
THE STATE OF NGS AND CSRC 2002



**A TOWN HALL MEETING ON
HEIGHT MODERNIZATION**

**SESSION RESULTS
APRIL 4, 2002**

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**Report on
State of NGS and CSRC, 2002
A Town Hall Meeting
On Height Modernization
Riverside, CA
April 4, 2002**

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Background

On April 4, 2002, the Southern California League of Surveying Organizations sponsored a town hall meeting on height modernization. The purpose was to review the state of the Southern California Integrated GPS Network (SCIGPSN), the National Geodetic Survey (NGS) and the California Spatial Reference Center (CSRC) program activities and Master Plan and to gather diverse input from a variety of users on the Height Modernization Program and CSRC Master Plan — how their current and future needs are being addressed. The CSRC had prepared a Master Plan for A Modern California Geodetic Control Network in February 2002. The plan detailed an initial implementation of the National Height Modernization Program in California. Current and potential network users comments and perspectives on the plan were highly desirable to maintain a strong “user” focus.

The meeting attendees consisted of a range of users. The meeting format included briefings by the NGS, the SCIGPSN, and the CSRC in the morning. The briefings included an overview of priorities, current programs and future plans. There was a brief question and answer period following the presentations. In the afternoon, the attendees were then asked to provide responses to a series of specific questions. Feedback was sought from groups of attendees on their current and future needs and requirements of the spatial reference system and the CSRC Master Plan; recommendations for a successful transition to a Continuously Operating Reference Stations (CORS) system; and suggestions for increasing state, local and private sector partnerships.

The following summary reflects a synthesis of the more common themes and major messages from many of the groups at the meeting.

Common Themes & Major Messages

Question 1. How well is the current spatial reference system serving your current needs? Do your applications require a few cm accuracy (2-5 cm), a few dm (10-30 cm), and/or meter level accuracy (1-3 meters)? Do you think the activities described in the CSRC Master Plan will assist in meeting your future needs? If yes, explain what they are doing to assist you in your daily activities. If no, what would you like to see the CSRC focus more attention on and why?

- The current system serves us well horizontally.
- The current system is inadequate vertically. There is no assurance of maintenance; it would require considerable workload to densify; Vertical does not know the Geoid everywhere.
- Need for densification of monuments, passive and CORS, especially in non-urban areas.
- Need to develop techniques, standards, specifications, and procedures to obtain desired and full range of accuracy level.
- Want published procedure for epoch data and constraints. CORS—increase the data epoch rate to 15 or faster; Published epochs are out-dated and inconsistent; Must track epochs real time.
- Most applications require 2-5 cm level of accuracy.
- Data sampling rate of 1-15 seconds.
- Better heights. Add hard vertical NAVD88 to as many CORS as possible; fewer antenna models, types.
- More attention to leveling, complete leveling. Improve Geoid Model per National Heights Study.
- Plan most is useful as primary and secondary data; Real time; For scientific community; OCRTS.
- Public bidding standards, and account of dollars and activities.

Question 2. CORS-based reference systems will eventually become a reality. In-ground monuments versus CORS-based reference points is an important issue. What has to happen for us to create a successful transition to a CORS-based system? What can be done and by whom to help you prepare for that transition?

- Will require user, owner, management education (public and private), training on performance, results, procedures and potential users and via technical support, FAQ, hands on workshops and outreach seminars.
- Must demonstrate CORS will work with proven results is reliable and usable before being available: available, accessible, ease of use, understandable, quality, GPS/RTK accuracy, and data consistency.
- Not complete abandonment of ground monuments, RTK/GPS system restrictions. Maintain a minimum number. Local agencies will propagate in-ground monuments; phase out maintenance of monuments and a ten year plan.
- Budget constraints of private, public sector. Affordable equipment for mom and pop organizations. CORS allows 1 receiver company to be competitive
- Publish standards, guidelines, procedures.

Question 3. The National Height Modernization study addresses the issue of the system's sustainability through partnerships with state, local and private sectors. What mechanisms should be used to a) Create more state, private and public interest, involvement and support? b) Ensure that user community requirements are met? Who else should be invited to these forums?

- Educate the public and professional community. Seminars of "Advantages"; Mass Media campaigns: Web-based case studies; e-mails; Newsletters; Pro-publication articles, "Good story", "Geodesy for Dummies": Town hall meetings, discussion forums at regional and local chapter organizational meetings of CLSA, CEAC, CELSOL, CGIA, ACSM.
- Marketing: Meet with, go to non-traditional users. Find user forums outside of survey/geodesy; transportation, insurance, port and airport authorities, heavy equipment manufactures, real estate developers, elected officials, emergency response agencies, GIS, environmentalists, civil engineering, city engineers and agencies, forestry, agricultural, BLM, vendors, duck trackers, researchers and the FAA.
- Requires a change in the law. Legislative legal mandate to use; local ordinance requirements.
- Create more funding sources. Increase fees for review/record "user pay"; decrease costs by maximizing the use of existing systems and networks.

