lift devices, but, in fact, during 2016 and 2017 they dropped only 230' on average in that segment.

Two procedural changes could help minimize level-flying segments. First, enable pilots flying aircraft that are to be vectored to arrive at HITIR at higher altitudes. This means eliminating the exact altitude requirement of 4000' for HITIR. Second, provide pilots with better predictability for their course well in advance of HITIR (and JESEN for that matter). Perhaps this could be done by ATC providing a course heading to the Bay that the pilot can target, as suggested earlier. Doing so would provide a double benefit: in addition to the dispersion discussed earlier, airplanes could fly quieter.

Defer noisy maneuvers until overflying compatible land adjacent to the Bay (Moffett Field, industrial parks)

Optimize all approach procedures for noise. Bring focus to the 75% of flights that do not fly the RNP approach

Other things being equal, encourage airplanes to fly slower and cleaner

Sound energy increases with the fifth power of the velocity of the airplane, so speed is important. Noise from lift devices (flaps and slats), which generate still more sound, is often the dominant source of noise on the ground. With advances in quieter engines, airframe noise is often a bigger factor in arrivals than jet noise. Use of jet thrust should also be minimized.

Other things being equal, raise altitudes

This is prioritized last because altitude, by itself, is not likely to buy us much. At a conference on airplane noise held in Long Beach last week, I learned that eight miles from the airport (FRA and LHR), planes arriving at a relatively steep 3.2° angle of descent were only 0.7dB quieter on average, with the best aircraft being 1.4dB quieter. That's not much. (ZORSA is 10 miles from SJC along the RNP path.) Whereas sound energy drops off with the fifth power of velocity and perhaps the sixth power of the speed of the exhaust, it drops off at only a bit more than the second power of altitude.

Higher altitudes can be especially helpful when they enable airplanes to fly cleaner or with less jet thrust (see the discussion of level-flight segments), however.

Other Suggestions

Fine-tune the trigger for South Flow

Airlines prefer North Flow to South Flow for SJC, so an attractive solution would be to increase the trigger used to declare South Flow conditions. A 5-knot windspeed trigger is currently used. Airports with longer runways use a 10-knot trigger. We have been told that a 10-knot trigger is not feasible at SJC. But 5- and 10-knots are very round numbers and perhaps an intermediate value would be possible. We should ask if a 6-knot trigger is feasible.

SJC to persuade airlines to install vortex generators on planes that emit a 'whine', perhaps in consideration of other benefits

SFO is about to send letters to airlines asking for their plans to install vortex generators. At the SFO Roundtable, SFO staff suggested that they would consider 'other options' if the response is lax. SJC

should consider taking similar measures, even if the percentage of planes requiring vortex generators is relatively low.

For flights that will arrive after the curfew, require pilots to state online what has caused them to violate the curfew - in advance of landing

A speaker at the Airplane Noise and Emissions Conference in Long Beach last week stated that this system reduced curfew incursions at one airport. Curfew incursions rose at SJC last year.

Revisit arrival procedures in the future as noise modeling tools improve

The tradeoffs between altitude, angle of descent, speed and whether an airplane is flying dirty are complex and interrelated. It is difficult to understand the net effects on noise without modeling. The FAA and academia are working to develop and improve tools to model aircraft noise. The FAA's noise modeling tool (AEDT) is being enhanced to better capture some of these effects, but those improvements are not yet available. We should encourage the FAA to revisit procedures that are developed as their modeling tools improve.

Currently, the FAA is shipping AEDT version 2d. AEDT version 3a will ship this fall and will offer enhanced modeling for noise levels below 65 DNL (the contour that defines who qualifies for noise remediation for their houses), which includes us. AEDT4 will incorporate airframe noise and engine noise, which could be a significant enhancement.

Appendix

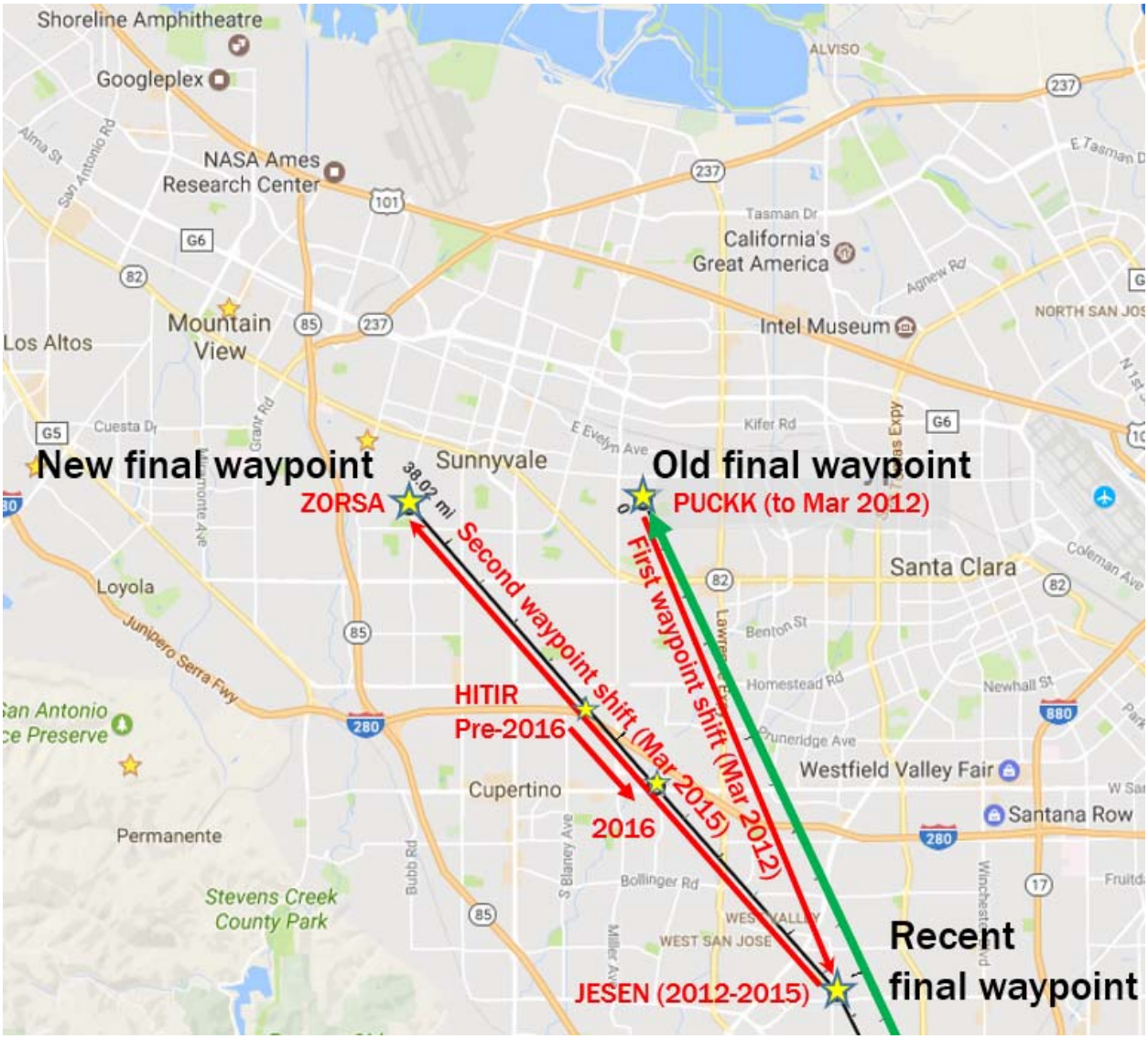


Figure 3. Evolution of waypoints on the STAR arrival procedures:

Disclaimer: The author is a layman. The statements in this paper are believed to be true but errors are possible.

Kazmierczak, Matthew

From: Robert Holbrook <>
Sent: Friday, March 09, 2018 10:50 AM
To: Glenn Hendricks; Kazmierczak, Matthew
Cc:
Subject: Ad Hoc Committee: Questions for a pilot
Attachments: RNP Z plates Evolution 2013-2016 (rnavz 20132016).pdf; JAWWS Evolution to RAZRR SILCN 2008-2017.pdf

Mayor Hendricks, Mr. Kazmierczak,

In its response to the "Requests, Questions and Next Steps" document posted for today's meeting, SJC staff said it would be helpful to know the kind of questions that might be asked of a pilot (item 13). In order to inform the discussion of this topic today, should it come up, I have prepared a list of questions. To answer some of these questions, I believe the pilot might want to refer to the attached documents, which show flight plates for earlier procedures. I have found that these are difficult to come by. I think the pilot might also want to refer to the vector maps in my document, "The Evolution of South Flow Traffic into SJC" posted at the Committee web site.

In addition, I expect the Committee would want to get the pilot's take on any other suggestions that are in play at the time he comes before the Committee.

