NOISE EXPOSURE FORECAST UPDATE
Sea-Tac International Airport

Work Program
Task Summary

Phase I: Scoping and Funding

Tasks: A. Study Scope

B. Compilation and Submittal of RFP & Consultant Selection

C. FAA-PGP Funding Grant Application

Phase II: INM Verification

Tasks: A. Development of Initial Data Base including Monitoring Data from NMS

B. Real Time Observation of Flight Tracks

C. Prepare INM Input with Refined Data Base

D. Model Verification; Run INM for Comparison with NMS and Establish Acceptance Criteria

E. INM Adjustment Procedure, as Needed

Phase III: Supplemental Data Compilation

Tasks: A. Acquisition of Technical Equipment

B. Field Data Collection

C. Noise System Survey

Phase IV: Real-Time Forecasts

Tasks: A. Estimation of Operations Growth

B. Survey of Aircraft, Engine Retrofit

C. Collection of Miscellaneous Data

D. Survey of Land Use Data

E. Collection of Retrospective Noise Data

Phase V: INM Forecast Generation, Conclusions, and Report

Tasks: A. Modeling of Forecasts

          B. Modeling of Retrospective Impacts

          C. Findings and Report

Phase VI: Administration and Citizen Involvement

Tasks: A. Technical Committee Interaction

          B. Citizen Involvement

          C. Consultant and Intergovernmental Coordination

          D. Port Commission Action

Phase I: Scoping and Funding

Phase I. Task A: Scoping of Study

Purpose: To determine scope of study, including needed tasks, manpower
                requirements, and timing. The purpose of this Noise Forecast
                update is to provide the raw material for validating or
                revising as necessary programs developed in the
                Sea-Tac/Communities Plan.

Procedure: Develop draft scope in-house and circulate for comments.

                Consult with FAA re: scope, required elements, and funding
                procedures.

Comments: Study planning staff time is chargeable to Port share of any
                FAA grant. Prepare to comply with the Aviation Safety and
                Noise Abatement Act of 1979. Also, provide noise maps for
                FHA use.

Output: Scope of work for study.

Staff: Sims   - 5 hours
                Parks   - 15 hours
                Dohrmann - 5 hours
                Wells   - 5 hours

Phase I. Task B: Compilation and Submittal of RFP and Consultant Selections

Purpose: Given the work program tasks and Commission approval,
                finalize a Request for Proposal (RFP) and solicit responses
                from acoustic consultants to carry out identified work for
                the Sea-Tac Noise Update.

                Use developed work scope to form RFP.

                Prepare and advertise a Request for Proposal (RFP).

                Select a Noise Consultant.

Output: Request for Proposal.

                Contract with selected consultant.

Staff: Parks   - 50 hours
                Sims   - 10 hours
                Dohrmann - 15 hours
                Wells   - 10 hours

Phase I. Task C: FAA-PGP Funding Support Application and Grant Management

        Purpose: To obtain FAA Planning Grant Program funding support.

        Procedure: Consult with FAA re: interest and potential for PGP support and procedures.

                    File A-95 form with PSCOG and obtain approval.

                    Obtain Port Commission authorization to proceed with application, consultant selection, and spend Port share of funding.

                    Submit PGP application to FAA.

                    Grant management preparation of required accounting reports.

        Comments: Federal money covers 75% of study costs. Port staff time and expenditure are considered   "Force account" and will act as the POS 25% matching cost. Maximum FAA share anticipated - $55,000.

        Staff: Parks   - 30 hrs
                     Dohrmann - 2 hrs
                     Wells   - 2 hrs

Phase II: INM Verification

Phase II. Task A: Development of Initial Base Data including Monitoring Data from NMS.

        Purpose: Compile base maps, plotting grids, and airport and Remote Monitor Station locations.

                    Develop grid system as used in Sea-Tac/Communities Plan.

                    Plot FAA standard flight tracks for later refinement for model input.

                    Compile information necessary to produce INM input data set for three test days.

                    Gather STIA NMS data for the three test days.

        Output: Initial data file on fleet mix, operations, and nominal tracks.

                    Base noise data from NMS.

        Staff: Parks   - 5 hours
                     Dohrmann - 10 hours
                     Planner I - 20 hours
                     Wells   - 40 hours

Phase II. Task B: Real-Time Observation of Flight Tracks

Purpose: To examine actual flight tracks of aircraft operations at
            STIA and to estimate the variance around the tracks used for
            INM input.