Meeting Evaluation

The meeting session had a total of 38 submissions with the following satisfaction levels (5 rating highest satisfaction): 87% of the attendees provided a rating of 4 or higher on their feelings about what was accomplished. 79% provided a rating of 4 or higher on their satisfaction with the process.

The attendees seemed split in their opinion of the highlight of the meeting: roughly half favored the morning presentations and half favored the afternoon small group workshop discussions. Some suggested that seeing other perspectives was a highlight.

There were two major suggestions for next time. Some clearly wished for a broader constituency, with more non-traditional users in attendance. Others mentioned the lack of time for additional open discussion and Q & As.

Key Question Responses

QUESTION 1. *How well is the current spatial reference system serving your current needs? Do your applications require a few cm accuracy (2-5 cm), a few dm (10-30 cm), and/or meter level accuracy (1-3 meters)? Do you think the activities described in the CSRC Master Plan will assist in meeting your future needs? If yes, explain what they are doing to assist you in your daily activities. If no, what would you like to see the CSRC focus more attention on and why?*

Question 1a. *Is the current system serving my needs?*

GROUP 1

1. Serves me well, used on all my projects (2-5 cm). • (2 votes)
2. Current system serves my needs, except in remote areas (2-5 cm). (2 votes)
3. Serves well horizontally; inadequate vertically (2-5 cm or less).• (4 votes)
4. Doesn't serve my needs; datums are inconsistent. (1 vote)
5. Doesn't serve my needs, control is established by Agency. (1 vote)

GROUP 2

- 1, 2-5 cm •••••
10-30 cm ••
1-3 m ••
2. Yes, mainly horizontally weekly basis. ••
3. Yes, use for vertical (conventional).
4. No, vertical subsidence, accuracy density issues. • (1 vote)
5. Develop techniques on procedures to obtain the accuracy level. • (6 votes)
(1 vote) Ans. 5, 2, 3

GROUP 3

Yes

1. But, more station and rapid results. ••
2. Provides Structure.

No (6 votes)

1. Ambiguous – current system. (5 votes)
2. Need densification of monuments for sub-com. ••• (4 votes)
3. CORS – data epoch rate increase (15 or faster). (4 votes)
4. Refine HTDP > predict acc. (5 votes)

GROUP 4

1. Yes –Meets needs now but question future needs.
2. Yes – Horizontal. (1 vote)
No – Vertical does not know Geoid everywhere. *****
3. Yes – OCRTS. (1 vote)
4. No inconsistent and outdated published epochs (2 votes)
5. Horizontal okay, but no assurance of maintenance – vertical lousy. (1 vote)
6. Hz okay – require considerable workload to densify. (1 vote)

GROUP 5

Q1a

1. CSRC lifesaver when base didn't rec. ••
2. Trouble with compressed format/access to converter.
3. CORS useful when crew member errs.
4. Vertical movement subsistence studies - 5 mm level highly reliable and available.
5. 2-5 cm surveying.
6. H&V 1-2cm H & 2-3 cm V surveying.

Q1b

7. CSRC base stations for RTK.
8. CORS as extra field base.
9. Proximity to project.
10. Navigation – Air – Densify to allow lower minimums on instrument approaches.
11. NAV – Shipping/boating piloting vessels in harbors - 1-3 accuracy plenty okay.

Summary (Vote)

- 1, 3, 7, 8 – CORS provides valuable primary as well as secondary (backup) data.
10, 11, 7, 9 – Real time access to data expands system uses.
4, 5, 6 – Meets full accuracy range – current system.

Question 1b. Will the CSRC Master Plan meet my needs?