Regards,
Robert Holbrook

Questions for a Pilot

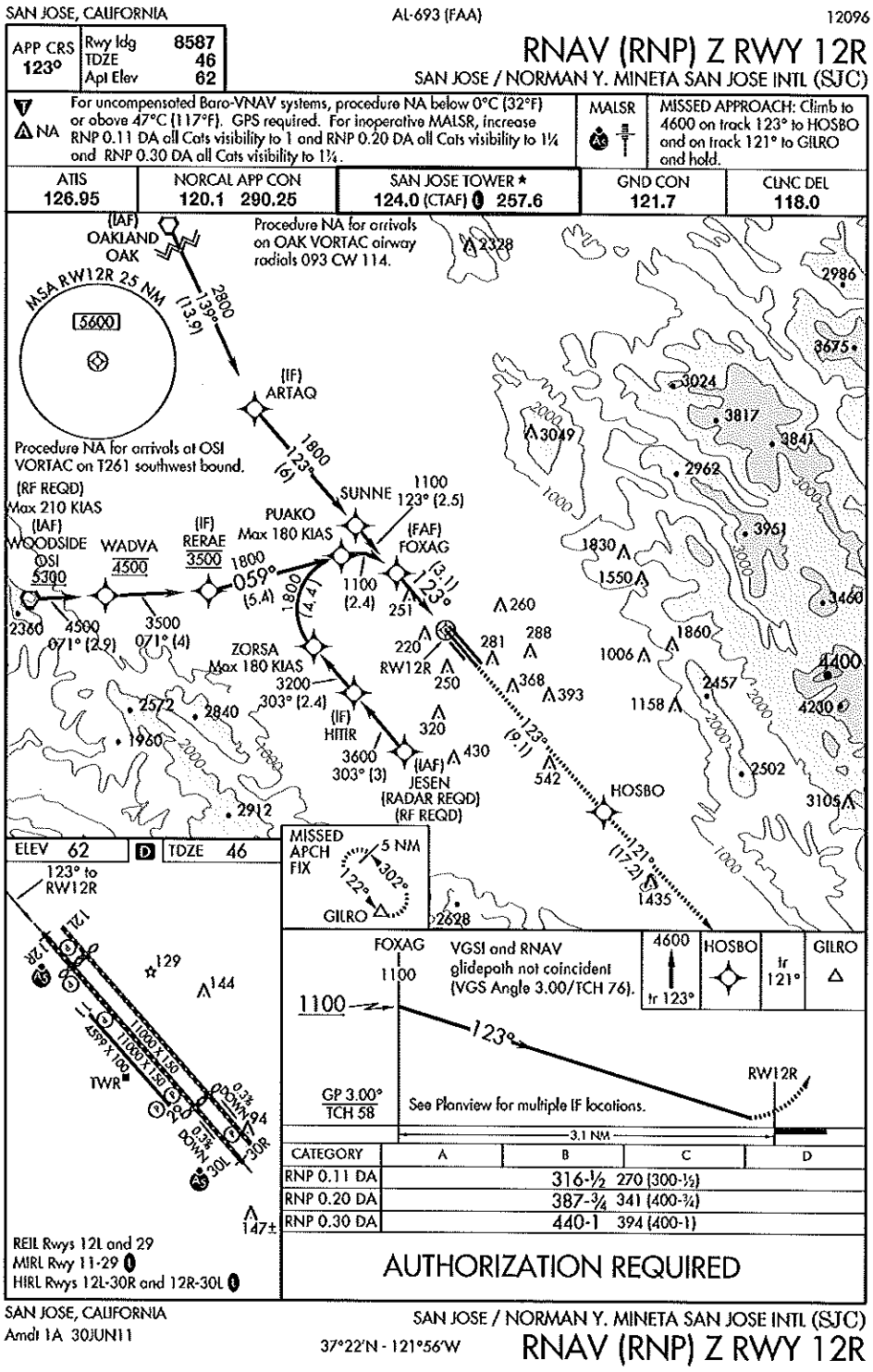
- Choice of Approach (past HITIR):
    - What drives your choice of approach after the STAR procedure is completed? Please discuss RNP, RNAV, Visual, Charted Visual, and vectored approaches.
    - Do different airlines use different approaches? Why?
    - To what extent do airlines define the approaches they use?
- Where along the arrival and approach paths would you expect single-flight noise to increase for reasons other than altitude?
- The Flight Management Controller (autopilot)
    - To what extent is the altitude you arrive at a waypoint driven by the Flight Management Controller (FMC)?
    - To what extent is the speed you arrive at a waypoint driven by the Flight Management Controller?
    - To what extent is deployment of flaps and slats driven by the Flight Management Controller?
    - Under what circumstances do you override the Flight Management Controller?
- RNP AR Z approach
    - Velocity
        - The RNP AR Z flight plate showed a maximum velocity of 180 knots at ZORSA prior to 2015. In 2016, the maximum velocity was increased to 210 knots. (Velocity is expressed as KIAS = knots indicated air speed, which is the airplane's speed relative to the wind.)
        - Why might this increase have occurred?
        - To what extent would you think this increase would be reflected in operations?
        - Since 2015 some data suggests that there has been an increase in average ground velocity at ZORSA, please comment.
    - Altitude

        - The Minimum Enroute Altitude (MEA) leading to ZORSA was 3200' prior to 2015 and 3000' in 2016
        - Why might this change have occurred?
        - To what extent would you think this reduction would be reflected in operations?
    - Would you expect lift (flaps and slats) and thrust to be required to execute the RNP AR Z turn after ZORSA?
    - Do planes make more noise when they turn? Is thrust required? Flaps?
    - How might the RNP AR Z turn be executed to create less noise?
- Level-flight segments for RNAV flights passing ZORSA over Mountain View and Palo Alto
    - HITIR specifies an exact altitude of 4000'. Is lift and thrust required to fly past ZORSA over Mountain View to Palo Alto?
    - Would arriving at HITIR at a higher altitude allow you to reduce the use of flaps/slats and thrust required to get to the Bay?
    - If so, what altitude window would you like to see to minimize noise while permitting vectoring?
- Noise and vectoring
    - From your perspective, would it be feasible for you to be vectored by ATC varying your course heading (from JESEN or HITIR) so that planes can be fanned out across Mountain View and Palo Alto as they approach their turn over the Bay?
    - Could you adjust the altitude you arrive at HITIR to fly more quietly to the Bay if ATC were to provide specific guidance of where you should turn long enough in advance?
    - When would you need that guidance for you to arrive HITIR at the best altitude for noise?
- Please discuss how changing ZORSA from a 'fly-over' fix to a 'fly-by' fix might affect where airplanes would turn. Would you expect this to increase dispersion across flights?
- From 2012 to 2015, the final waypoint on the JAWWS THREE STAR procedure was JESEN. Vector maps of flights during that period indicate more dispersion after JESEN than we have with the current procedures. How would the turn after JESEN have been driven during that period?
- Before 2012, the final waypoint on the JAWWS TWO STAR procedure was PUCKK. Vector maps of flights during that period show a great deal of dispersion. They also show that most airplanes were unable to reach PUCKK. Why and how might airplanes have left the STAR procedure before PUCKK?
- Would it be possible to prolong flying quieter over residential areas by 'catching up' and making more noise once industrial areas or the Bay have been reached?
- Do you have other ideas to increase dispersion?
- Do you have other ideas to reduce per-flight noise?

The first posting of RNP Z on Flightaware occurred between June 25, 2008 and Feb 3, 2009 per the Wayback Machine.

https://web.archive.org/web/20090501000000*/http://flightaware.com/resources/airport/KSJC

2013



2015

KSJC/SJC MINETA SAN JOSE INTL

JEPPESEN

27 FEB 15 Eff 5 Mar

(12-21)

SAN JOSE, CALIF RNAV (RNP) Z Rwy 12R

D-ATIS (ASOS when Twr inop)	NORCAL Approach (R)	*SAN JOSE Tower	*Ground
126.95	120.1	CTAF 124.0	121.7

BRIEFING STRIP™

RNAV	Final Apch Crs	Minimum Alt	RNP 0.15 DA(H)	Apt Elev 62′
	123°	FOXAG 1100′ (1054′)	380′ (334′)	TDZE 46′

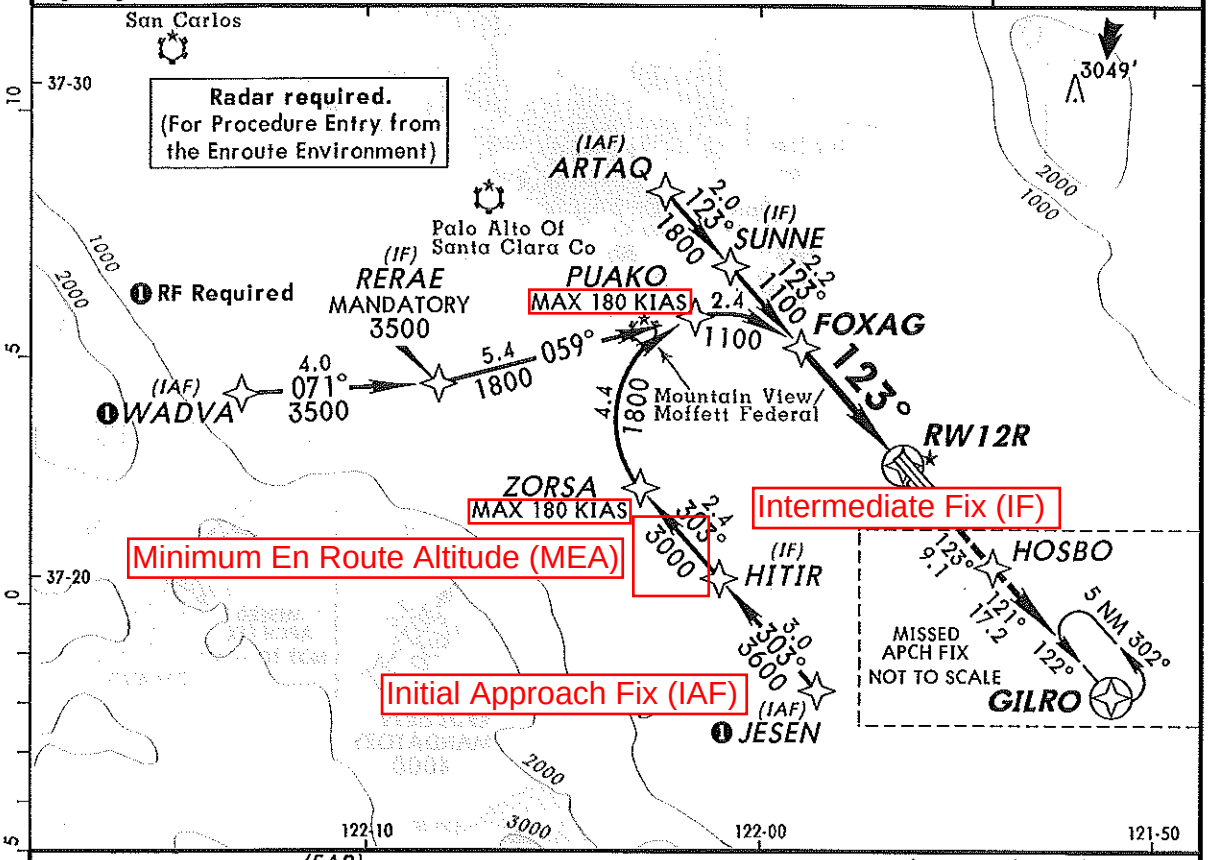
MISSED APCH: Climb to 4600′ on track 123° to HOSBO and on track 121° to GILRO and hold.