Procedure: Consult with FAA re: standard STIA procedures and flight
            track limits, including preferred routings under different
            conditions (for all different classes of aircraft).

            Discuss similar items with chief pilots, including preferred
            routings, turn rates, effects of wind and weather, and track
            keeping ability (particularly during takeoffs).

            Conduct real-time flight path tracking using FAA training
            radar, visual observations, or paired transit sights for the
            three day test. (Particular interest in Commuter/GA as
            well.) Provide flight path tracking data with reference to
            ground features (e.g., streets etc.).

Commments: This would coordinate with other real-time data collection
            and could in part utilize consultant manpower.

            This will involve getting airline representatives to discuss
            reality vs. established procedures.

Output: Refined flight track information for INM input.

            Estimate of the variance range that practice places around
            theory.

            Observation of GA and Commuter flight tracks (which are
            independent of commercial jets tracks).

Staff: Planner I - 35 hours
            Wells   - 10 hours

Consultant: 20 hours

Phase II: Task C: Prepare INM Input With Refined Data Base

Purpose: To provide most accurate set up of INM input data.

Procedure: Establish INM model account and review current literature on
            model use.

            Using best available data collected in Phase II, Tasks A and
            B to provide most accurate set up of INM input data.

            Consultant review of INM input setup.

Comments: Preparation of INM input data to take into account the
            characteristics of STIA.

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Phase II: Task C: (continued)

Output: Accurate INM set up for STIA for both this study and for future use in other noise analyses.

Staff:
Parks   - 5 hours
Dohrmann   - 20 hours
Planner I - 45 hours
Wells   - 10 hours

Consultant: 25 hours

Phase II: Task D: Model Verification, Run INM for Comparison with NMS and Establish Acceptance Criteria

Purpose: To assess accuracy of the FAA Integrated Noise Model by comparison with ground-truth data gathered by Phase II, Tasks A and B.

Procedure: Using data base developed in Phase II, Tasks A and B, run INM for test days and compare with actual values from NMS for noise at STIA.

Selection of people who will determine the acceptable INM vs. NMS variation.

Determine acceptable variation between INM output and NMS results.

Output: Determination - INM is or is not accurate within tolerance. If not, a correction program would be necessary.

Contours of present exposures for comparison (INM vs. NMS).

Familiarization with operation of INM.

Staff:
Dohrmann   - 10 hours
Wells   - 40 hours
Planner I - 20 hours
Consultant - 10 hours

Planner II: Task E: INM Adjustment Procedure, as Needed

Purpose: To develop INM Adjustment Procedure to attain desirable accuracy.

Procedure: Decide if study is feasible as an in-house project.

Review Phase II, Task D with consultant to prepare correction procedure, as needed.

Rerun input data Phase II, Task D using the correction procedure.

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Phase II: Task E: (continued)

    Procedure: (continued)

        Compare output of revised INM with NMS data to determine if acceptable variation limits were attained.

    Output: Decisions of feasibility, funding, and final scopes.

    Staff:

Parks	- 10 hours
Dohrmann	- 10 hours
Planner I	- 20 hours
Sims	- 10 hours

Consultant: 10 hours

Phase III: Supplemental Data Compilation

Phase III. Task A: Acquisition of Technical Equipment (Noise Meter, Supplies)

    Purpose: To obtain and install technical equipment and supplies needed to support study work, Phase II, Task D and Phase III, Task B.

    Listing:

Integrating noise meter (portable) 24 hour tape capacity	5,000
Support tower for microphone	100
Aircraft frequency radio receiver	300
Misc. charts and technical publications	100
Chart and printer paper, pens for NMS	100
Computer time for modeling & plot output	5-10,000

    Output: In-house capability for community and facility noise measurements to current procedures.

    Staff:

Parks	- 5 hours
Dohrmann	- 5 hours
Wells	- 15 hours
Planner	- 10 hours

Phase III. Task B: Field Data Collection With Noise Meter

    Purpose: To supplement real-time noise exposure data base provided by NMS for full study area intercalibration.

    Procedure: Intercalibrate portable integrating meter with NMS by simultaneous measurements.

        Establish sampling program along flight tracks and sidelines throughout study area. Concentrate some time to identification of low frequency noise, vibration, to address in Phase V Reports.

Phase III: Task B: (continued)

        Procedure (continued)

                Collect real-time data on both individual aircraft events and cumulative exposure.