GROUP 1

1. Will serve my needs when complete. •• (3 votes)
2. Will never serve needs of deformation vertical community. (3 votes)
3. Doubtful in present configuration, because of organizational structure of spenders. (1 vote)

GROUP 2

1. Existing conditions meet my needs in social area. • (2 votes)
2. Non-urban network – more stations and development. (3 votes)
3. Leveling/gravity date - more attention. • “Scientific camp help”
Improve modeling (Geoid) subsidence – changes in mass areas. (5 votes)

GROUP 3

Yes

1. Will help scientific community.
2. OCRTS.

No

- ~~1. Need denser network (CORS) •••~~
2. (3) Need better heights (CORS). •••• (4 votes)
- ~~3. Need denser passive mons. ••~~
4. (1) Education. •• (3 votes)
5. Refine HTDP. (1 vote)

GROUP 4

1. (2) Adopt a better plan regarding vertical for CORS sites. * (Densify as well)
(5 votes)
- 2.* Yes (1 vote)
- 3.. (3) Antenna Types: use fewer models/types; publish consistent antenna metadata.
(3 votes)
4. Yes. (6 votes)
 - Must track epochs
 - Must still maintain ground monumentation.
5. Yes – if they get real time. (1 vote)

GROUP 5

(No Input)

GROUP 6

1. Not user friendly. •• (2 votes)
2. Needs ortho elevations. (2 votes)
3. (5) All accuracy levels. (1 vote)
4. Better quantify accuracy. (2 votes)

5. (3) Flexibility.
6. Data rates. (4 votes)
7. Published procedures. (4 votes)
8. CSRC plan not specific enough. (2 votes)
9. No medium for user input/community needs. (2 votes)
10. Public account of dollars and activities. (2 votes)
11. Lack of legal status for vertical. (3 votes)
12. CSRC conflicts with Height Modernization Plan (Density of stations).

QUESTION 2. CORS-based reference systems will eventually be come a reality. In-ground monuments versus CORS-based reference points is an important issue. What has to happen for us to create a successful transition to a CORS-based system? What can be done and by whom to help you prepare for that transition?

GROUP 1

1. Will require user education. (6 votes)
2. Need public Agency bidding standards. (2 votes)
3. Readily available, understandable and accurate. (3 votes)
4. Real time availability. (1 vote)
5. Accessible CORS stations must have physical monument. •(2 votes)
6. Needs of small companies are being ignored. • (1 vote)
7. CORS will allow receiver companies to be competitive. (1 vote)
8. Local Agencies will propagate in ground monuments.

GROUP 2

1. CORS required in specifications for projects. ••• Changes in laws to corporate. (3 votes)
2. Education & outreach/seminars (how to); fundamental perspective of surveying public/private to change. ••• +++ (2 votes)
3. Data consistency and accessibility data quality and format. •• + (2 votes)
4. Data liability/level of comfort. (1 vote)
5. Budget – private and public sector. (1 vote)
6. Spacing versus accuracy in systems. + (2 votes)
7. Future technology advancement. (1 vote)
8. Orthometric heights – need. (3 votes)

Ans. 1, 2, 8

GROUP 3

1. Need to finish CORS infrastructure. (2 votes)
2. (1) Complete leveling. (4 votes)
3. (3) Affordable (buy/maintain/replace) equipment. (3 votes)
4. Demonstrate CORS will work and replace passive mon. •
5. Routine sight visits (maintenance). (1 vote)
6. (2) Standards/specifications (guidelines). (3 votes)
7. Education. •• (2 votes)

GROUP 4

1. Make sure CORS information is usable before becoming available. (3 votes)
2. Decide how to publish epoch. (2 votes)
3. Real time vertical epoch.
4. (1) Have CSRC publish standards and guidelines. (4 votes)
5. (2) Provide training (CSRC). (4 votes)
6. Add more CORS stations (densify network). (2 votes)
7. (3) Add hard vertical NAVD 88 to as many sites as possible. (4 votes)
8. Create 10 year plan to phase out maintenance of inground monuments. (3 votes)
9. Encourage and pursue better communication links.

10. Maintain minimum number of inground monuments (forever). (2 votes)
11. Surveyor must own/rent and operate GPS equipment. (2 votes)
12. County surveyor support. (2 votes)

GROUP 5

1. RTK/GPS system restrictions will not allow complete abandonment of ground based control. (1 vote)
2. CORS only system can be used to create mon. positions on demand.
3. Need to educate users. Responsibility of GPS owner. (3 votes)
4. Most surveyors do not use GPS. (2 votes)
5. Ground monuments control boundary issues. (1 vote)
6. Improve RTK accuracy. (3 votes)
7. Getting RTK signal (RF Interference). (3 votes)
8. Need both ground/CORS.
9. Prove results and sell ideas to management. (3 votes)
10. Reduce equipment costs. (1 vote)
11. Equipment pool.
12. CSRC – lead role in making technology and education available. (1 vote)

Summary (Vote)

1. Need to educate users, owners and management on performance, results, procedures and potential uses.
2. Improve RTK/GPS accuracy.
3. Facilitate getting RTK signal (minimize RF interference).