Alt Set: INCHES Trans level: FL 180 Trans alt: 18000′

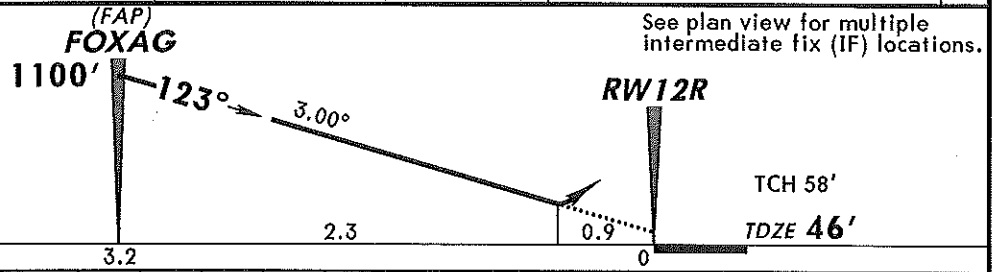
1. AUTHORIZATION REQUIRED. 2. GPS required.
3. For uncompensated Baro-VNAV systems, procedure not authorized below -1°C (31°F) or above 54°C (130°F). 4. VGSI and RNAV glidepath not coincident. 5. Pilot controlled lighting 124.0.

5600′

MSA RW12R



1 in=5 NM



See plan view for multiple intermediate fix (IF) locations.

Gnd speed-Kts	70	90	100	120	140	160
Glide Path Angle 3.00°	372	478	531	637	743	849
MAP at DA						

MALSR PAPI 4600′ on 123° HOSBO

TERPS

STRAIGHT-IN LANDING RWY 12R

	RNP 0.15 DA(H) 380′ (334′)		RNP 0.30 DA(H) 486′ (440′)	
	RAIL out	ALS out	RAIL out	ALS out
A	5/8	3/4	1	1 3/8
B				
C				
D				

TERPS AMEND 2 5 MAR 2015

CHANGES: Procedure.

SAN JOSE, CALIFORNIA | AL-693 (FAA) | 15232

RNAV (RNP) Z RWY 12R

NORMAN Y MINETA SAN JOSE INTL (SJC)

APP CRS	Rwy Idg	8587
123°	TDZE	46
	Apt Elev	62

For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

MALSR

MISSED APPROACH: Climb to 4600 on track 123° to HOSBO and on track 121° to GILRO and hold.

ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL
126.95	120.1 290.25	124.0 (CTAF) 257.6	121.7	118.0

RADAR REQUIRED

MSA RW12R 25 NM 5700

(IAF) ARTAQ 1800 123° (2)

PUAKO Max 210 KIAS

(IF) SUNNE 1100 123° (2.2)

(IAF) WADVA 4500 (RF REQD)

(IF) RERAE 1800 059° (5.3)

(FAF) FOXAG 123° (3.2)

1100 (2.4)

1800 (4.4)

3500 071° (4)

ZORSA Max 210 KIAS

3000 303° (3.1)

RW12R

(IF) HITIR 4000 (RF REQD)

123° (9.1)

HOSBO

121° (17.2)

ELEV 62 D TDZE 46

123° to RW12R

MISSED APCH FIX 5 NM 122° 302° GILRO

FOXAG 1100

VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 75).

4600 fr 123° HOSBO fr 121° GILRO

1100

123°

RW12R

GP 3.00° TCH 58

See plonview for multiple IF locations.

3.2 NM

CATEGORY	A	B	C	D
RNP 0.15 DA	380-⅝ 334 (400-⅛)			
RNP 0.30 DA	486-1 440 (500-1)			

AUTHORIZATION REQUIRED

REIL Rwy 12L

HIRL Rwys 12L-30R and 12R-30L

SAN JOSE, CALIFORNIA

Amdt 3 20AUG15

37°22'N-121°56'W

NORMAN Y MINETA SAN JOSE INTL (SJC)

RNAV (RNP) Z RWY 12R

SW-2, 31 MAR 2016 to 28 APR 2016

SW-2, 31 MAR 2016 to 28 APR 2016

SAN JOSE, CALIFORNIA | AL-693 (FAA) | 15232

RNAV (RNP) Z RWY 12R

NORMAN Y MINETA SAN JOSE INTL (SJC)

APP CRS		
123°	Rwy Idg	8587
	TDZE	46
	Apt Elev	62

For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

MALSR

MISSED APPROACH: Climb to 4600 on track 123° to HOSBO and on track 121° to GILRO and hold.

ATIS	NORCAL APP CON	SAN JOSE TOWER ★	GND CON	CLNC DEL
126.95	120.1 290.25	124.0 (CTAF) 257.6	121.7	118.0

RADAR REQUIRED

MSA RW12R 25 NM 5700

(IAF) ARTAQ 1800 123° (2)

PUAKO Max 210 KIAS

(IF) SUNNE 1100 123° (2.2)

(IAF) WADVA 4500 (RF REQD)

(IF) RERAE 1800 059° (5.3)

(FAF) FOXAG 123° (3.2)

1100 (2.4)

1800 (4.4)

3500 071° (4)

ZORSA Max 210 KIAS

3000 303° (3.1)

(IF) HITIR 4000 (RF REQD)

RW12R

123° (9.1)

HOSBO

121° (17.2)

1435

GILRO

MISSED APCH FIX 5 NM 122° 302°

ELEV 62 | D | TDZE 46

123° to RW12R

TWR

REIL Rwy 12L

HIRL Rwys 12L-30R and 12R-30L

FOXAG 1100

VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 75).

4600 tr 123° | HOSBO | tr 121° | GILRO

GP 3.00° TCH 58

See planview for multiple IF locations.

3.2 NM

CATEGORY	A	B	C	D
RNP 0.15 DA	380-⅝ 334 (400-⅛)			
RNP 0.30 DA	486-1 440 (500-1)			

AUTHORIZATION REQUIRED

SAN JOSE, CALIFORNIA
Amdt 3 20AUG15

37°22'N-121°56'W

NORMAN Y MINETA SAN JOSE INTL (SJC)

RNAV (RNP) Z RWY 12R

SW-2, 28 APR 2016 to 26 MAY 2016

SW-2, 28 APR 2016 to 26 MAY 2016

RNAV (RNP) Z RWY 12R

NORMAN Y MINETA SAN JOSE INTL (SJC)