                Identify degree to which smaller aircraft (Commuters and GA) are classified as aircraft by NMS.

                Coordinate with other real-time sampling tasks.

      Comments: ✓ Study area will include out to 65 dBA LDN contour.

      Output: Full study area data base to confirm INM/NMS verification.

                Estimates of variance of noise from similar types of operations.

      Staff: Dohrmann   – 25 hours
                    Planner I – 100 hours
                    Wells   – 20 hours

      Consultant: 20 hours

Phase III. Task C: Noise System Survey

      Purpose: To review operational noise monitoring systems and output and critique their use at Sea-Tac.

      Procedure: Contact noise abatement system locations, interview staff, observe operations and develop like situations for their application at Sea-Tac.

      Comment: Probable sites of interest are San Francisco, San Jose, and Portland.

      Output: Working paper on Noise Abatement program application at Sea-Tac compared with other applied systems.

      Staff: Sims – 25 hours
                    Parks – 35 hours

Phase IV: Continued Data Collection; Real-Time Forecasts

Phase IV. Task A: Estimation of Operations Growth

      Purpose: To provide estimates of future operations growth, stage lengths and load factors for INM generation of noise impact projections.

Procedure: Retrieve estimates of air traffic growth factors from appropriate government and industry sources.

Investigate the basis of these estimates and assess their validity. Establish "best estimates" and range.

Factors to be considered: operations growth, passenger numbers, load factor changes, changes in sources/destinations, fleet changes, etc.

Estimates made relative to international, national, and STIA traffic; certificated carriers, commuters, air cargo, and general aviation.

Consultant: Review of forecasts.

In the current climate of deregulation and the economy, forecast accuracy may be even lower than usual, including short-term.

Study target years are 1980, 1985, 1990 and 2000.

Output: Range of estimates of operations growth and fleet mix for INM input and noise impact projection.

Staff:

Sims	– 10 hours
Parks	– 25 hours
Dohrmann	– 10 hours
Planner I	– 25 hours
Kinnaman	– 100 hours

Consultant: 25 hours

Phase IV. Task B: Survey of Aircraft and Retrofit

Purpose: To obtain information on future noise profiles of new aircraft and on engine-retrofitted existing planes.

Procedure: Airlines will be surveyed re: intended aircraft purchases and sales, retrofit plans, and anticipated future aircraft types (stretch-jumbos, 757, 767, DC-9 stretch etc.) within the study period.

Published reports of aircraft sales, fleet plans, and survey of manufacturers will be gathered for comparison.

Appropriate estimated noise profiles may be developed for inclusion in INM data base, if needed.

Consultant review of data base.

Obtain noise measurement data/estimates from manufacturers and FAA (FAR-36 info., etc.).

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Phase IV: Task B: (continued)

Comments: Many measurements do not yet exist; FAR-36 limits may be only available estimate or projections based on similar current aircraft types.

This will overlap with fleet mix portion of Phase IV, Task A.

Estimates could be based on industry-wide proportions of aircraft types expected to be sold.

Need to look at the procedures as written and as they are acutally flown/altered.

Output: Supplement to noise profiles stored in INM data base.

Fleet mix estimates for input to INM for projections.

Staff:
Parks   - 35 hours
Planner I - 35 hours
Dohrmann   - 10 hours
Wells   - 10 hours

Consultant: 15 hours

Phase IV. Task C: Collection of Miscellaneous Data

Purpose: To obtain other data needed to supplement operational and noise measurements for analysis of noise level variation including but not limited to operational procedures and changes, weather conditions, etc.

Procedure: Compile daily meteorological records using STIA weather bureau data (temperature, humidity, barometer, clouds, precipitation, fog).

Using portable meter, examine community noise level sources and variation at NMS stations and near other major sources (highways, industries.).

Measure ambient noise level minima (no aircraft, early morning).

Measure taxing and runup noise levels.

Discuss with airlines, FAA, ATA, etc., technical and operational procedures and future changes in these methods.

Comments: Possible consultant role in this data collection.

Output: Meteorological data for sensitivity analysis of noise level variability.

Take-off and arrival procedures for INM input and to correct internal data base.

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Phase IV: Task C: (continued)

    Output: (continued)

        Background level data for assessment of relative impact of community and aircraft noise sources. (But will not measure the unquantifiable psychological factors of noise disturbance.)

    Staff:

Parks	–	5 hours
Dohrmann	–	10 hours
Planner I	–	75 hours
Wells	–	5 hours

Consultant: 10 hours

Phase IV. Task D: Survey of Land Use

    Purpose: To have current land use data compiled.