GROUP 6

1. Successful archive of data at fast rate. •
- 2.(10) Reliability. (4 votes)
3. Density.
4. Law - reflect the CORS. (1 vote)
5. Access of information.
6. Affordability – Private and public – funding. •
- 7.(12) User education – private and public. • (7 votes)
8. Local involvement. (3 votes)
9. Ortho elevations.
- 10.(2) Quality of data. (Metadata included). •
11. Standard formats. (1 vote)
- 12.(7) Technical support/FAQ.
- 13.(7) “Hands-on” workshop/training.
14. Single source for data.
15. Ease of use. (2 votes)
16. Published procedure for epoch data and constraints. (4 votes)
17. Historical continuity of data (backwards compatibility). (2 votes)

QUESTION 3. The National Height Modernization study addresses the issue of the system’s sustainability through partnerships with state, local and private sectors. What mechanisms should be used to a) Create more state, private and public interest, involvement and support? b) Ensure that user community requirements are met? Who else should be invited to these forums.

GROUP 1

1. Legislative mandate. (2 votes)
2. Educate public; educate professional community and mass media campaigns. (5 votes)
3. Invite transportation, insurance companies, port and airport authorities, heavy equipment manufacturers. developers and legislators. (6 votes)
4. Create partnerships with state, private and public sectors. (5 votes)

GROUP 2

GROUP 2

1. Seminars to private/public sectors of advantages. •• ++ (2 votes)
2. Increase fees for review/record "user pay". (2 votes)
3. Forums – CLSA, CEAC, CELSOC, CGIA, ACSM. •• (4 votes)
4. Maximize use of existing systems and networks to minimize costs. (4 votes)
5. Advertisement pro. Publications. (2 votes)
6. Public Agencies – involvement. • +++++ (2 votes)
7. More funding sources.
8. Political elected officials involvement. (2 votes)
9. Multi-phase implementation or stages.
10. Specific requirements by Agency.

GROUP 3

1. Local Ord. Requirements. (1 vote)
2. (1) Interagency agreement. (5 votes)
3. ~~Subsidence in S. JOA. Valley.~~
4. (2) Town Hall meetings. •• (4 votes)
5. Newsletters/e-mails. (1 vote)
6. Seminars. (2 votes)
7. Web-based "case studies". (2 votes)
8. (3) Organizational meetings. (3 votes)

Question 3b. Ensure that user community requirements are met? Who else should be invited to these forums? (Group 3 only)

1. (1) Emergency response agencies. •• (6 votes)
2. (2) G.I.S. •• (5 votes)
3. Environment. •
4. (3) Professional organizations. (4 votes)
5. Transportation. •• (2 votes)
6. Civil engineering. (1 vote)
7. Forestry. (1 vote)
8. Agricultural. (1 vote)
9. BLM.
10. Vendors.

GROUP 4

1. (8) Have a "surveyor general" – a top man at the state level. (8 votes)
2. Obtain CALTRANS lead. (a) A licensed surveyor for each county.
3. Regional forums.
4. (3) Company managers involvement (private sector). (3 votes)
5. (6) Obtain adequate funding for CSRC. (6 votes)
6. (3) Local CLSA Chapter involvement ASCE. (3 votes)
7. Obtaining long-term commitment.
8. Have CSRC go to local CLSA chapters.
9. Involve "non-surveyors", GIS, construction. (1 vote)
10. Involve city engineers and agencies.

GROUP 5

A

1. Publications and articles.
2. Get private sector involved – identify users and meet with users, Go to them.
3. Demonstrate value. (6 votes)
4. Convince management of accuracy and repeatability. (1 vote)
5. County surveyor requirement. (1 vote)

B

6. Streamline/improve CSRC data portal through feedback process from CORS/CSRC users (1 vote)
7. Identify user requirements. (1 vote)
8. Invite non-traditional users. (3 votes)
9. Expand user base by RT access to data. (2 votes)
10. Invite current users, surveyors, real estate, GIS navigation, FAA, emergency services, environmentalists, grading contractors and manufacturers.
11. RTK/CSRC users group and discussions forum. (3 votes)

Summary (Vote)

- 3, 4 – Demonstrate value of RTK speed accuracy repeatability.
8 – Invite non traditional users – duck trackers.

GROUP 6

1. Find user forums; outside survey/geodesy. • (3 votes)
- 2.(12) Advertise/public relations. (7 votes)
3. Approach equipment manufacturers and other industries. (1 vote)
4. Legal mandate. (3 votes)
5. Champion NGS. (1 vote)
6. Outside researchers. (1 vote)
7. Think outside the (our) box. (3 votes)
8. (2) (12) Good story.
9. Geodesy for dummies.
10. Real world applications (outside survey). (2 votes)
11. Combining technologies.
12. (2) (8) Marketing.