APP CRS	Rwy ldg	8587
123°	TDZE	46
	Apt Elev	62

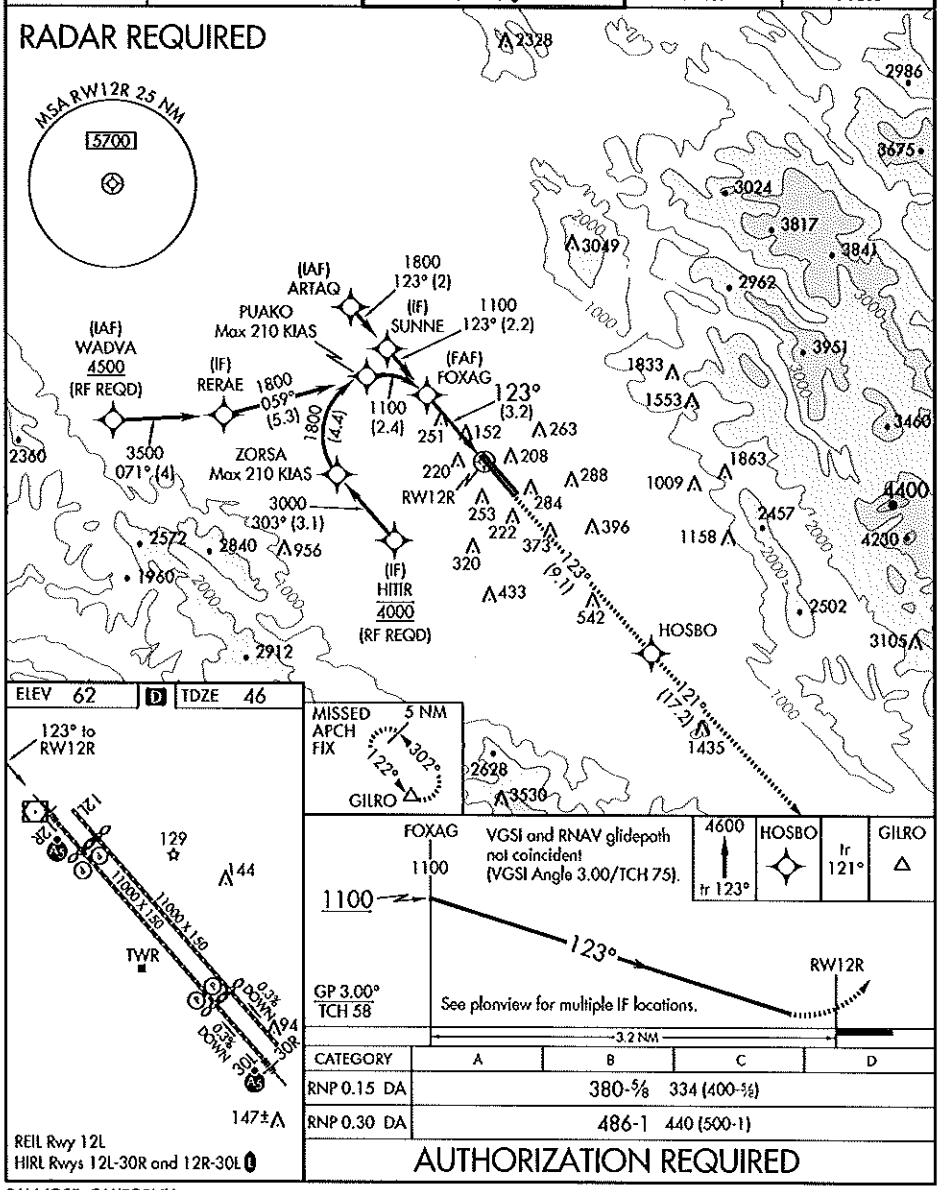
For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

MALSR

MISSED APPROACH: Climb to 4600 on track 123° to HOSBO and on track 121° to GILRO and hold.

ATIS	NORCAL APP CON	SAN JOSE TOWER *	GND CON	CLNC DEL
126.95	120.1 290.25	124.0 (CTAF) 257.6	121.7	118.0

RADAR REQUIRED



ELEV 62	D	TDZE 46

CATEGORY	A	B	C	D
RNP 0.15 DA	380-⅝ 334 (400-½)			
RNP 0.30 DA	486-1 440 (500-1)			

AUTHORIZATION REQUIRED

SAN JOSE, CALIFORNIA
Amdt 3 20AUG15

37°22'N-121°56'W

NORMAN Y MINETA SAN JOSE INTL (SJC)

RNAV (RNP) Z RWY 12R

SW-2, 26 MAY 2016 to 23 JUN 2016

SW-2, 26 MAY 2016 to 23 JUN 2016

SAN JOSE, CALIFORNIA AL-693 (FAA) 15232

RNAV (RNP) Z RWY 12R

NORMAN Y MINETA SAN JOSE INTL (SJC)

APP CRS	Rwy ldg	8587
123°	TDZE	46
	Apt Elev	62

For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

MALSR

MISSED APPROACH: Climb to 4600 on track 123° to HOSBO and on track 121° to GILRO and hold.

ATIS	NORCAL APP CON	SAN JOSE TOWER *	GND CON	CLNC DEL
126.95	120.1 290.25	124.0 (CTAF) 257.6	121.7	118.0

RADAR REQUIRED

MSA RW12R 25 NM 5700

(IAF) ARTAQ 1800 123° (2)

PUAKO Max 210 KIAS

(IF) SUNNE 1100 123° (2.2)

(IAF) WADVA 4500 (RF REQD)

(IF) RERAE 1800 059° (5.3)

(FAF) FOXAG 123° (3.2)

1800 (4.4)

1100 (2.4)

3500 071° (4)

ZORSA Max 210 KIAS

3000 303° (3.1)

RW12R

(IF) HITIR 4000 (RF REQD)

HOSBO

121° (17.2)

1435

123° (9.1)

542

433

320

373

222

253

284

288

396

208

220

263

152

251

2328 2986 3675 3024 3817 3841 3049 2962 3951 1833 1553 3460 1863 1009 4400 2457 1158 4280 2502 3105 2360 2572 2840 956 1960 2912 2628 3530

MISSED APCH FIX 5 NM 302° 122° GILRO

ELEV 62 D TDZE 46

123° to RW12R

TWR

REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L

147±

FOXAG 1100 VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 75).

4600 fr 123° HOSBO lr 121° GILRO

1100 123° RW12R

GP 3.00° TCH 58

See planview for multiple IF locations.

3.2 NM

CATEGORY	A	B	C	D
RNP 0.15 DA	380-⅝ 334 (400-⅝)			
RNP 0.30 DA	486-1 440 (500-1)			

AUTHORIZATION REQUIRED

SAN JOSE, CALIFORNIA
Amdt 3 20AUG15

37°22'N-121°56'W

NORMAN Y MINETA SAN JOSE INTL (SJC)

RNAV (RNP) Z RWY 12R

SW-2, 23 JUN 2016 to 21 JUL 2016

SW-2, 23 JUN 2016 to 21 JUL 2016

APP CRS	Rwy ldg	8587
126°	TDZE	46
	Apt Elev	62

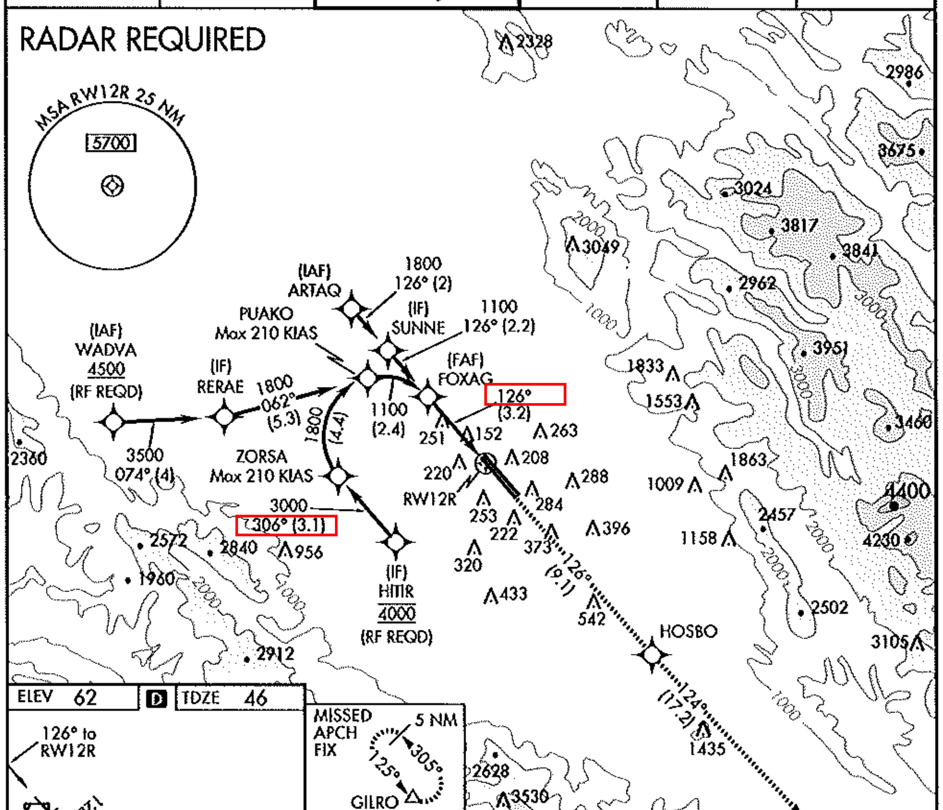
RNAV (RNP) Z RWY 12R
NORMAN Y MINETA SAN JOSE INTL (SJC)

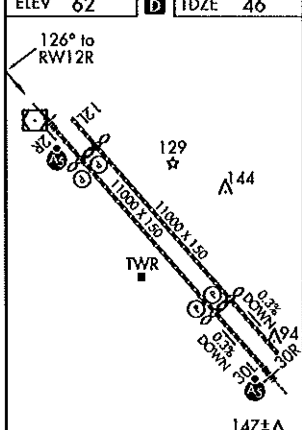
For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

MALSR

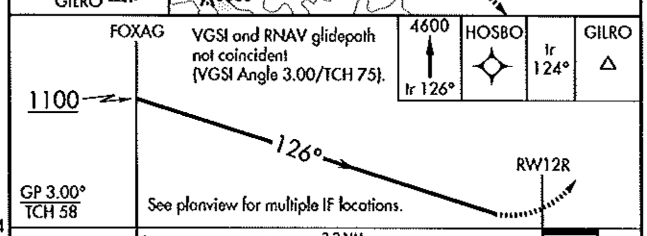
MISSED APPROACH: Climb to 4600 on track 126° to HOSBO and on track 124° to GILRO and hold.