    Procedure: Collect and compile data.

        Using existing land use, zoning, and population data from the City of Seattle, King County, Des Moines, and other government units, as appropriate, present the results in a format compatible with the other study information.

        Results to be compiled on base maps for comparison with INM noise exposure contour outputs.

    Output: Current population patterns and land use for estimating impacts of projected noise exposures.

    Staff:

Sims	–	5 hours
Parks	–	30 hours
Dohrmann	–	5 hours
Planner I	–	130 hours

Phase IV. Task E: Collection of Retrospective Noise Data

    Purpose: To establish data base for modeling noise impacts in retrospect for evaluation of relative changes through time.

    Procedure: Retrieve available data from previous noise studies (by the Port and others). Should include the Remote Sensing maps developed for the Sea-Tac/Communities Plan.

        Obtain historical data on operations levels and fleet mixes and on noise levels of older and obsolete aircraft types. (Target years: 1970, 1965, 1960.)

    Comments: INM data base includes some older jet aircraft and piston engine classes. Some information should be available from early EPA and FAA research into aircraft noise.

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Phase IV: Task E: (continued)

    Output: Data base for modeling of historical noise levels.

    Staff:
Sims	- 5 hours
Parks	- 10 hours
Dohrmann	- 10 hours
Planner I	- 35
Wells	- 10 hours
Kinnaman	- 10 hours

Phase V: INM Forecast Generation, Conclusions, and Reports

Phase V. Task A: Modeling of Forecasts

    Purpose: To utilize forecasts made in Phase IV, Tasks A and B, to provide both best estimates and likely ranges of noise exposure in the study area for the target years. Alternative patterns will also be prescribed.

    Procedure: Develop scenarios of operations growth, fleet mix, and operating procedures, using data developed in Phase IV.

    Use these scenarios with the INM, as finally verified in Phase II. to generate output grids of values for Ldn.

    Generate contour plot output of noise exposure forecasts to superimpose on study area base maps. Also imposed on these maps will be the 40 acre, 1000' per side Sea-Tac Communities Plan developed grid.

    Comments: The scenarios will center on the growth, fleet, and procedures for the target years but will also encompass other alternative estimates in order to estimate a potential range of impacts.

    Output: Plots of projected future noise exposure in the areas around Sea-Tac International Aiport in a form compatible with the Aviation Safety and Noise Abatement Act of 1979.

    Staff:
Dohrmann	- 25 hours
Planner I	- 100 hours
Wells	- 25 hours

Consultant: 30 hours

Phase V. Task B: Modeling of Retrospective Impacts

    Purpose: To develop comparable estimates of historical noise exposure in the study area.

    Procedure: Similar to Phase V, Task A using the historical data base developed in Phase IV, Task E.

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Comments: Historical noise exposure calculated with the same methods
             will let us reasonably examine the magnitude of the
             measurable change in the noise impact of Sea-Tac (but it will
             not alter perceived changes).

Output: Plots of estimated historical noise impacts.

Staff: Dohrmann - 10 hours
             Planner I - 40 hours
             Wells   - 20 hours

Consultant: 20 hours

Phase V. Task C: Findings & Report

Purpose: Summarize noise and present the Noise Exposure Forecast
             Update on a grid system.

Procedure: Graphically present maps in reproducable format and write
             procedures.

Comments: While the technical consultant will have overseen the entire
             study and it should be reasonably accurate and credible, we
             do not at this stage want to assert that the results will
             necessarily be implemented as, for instance, changes in the
             acquisition program. The end point for this study is the new
             forecast, not a new remedy program.

Output: New forecasts and area maps of Ldn 75, 70, and 65 noise
             exposure for the STIA area for 1980, 1985, 1990 and 2000.
             Each forecast year will have a "best guess" hypothesis, a
             pessimistic and optimistic alternative. Retrospective charts
             of approximately 1960, 1965, 1970 and 1973 will be produced.
             One hundred copies of the final report will be produced.

Staff: Sims   - 20 hours
             Parks   - 40 hours
             Dohrmann - 25 hours
             Planner I - 60 hours
             Wells   - 10 hours

Consultant: 30 hours

Phase VI: Administration and Citizen Involvement

    A.   Technical Committee Interaction

A technical committee composed of representatives of the Port, FAA, FHA, EPA, airlines, and other parties with expertise, will be established as a subcommittee from the Policy Advisory Committee to act as a resource group for data and to assess study progress. It is hoped this group will become a useful resource for future interaction as well. It should provide added credibility to the conduct and findings of the noise update.