ATIS	NORCAL APP CON	SAN JOSE TOWER *	GND CON	CLNC DEL	CPDLC
126.95	120.1 290.25	124.0 (CTAF) 257.6	121.7	118.0	





REIL Rwy 12L
HIRL Rwys 12L-30R and 12R-30L



CATEGORY	A	B	C	D
RNP 0.15 DA	380-⅝ 334 (400-⅝)			
RNP 0.30 DA	486-1 440 (500-1)			

AUTHORIZATION REQUIRED

SW-2, 21 JUL 2016 to 18 AUG 2016

SW-2, 21 JUL 2016 to 18 AUG 2016

2016

SAN JOSE, CALIFORNIA

AL-693 (FAA)

16203

RNAV (RNP) Z RWY 12R

NORMAN Y MINETA SAN JOSE INTL (SJC)

APP CRS		
126°	Rwy ldg	8587
	TDZE	46
	Apt Elev	62

For uncompensated Baro-VNAV systems, procedure NA below 0°C (32°F) or above 54°C (130°F). GPS required.

MALSR

MISSED APPROACH: Climb to 4600 on track 126° to HOSBO and on track 124° to GILRO and hold.

ATIS	NORCAL APP CON	SAN JOSE TOWER*	GND CON	CLNC DEL	CPDLC
126.95	120.1 290.25	124.0 (CTAF) 257.6	121.7	118.0	

RADAR REQUIRED

MSA RW12R 25 NM 5700

(IAF) ARTAQ 1800 126° (2)

PUAKO Max 210 KIAS

(IF) SUNNE 1100 126° (2.2)

(IAF) WADVA 4500 (RF REQD)

(IF) RERAE 1800 062° (5.3)

(FAF) FOXAG 126° (3.2)

1100 (2.4)

1800 (4.4)

3500 074° (4)

ZORSA Max 210 KIAS

3000 306° (3.1)

RW12R

(IF) HITTR 4000 (RF REQD)

126° (9.1)

HOSBO

124° (17.2)

1435

ELEV 62 | D | TDZE 46

126° to RW12R

MISSED APCH FIX 5 NM 125° 305° GILRO

FOXAG

VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 75).

4600 ↑ tr 126° | HOSBO | tr 124° | GILRO

1100

126°

RW12R

GP 3.00° TCH 58

See planview for multiple IF locations.

3.2 NM

CATEGORY	A	B	C	D
RNP 0.15 DA	380-⅝ 334 (400-⅝)			
RNP 0.30 DA	486-1 440 (500-1)			

AUTHORIZATION REQUIRED

TWR

REIL Rwy 12L

HIRL Rwys 12L-30R and 12R-30L

SAN JOSE, CALIFORNIA

Amdt 3A 21JUL16

37°22'N-121°56'W

NORMAN Y MINETA SAN JOSE INTL (SJC)

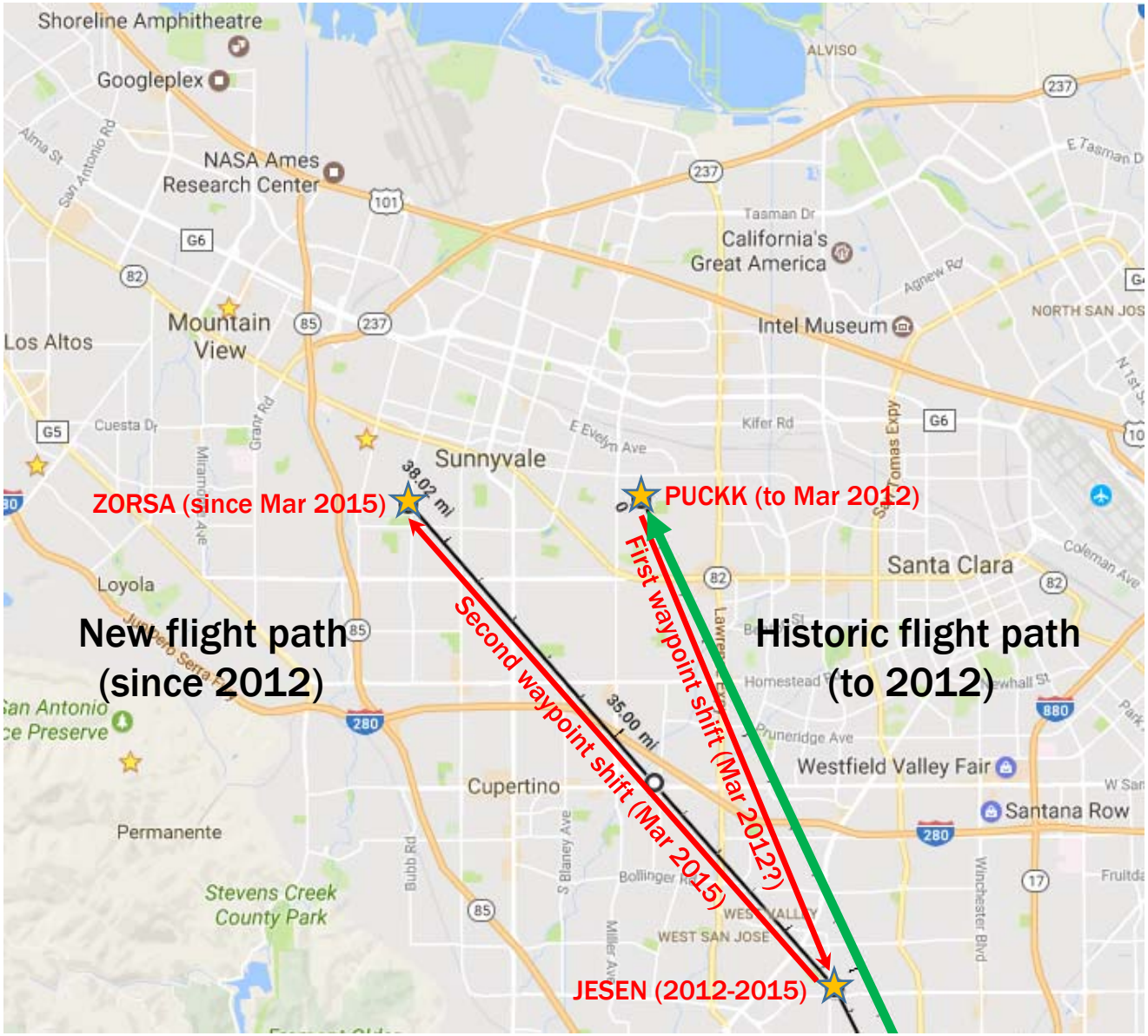
RNAV (RNP) Z RWY 12R

SW-2, 18 AUG 2016 to 15 SEP 2016

SW-2, 18 AUG 2016 to 15 SEP 2016

Flight path shifted in two stages

Final waypoints for arrivals: 2012 to 2015



SW-2, 03 JUL 2008 to 31 JUL 2008

NORCAL APP CON
124.525 348.675
ATIS 126.95

JAWWS 2 was used in Feb 2005: https://web.archive.org/web/20050217032821/http://www.airnav.com/airport/ksjc

MUSTANG

FL180 167° (111)

COALDALE
117.7 OAL
Chan 124
N38°00.20'-W117°46.23'
L-9, H-3

OAKLAND
116.8 OAK
Chan 115

EL NIDO
114.2 HYP
Chan 89
N37°13.16'-W120°24.02'
L-3, H-3

SAN JOSE
114.1 SJC
Chan 88

65 94

ELCAP
N37°41.17'
W119°46.10'
TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect clearance to cross at or below FL 240.

PAPEE
N37°08.38' - W120°46.17'
TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect clearance to cross at or below 11000'.

R-138 24
300°
R-242
318° (29) 53
PLUCKK
N37°21.81'
W122°00.58'

FL180 212° (41) 48
R-032
12000 247° (29)
8000 240° (18)
R-067
FL210 216° (611)
FL180 247° (49)
CANDA
N37°23.38'
W118°47.03'

JAWWS
N36°55.50'
W121°45.24'
TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect clearance to cross below 8000'.

240° (49)
8000 318° (17)
R-345
PANOCHE
112.6 PXN
Chan 73
R-348
KNOLS
N37°17.17' - W119°47.50'
TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect clearance to cross at or below FL 240.

R-128
12000 308° (50)
R-212
CLOVIS
112.9 CZQ
Chan 76

SALINAS
117.3 SNS
Chan 120
N36°39.83'
W121°36.19'

ROBIE
N35°58.89'
W121°00.57'

J6
FL180 276° (54)
71
86
AVENAL
117.1 AVE
Chan 118
N35°38.82'
W119°58.72'
L-3-7, H-4

J88-126
FL180 312° (107)
SAN MARCUS
114.9 RZS
Chan 96
N34°30.57'-W119°46.26'
L-3-4-7, H-4

NOTE: Radar required.
NOTE: Procedure authorized for runway 12 only.

(NARRATIVE ON FOLLOWING PAGE)

NOTE: Chart not to scale.

SW-2, 03 JUL 2008 to 31 JUL 2008

FlightAware

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RESERVATIONS

Reserve Avis Car AVIS

Reserve Enterprise Car

For pick-up on the ramp at KSJC.

Reserve Hotel

Reserve hotel rooms in San Jose, CA now.

LIVE FLIGHT TRACKER

PRIVATE FLIGHT TRACKER:
Flight/Tail# e.g. N123AB
TRACK FLIGHT

AIRLINE FLIGHT TRACKER:
Airline e.g. United
Flight # e.g. 450
TRACK FLIGHT

FORGOT THE FLIGHT NUMBER?

AIRPORT TRACKER/INFO
Airport Code KSJC
-or-
Airport City e.g. New York
VIEW ACTIVITY
VIEW INFO

Bundled Procedure ("Plates") Download

(right click to save)

- All Departures (DPs)
- All Arrivals (STARs)
- All Approaches (IAPs)
- Special Minimums
- All KSJC Procedures (with diagram)

Terminal Procedures

Type	Name
APD	AIRPORT DIAGRAM
DP	MOONY THREE
DP	LOUPE ONE
DP	SUNOL SIX
DP	DANVILLE TWO
DP	ALTAM SEVEN
DP	SAN JOSE NINE
HOT	HOT SPOT
IAP	RNAV (GPS) Y RWY 30R
IAP	RNAV (RNP) Z RWY 12L
IAP	RNAV (RNP) Z RWY 12R
IAP	RNAV (RNP) Z RWY 30L

Terminal Procedures

Type	Name
IAP	RNAV (RNP) Z RWY 30R
IAP	VOR/DME RWY 30L
IAP	VOR/DME RWY 30R
IAP	VOR RWY 12R
IAP	FAIRGROUNDS VISUAL RWY 30L/R
IAP	ILS OR LOC RWY 12R
IAP	ILS OR LOC/DME RWY 30L
IAP	RNAV (GPS) RWY 11
IAP	RNAV (GPS) RWY 29
IAP	RNAV (GPS) Y RWY 12L
IAP	RNAV (GPS) Y RWY 12R

Terminal Procedures

Type	Name
MIN	TAKE-OFF MINIMUMS
MIN	ALTERNATE MINIMUMS
STAR	ROBIE THREE
STAR	GOLDEN GATE SIX
STAR	EL NIDO FIVE
STAR	JAWWS TWO
STAR	CAPITOL THREE
STAR	BRINY ONE
STAR	POINT REYES ONE

Instrument Procedures

https://web.archive.org/web/20120401155514/http://www.airnav.com/airport/KSJC

From earlier on this page: "FAA Information Effective 09 February 2012"

NOTE: All procedures below are presented as PDF files. If you need a reader for these files, you should download the free Adobe Reader.

NOT FOR NAVIGATION. Please procure official charts for flight.
FAA instrument procedures published for use between 8 March 2012 at 0901Z and 5 April 2012 at 0900Z.

STARs - Standard Terminal Arrivals

BRINY ONE **CHANGED**	download (217KB)
CAPITOL THREE	download (107KB)
EL NIDO FIVE **CHANGED**	download (261KB)
GOLDEN GATE SIX **CHANGED**	download (403KB)
JAWWS THREE **NEW**	2 pages: [1] [2] (427KB)
POINT REYES ONE **CHANGED**	2 pages: [1] [2] (331KB)
ROBIE THREE	download (227KB)

This plate might never have been used. JAWWS 2 was used until 8 Mar 2012.

Change: Designator, Routeing

Norcal APP			San Jose TWR	GND	ATIS (D)
120.1	125.35	134.5	124.0	121.7	126.95
133.95	126.475	124.525			
TL ATC	AD Elev 62				

Oakland D116.8 OAK
N37 43.6 W122 13.4

Oakland KOAK

San Francisco KSFO

Moffett Field KNUQ

San Jose D114.1 SJC
N37 22.5 W121 56.7

Reid Hillview KRHV

R138

300°

R242

JESEN
D24 OAK
N37 21.8 W122 00.6

16

13

JAWWS 3

SHRRK
D40 OAK
N37 07.3 W121 52.1

HYP

EL NIDO TR

49

Expect to cross:
MAX FL200

El Nido D114.2 HYP
N37 13.2 W120 24.0

240° 18 8000

212° 41

MUSTANG TR

FMG

99 94 111 167° FL180

Mustang D117.9 FMG
N39 31.9 W119 39.4

ELCAP
D48 CZQ
N37 41.2 W119 46.1

CANDA TR

247° 49 FL180

CANDA
N37 23.4 W118 47.0

29 12000

KNOLS
N37 17.2 W119 47.5

R348

R345

JAWWS
Expect to cross:
MAX 8000
D53 OAK
N36 55.5 W121 45.2

138°

318° 17 8000

Salinas D117.3 SNS
N36 39.8 W121 36.2

PAPEE
Expect to cross:
MAX 11000
N37 08.4 W120 46.2

Clovis D112.9 CZQ
N36 53.1 W119 48.9

GOALI
Expect to cross:
MAX FL200
N36 27.6 W121 25.4

308° 15

Panoche D112.6 PXN
N36 42.9 W120 46.7

R212

308° 12000 35

❷ RZS
SAN MARCUS TR

❸ ROBIE
N35 58.9 W121 00.6

312° 107 FL180 ❷

J88-126

AVENAL TR

276° 54 FL180

J6

Avenal D117.1 AVE
N35 38.8 W119 58.7

San Marcus D114.9 RZS
N34 30.6 W119 46.3

❸
ROBIE
127°
307°

COM FAIL
Proceed direct SJC and execute ILS RWY 12R

❶ PROC authorised for RWY 12 only

SPEED
MAX 250kt below 10000ft

RADAR required

Expect RADAR vectors to final APP course

56
SJC

0 5 10 15 20nm

STAR JAWWS 3 ❶

WEF 09 FEB 12

40 - 5 | 11 JAN 12

USA (CA) - KSJC / SJC

Norman Y Mineta INTL SAN JOSE

NORCAL APP CON
120.1 290.25
ATIS 126.95

MUSTANG
117.9 FMG
Chan 126
N39°31.88′-W119°39.36′
L-9, H-3

FL180
167°
(111)

65
94

TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect FL200

EL NIDO
114.2 HYP
Chan 89
N37°13.17′-W120°24.01′
L-3, H-3

OAKLAND
116.8 OAK
Chan 115

SAN JOSE
114.1 SJC
Chan 88

ELCAP
N37°41.16′
W119°46.10′

COALDALE
117.7 OAL
Chan 124

PAPEE
N37°08.54′ - W120°45.78′
TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect 11000

R-138
300°
28
JESEN
N37°17.69′
W121°58.53′
40
12
R-181
SHRRK
N37°07.30′
W121°52.09′
53
(13)
6100
318°
8000
(17)
JAWWS
N36°55.50′
W121°45.24′
TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect 8000

8000
240°
(49)
8000
240°
(18)
R-032
FL180
212°
(41)
48
12000
247°
(29)
R-067
FL180
247°
(49)
R-216
CANDA
N37°23.38′
W118°47.03′
H-3
KNOLS
N37°17.17′
W119°47.50′
R-348

SALINAS
117.3 SNS
Chan 120
N36°39.83′
W121°36.19′
R-346
PANOCHE
112.6 PXN
Chan 73

CLOVIS
112.9 CZQ
Chan 76

R-228
12000
308°
(15)
R-128
12000
308°
(35)
R-212

GOALI
N36°27.57′
W121°25.44′
TURBOJET VERTICAL NAVIGATION PLANNING INFORMATION
Expect FL 200

50
ROBIE
N35°58.89′
W121°00.57′
308°
71
86
FL180
276°
(54)
FL180
312°
(107)

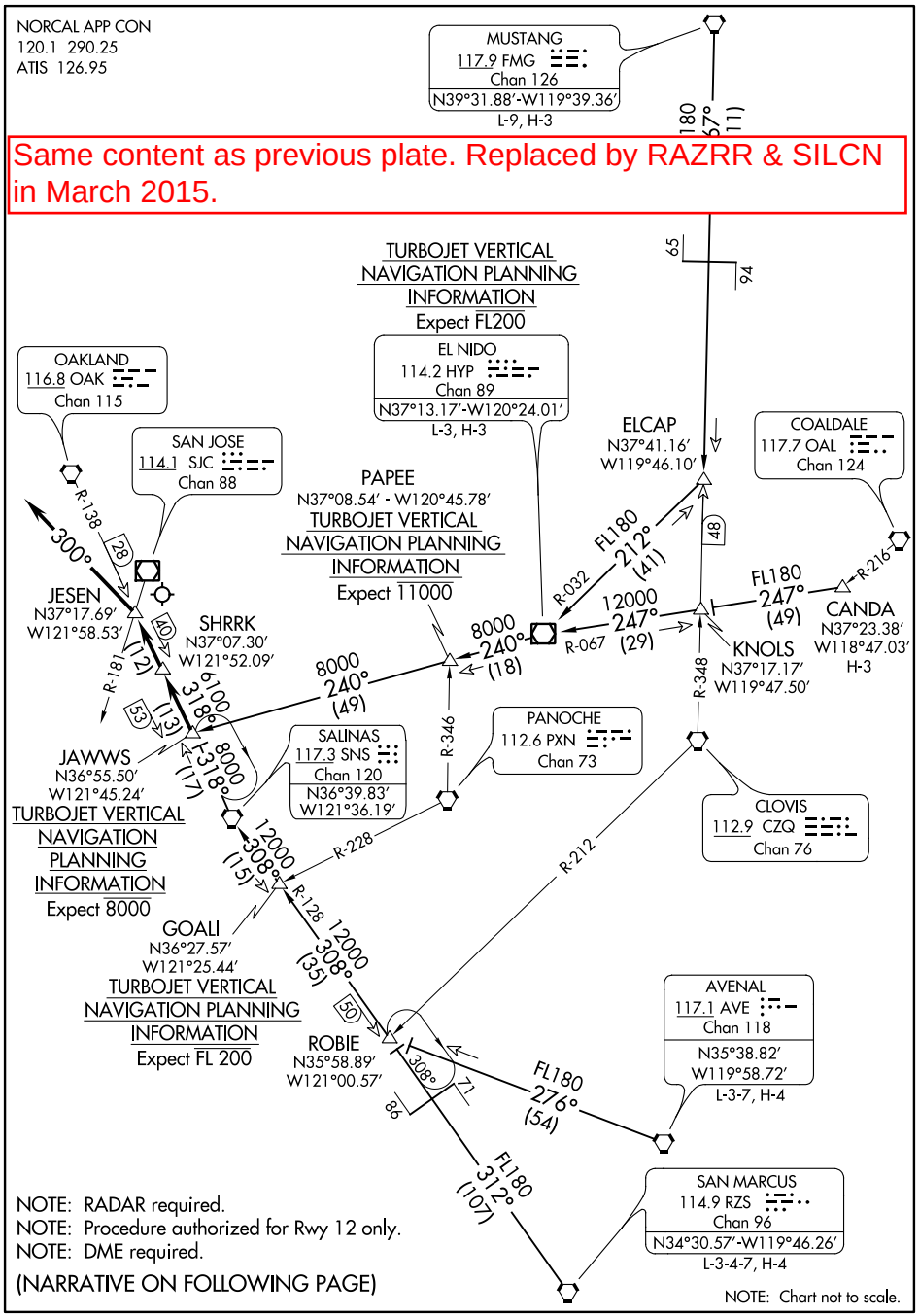
AVENAL
117.1 AVE
Chan 118
N35°38.82′
W119°58.72′
L-3-7, H-4