    B.   Citizen Involvement

Public awareness about the objectives, methods, progress, and results of the study should be encouraged. The Sea-Tac/Community Plan's Policy Advisory Committee (PAC) will help coordinate the citizen involvement program. A more formal citizens technical committee will assist the above mentioned Technical Committee. The study results will not produce an immediate alteration of the noise remedy programs but will provide a basis for future actions. While public comment and input will be welcomed, the situation should not develop such that we are expected to "measure the noise outside my house".

A series of PAC briefings and discussions, "public meetings," and open technical committee meetings will be conducted.

    C.   Consultant Coordination

Consultant assistance will provide technical, overview assistance, technical oversight, and review to staff work. The consultant will review the methodology, data collection, and analysis of the study and add credibility to the final results. This should reduce the inevitable suspicion that a Port-run study is automatically biased in the Port's favor. The added degree to which the Consultant may be needed to actually carry out data collection and analysis will be determined at the end of Phase II.

    D.   Commission Action

The Port Commission authorized, on July 22, 1980, the completion of the Noise Forecast Update. They will also be requested to review in summary the findings of the update and take action, if warranted, in implementing any recommendations.

Phase VI Resource Allocation:
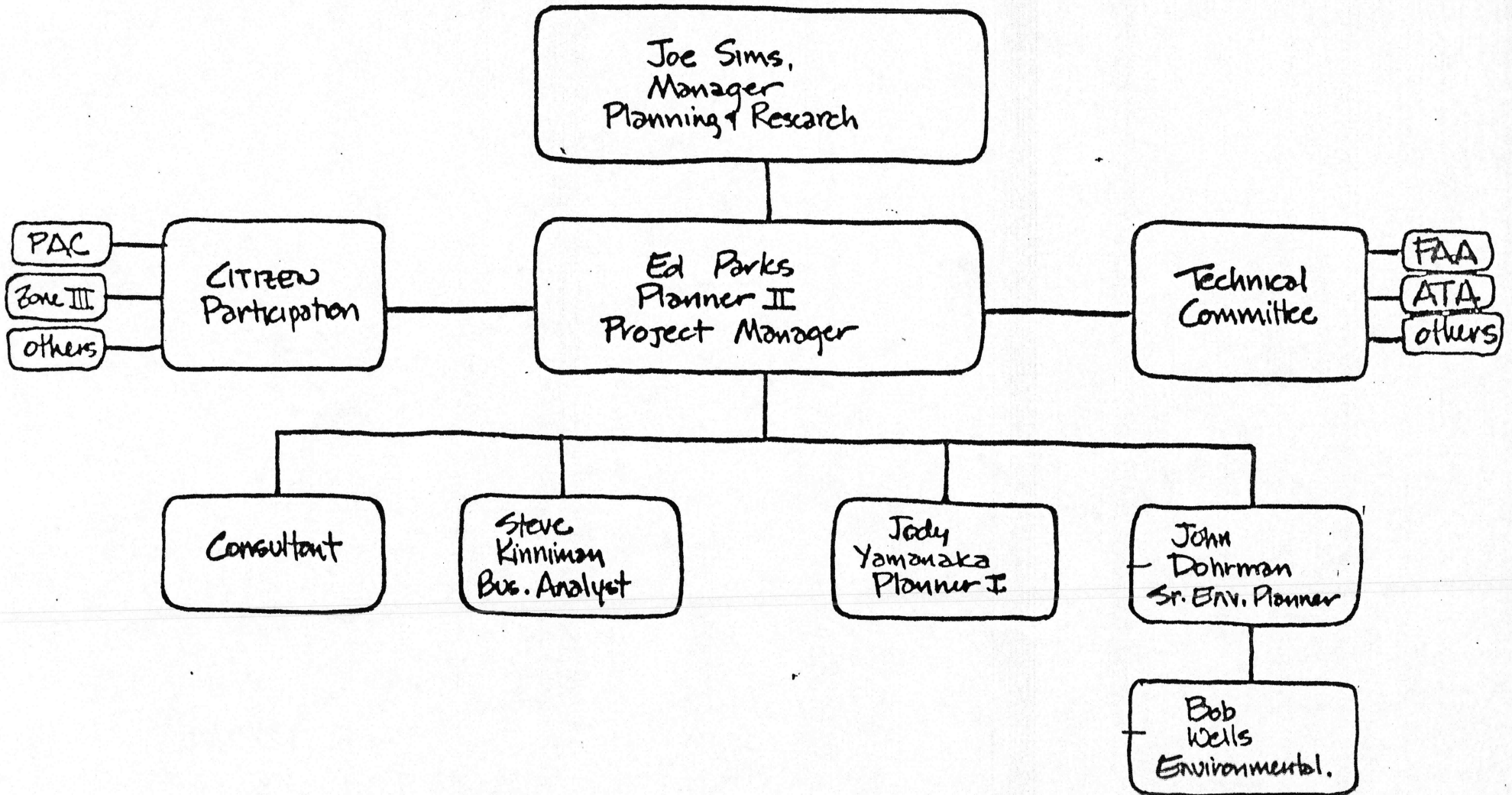
    Staff: Sims   - 20 hours
                Parks   - 135 hours
                Planner I - 150 hours
                Dohrmann -   5 hours
                Wells   -   5 hours