SAN MARCUS
114.9 RZS
Chan 96
N34°30.57′-W119°46.26′
L-3-4-7, H-4

NOTE: Radar required.
NOTE: Procedure authorized for Rwy 12 only.
NOTE: DME required.
(NARRATIVE ON FOLLOWING PAGE)

NOTE: Chart not to scale.

SW-2, 26 JUN 2014 to 24 JUL 2014



SW-2, 26 MAY 2016 to 23 JUN 2016
SW-2, 26 MAY 2016 to 23 JUN 2016

ARRIVAL DESCRIPTION

AVENAL TRANSTION (AVE.JAWWS3): From over AVE VORTAC via AVE R-276 to ROBIE INT, then via SNS R-128 to SNS VORTAC, then via SNS R-318 to JAWWS INT. Thence . . . .

CANDA TRANSITION (CANDA.JAWWS3): From over CANDA INT via HYP R-067 to HYP VOR/DME, then via HYP R-240 to JAWWS INT. Thence . . . .

EL NIDO TRANSITION (HYP.JAWWS3): From over HYP VOR/DME via HYP R-240 to JAWWS INT. Thence . . . .

MUSTANG TRANSITION (FMG.JAWWS3): From over FMG VORTAC via FMG R-167 and CZQ R-348 to ELCAP INT, then via HYP R-032 to HYP VOR/DME, then via HYP R-240 to JAWWS INT. Thence . . . .

SAN MARCUS TRANSITION (RZS.JAWWS3): From over RZS VORTAC via RZS R-312 and SNS R-128 to SNS VORTAC, then via SNS R-318 to JAWWS INT. Thence . . . .

. . . . From over JAWWS INT on OAK R-138 to JESEN INT then on heading 300°, expect RADAR vectors to the final approach course.

LOST COMMUNICATIONS: Proceed direct SJC VOR/DME and execute the ILS or LOC Rwy 12R approach.

SW-2, 28 APR 2016 to 26 MAY 2016

RAZRR FOUR ARRIVAL (RNAV) Arrival Routes

(STUBL.RAZRR4) 21JUL16

NORMAN Y MINETA SAN JOSE INTL (SJC)

SAN JOSE, CALIFORNIA

OAKLAND CENTER
121.25 327.0
NORCAL APP CON
126.475 317.775
ATIS
126.95
SAN JO
124.0 2
GND CO
121.7

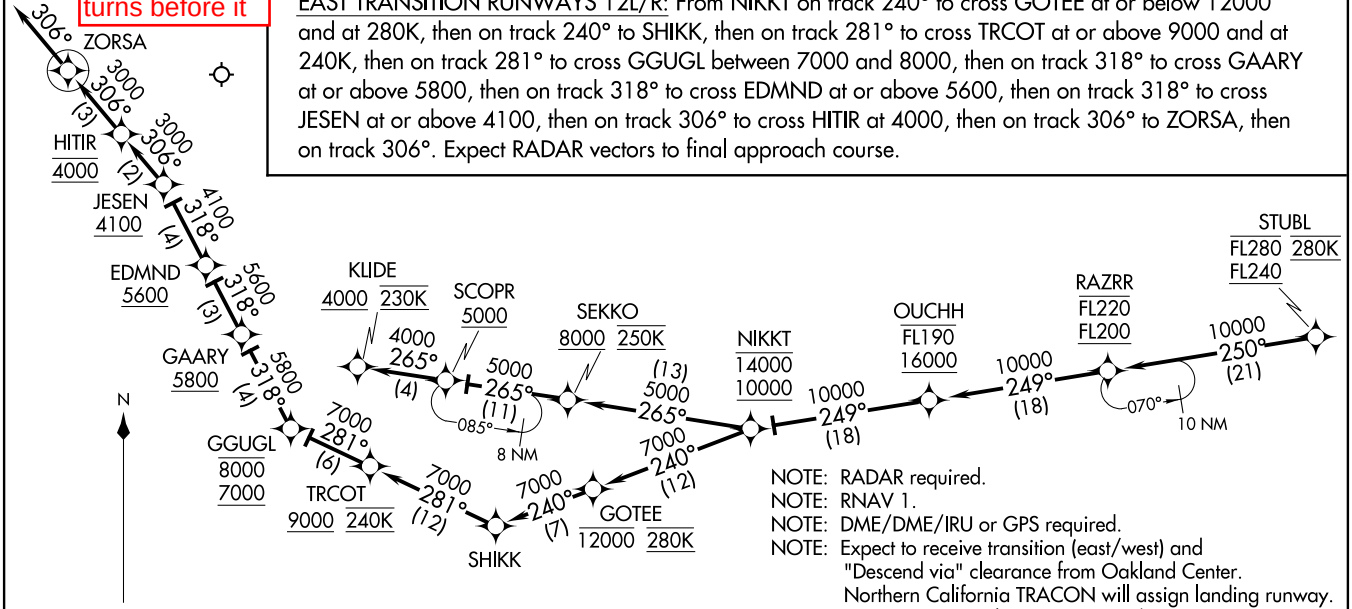
Circle indicates 'Fly-Over Fix', precluding turns before it

ARRIVAL ROUTE DESCRIPTION

From STUBL on track 250° to cross RAZRR between FL200 and FL220, then on track 249° to cross OUCHH between 16000 and FL190, then on track 249° to cross NIKKT between 10000 and 14000.

WEST TRANSITION RUNWAYS 30L/R: From NIKKT on track 265° to cross SEKKO at or above 8000 and at 250K, then on track 265° to cross SCOPR at or above 5000, then on track 265° to cross KLIDE at or above 4000 and at 230K. Expect assigned instrument approach procedure.

EAST TRANSITION RUNWAYS 12L/R: From NIKKT on track 240° to cross GOTEE at or below 12000 and at 280K, then on track 240° to SHIKK, then on track 281° to cross TRCOT at or above 9000 and at 240K, then on track 281° to cross GGUGL between 7000 and 8000, then on track 318° to cross GAARY at or above 5800, then on track 318° to cross EDMND at or above 5600, then on track 318° to cross JESEN at or above 4100, then on track 306° to cross HITIR at 4000, then on track 306° to ZORSA, then on track 306°. Expect RADAR vectors to final approach course.



NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.
NOTE: Expect to receive transition (east/west) and "Descend via" clearance from Oakland Center. Northern California TRACON will assign landing runway.
NOTE: West transition indicates Rwys 30L/R.
NOTE: East transition indicates Rwys 12L/R.
NOTE: Expect west transition unless otherwise advised.

NOTE: Chart not to scale.

(STUBL.RAZRR4) 16203

RAZRR FOUR ARRIVAL (RNAV) Arrival Routes

ST-693 (FAA)

NORMAN Y MINETA SAN JOSE INTL (SJC)

SAN JOSE, CALIFORNIA

This procedure had too steep of a descent, probably between EDMND and JESEN and was replaced by late April.

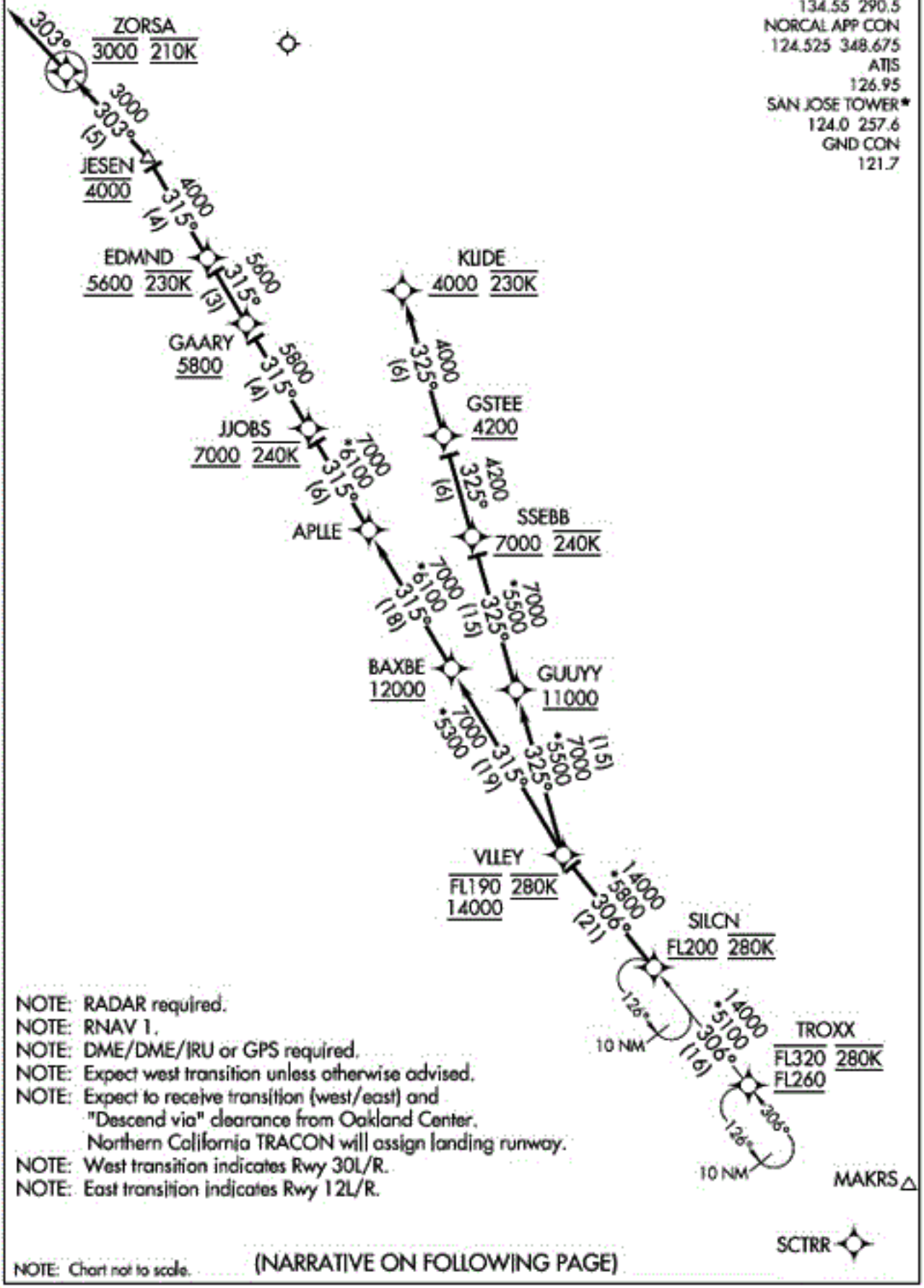
(SILCN.SILCN1)

SILCN ONE ARRIVAL (RNAV)

ST-693 (FAA)

NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA

OAKLAND CENTER
134.55 290.5
NORCAL APP CON
124.525 348.675
ATIS
126.95
SAN JOSE TOWER*
124.0 257.6
GND CON
121.7



NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.
NOTE: Expect west transition unless otherwise advised.
NOTE: Expect to receive transition (west/east) and "Descend via" clearance from Oakland Center. Northern California TRACON will assign landing runway.
NOTE: West transition indicates Rwy 30L/R.
NOTE: East transition indicates Rwy 12L/R.

NOTE: Chart not to scale.

(NARRATIVE ON FOLLOWING PAGE)

SILCN ONE ARRIVAL (RNAV)
(SILCN.SILCN1) 15064

SAN JOSE, CALIFORNIA
NORMAN Y MINETA SAN JOSE INTL (SJC)

SW-2, 05 MAR 2015 to 02 APR 2015

SW-2, 05 MAR 2015 to 02 APR 2015

BUSINESS AVIATION

California Rnav Procedures Contain Errors

by Robert P. Mark - March 8, 2015, 1:18 PM

The FAA said it is aggressively working to correct a number of design problems in some Rnav procedures released last week for San Jose Norman Y. Mineta International airport (SJC) and Sacramento International Airport (SMF). Two standard terminal arrival routes (Stars) into SJC (SILCN and RAZZR) Runway 12L/R contain descent angles that are too steep for most aircraft to fly—losing 1,600 feet in 4.2 miles. ATC will instead issue standard descend-and-maintain clearance until the problem is corrected. The Rnav/RNP approaches to Runway 12L/R will be unusable because of mismatched altitudes and speeds.

Issues also exist with Stars published for SMF's Runway 16L/R, both the transitions and the ILS approaches. ATC should be issuing an altitude to cross TENCO for aircraft given the ILS approach. Pilots are urged to be sure they don't lose the procedure's altitude restrictions when linking these Stars to the ILS 16L/R approaches at TENCO. Altitudes and speeds on the approaches to 34L/R do not match the Stars, the agency said.

AIRPORTS ATC

There are no comments yet, please Login or Register to begin a discussion.

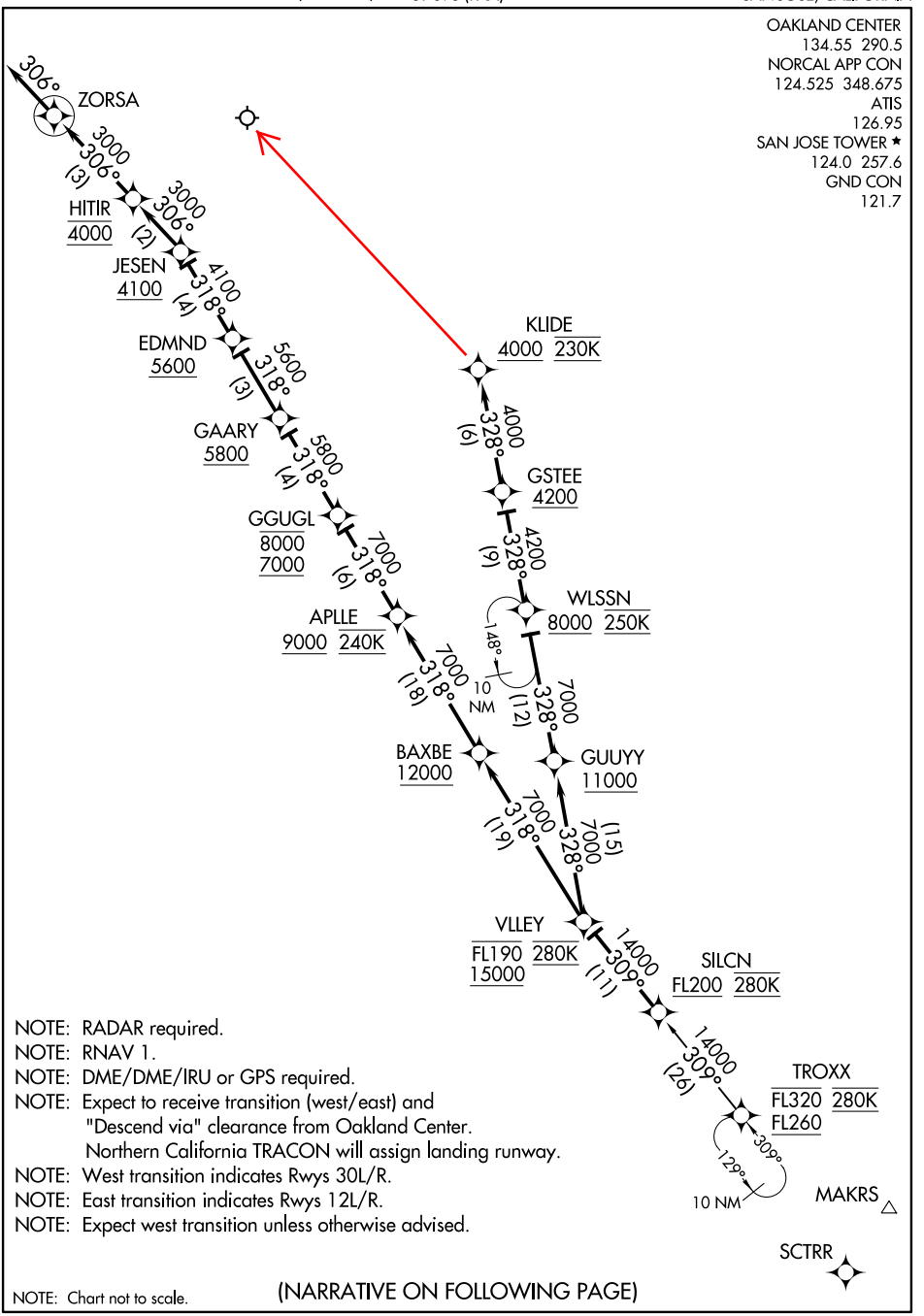
KLIDE is the final waypoint for normal flow

(SILCN.SILCN4) 16203

SILCN FOUR ARRIVAL (RNAV)

ST-693 (FAA)

NORMAN Y MINETA SAN JOSE INTL (SJC)
SAN JOSE, CALIFORNIA



NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.
NOTE: Expect to receive transition (west/east) and "Descend via" clearance from Oakland Center. Northern California TRACON will assign landing runway.
NOTE: West transition indicates Rwys 30L/R.
NOTE: East transition indicates Rwys 12L/R.
NOTE: Expect west transition unless otherwise advised.

NOTE: Chart not to scale.

(NARRATIVE ON FOLLOWING PAGE)

SW-2, 05 JAN 2017 to 02 FEB 2017

SW-2, 05 JAN 2017 to 02 FEB 2017

SILCN FOUR ARRIVAL (RNAV)
(SILCN.SILCN4) 21JUL16

SAN JOSE, CALIFORNIA
NORMAN Y MINETA SAN JOSE INTL (SJC)