Consultant: 45 hours

Noise Forecast Update
Sea-Tac Int'l Airport

Study Management

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                        ┌─────────────────────┐
                        │     Joe Sims,       │
                        │      Manager        │
                        │ Planning & Research │
                        └─────────────────────┘

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 │ PAC │───│           │   │    Ed Parks      │   │            │───│  FAA  │
 ├─────┤   │  Citizen  │   │   Planner II     │   │ Technical  │───│  ATA  │
 │Zone │───│Participaton│──│ Project Manager  │───│ Committee  │   ├───────┤
 │ III │   │           │   │                  │   │            │───│ others│
 ├─────┤   └───────────┘   └──────────────────┘   └────────────┘   └───────┘
 │others│───
 └─────┘
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- Consultant
- Steve Kinniman, Bus. Analyst
- Jody Yamanaka, Planner I
- John Dohrman, Sr. Env. Planner
  - Bob Wells, Environmental.

#		SIMS	PARKS	PLAN I	POTENTIAL WELLS	ENVIRONMENTAL	TOTAL STATE	CONSENT	COMP EQUIP	TOTAL HOURS	TOTAL BUDGET	% Comp Monthly Hours	Monthly Hours PTO

I. Scoping & Funding
  A. Study Scope
  B. RFP/Consultant
  C. FAA P&O Application

II. IUM Verification
  A. Develop Data Base
  B. Flight Observation
  C. Phone IUM Input
  D. Mail Verification
  E. IUM Adjustment

III. Supplemental Data
  A. Acquisition of Equipment
  B. Field Data Collection
  C. None System Survey

IV. Real Time Forecasts
  A. Operations Growth
  B. Aircraft Survey
  C. Collect Mfr. Data
  D. Survey Local etc.
  E. Collect Historic Data

V. IUM Output Conclusions Report
  A. Modeling of Forecasts
  B. Modeling of Historic Data
  C. Findings, Mods, Report

VI. Admin & Citizen Involvement
  A. Technical Committee
  B. Citizen Involvement
  C. Consultant Coordination
  D. Commission Action

Total Hours
FAS Cost

Time Schedule
Noise Forecast Update
Sea-Tac

		Initials	Date
Prepared by			
Approved by			

Timeline columns: AUG(1) SEPT(2) OCT(3) NOV(4) DEC(5) JAN(6) FEB(7) MAR(8) APRIL(9) MAY(10) JUN

		TASK
I		Scoping & Funding — PHASE I
	A	Study Scope
	B	RFP / Consultant
	C	FAA - PGP Application
II		INM Verification — PHASE II
	A	Develop. Data Base
	B	Flight Observation
	C	Prepare INM Input
	D	Model Verification
	E	INM Adjustment
III		Supplemental Data — PHASE III
	A	Acquisition of Equipment
	B	Field Data Collection
	C	Noise System Survey
IV		Real Time Forecasts — PHASE IV
	A	Operations Growth
	B	Aircraft Survey
	C	Collect Misc Data
	D	Survey Land Use
	E	Collect Historic Data
V		INM Output, Conclusions, Report — PHASE V
	A	Modeling of Forecasts
	B	Modeling of Historic Data
	C	Findings, Maps, Report
VI		Adm & Citizen Involvement — PHASE VI
	A	Technical Committee
	B	Citizen Involvement — PAC
	C	Consultant Supervision
	D	Commission Action

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