Reports

1. **Top 3 ways the current spatial reference system and the activities described in the CSRC Master Plan either meets or fails to meet your needs.**

GROUP 1

1. Serves well horizontally - inadequate vertically. .
2. Will serve my needs when complete
3. Will never serve the needs of the deformation community.

GROUP 2

1. Develop methods and procedures for obtaining desired accuracies.
2. Develop networks/stations in non-urban areas.
3. More attention to leveling/Geoid model per recommendations of National Height Mod. Study.

GROUP 3

1. Education
2. Need densification of mon's for sub com – passive and CORS.
3. Need better heights (CORS).

GROUP 4

1. Adopt plan placing NAVD88 on CORS.
2. Use fewer antenna models/types, more metadata.
3. Must track epochs; must maintain some ground monuments.

GROUP 5

1. Meets: Provides valuable primary and secondary data.
2. Real time = most useful.
3. Needs to meet the full range of accuracies.

GROUP 6

1. Data rates 1 sec to 15 sec.
2. Published procedures.
3. Lack of legal status of vertical.

2. **Top 3 ideas for a successful transition to CORS (who should do what).**

GROUP 1

1. Will require user education.
2. Readily available, understandable and accurate.
3. Local agencies will propagate in ground monuments.

GROUP 2

1. CORS required in project specifications changes in laws.
2. Education and outreach/seminars (how to). Fundamental change in surveyor's perspective.
3. Necessity for orthometric heights.

GROUP 3

1. Complete leveling (CORS).
2. Standard specifications and guidelines.
3. Enable mom and pop organizations to obtain affordable (buy, maintain and replace) equipment.

GROUP 4

1. Have CSRC published standards/guidelines.
2. Provide CORS Training from CSRC.
3. Add as many NAVD88 elevations to CORS.

GROUP 5

1. Need to educate users, owners, managements on performance, results, procedures and potential users.
2. Improve GPS/RTK accuracy.
3. Facilitate getting RTK signal – minimize RF interference.

GROUP 6

1. User education (public and private) – technical support/FAQ/hands on workshop/training.
2. Reliability.
3. Published procedures for epoch date and constraints for adj.

3. *Top 3 state, private and public involvement mechanisms.*

GROUP 1

1. Invite transportation, INS, part., equipment, etc.
2. Partnership.
3. Educate.

GROUP 2

1. forums – CLSA, CEAC, CELSOL, CGIA, ACSM.
2. To minimize costs - maximize use of existing systems and networks.
3. Public agency involvement.

GROUP 3

1. Interagency agreements.
2. Town Hall meetings.
3. Organizational meetings – CLSA, ACSM, etc.

Who else to invite?

1. Response agencies.
2. GIS
3. Interagency agreements.
4. Professional organizations

GROUP 4

1. Have a state surveyor general position
2. Involve company managers from private sector.
3. Obtain adequate funding for the CSRC.

GROUP 5

1. Demo value of RTK speed, accuracy, and repeatability.
2. Invite non traditional users – Duck Trackers researchers.
3. CSRC users group and discussion forums.

GROUP 6

1. Advertise/public relations/good story/"Geodesy for Dummies"/marketing.
2. Find user forums outside geodesy and surveying/think outside our box.
3. Legal mandate to use.

Open Discussion Comments

QUESTIONS AND ANSWERS, A.M. SESSION

- For Ken Hudnut
1. What is the long term funding for Southern California Integrated GPS Network?
We're developing a new proposal to NSF for 5 additional years with SCIGN providing matching funds. Earthscope is another potential source of funds.
 2. How many stations?
430 are existing, continue to operate; 875 new stations
 3. Is the plan to expand from Alaska to Mexico still current?
Yes, that is the plan. Alaska is for sure if Earthscope goes forward.
- For Yehuda Bock/Greg Helmer
4. Will this connector server provide adjustments to Geoid99?
You will need a local patch.
 5. Will the connector service include models for the atmosphere?
Atmospheric models will come from the densification of CORS. They are separate models.
 6. How do you get the time position into law?
Right now, the Horizontal is in the State Code. It was mandated 5 years ago to include epoch data. This has not been done for Vertical.
 7. Will we have 2-way communication with RTK?
You'll be getting the data and coordinates of the CORS station. If your using RTK, it will use those coordinates. RTCM data is streamed out with coordinate headers. It works the same way as any RTK system. Site calibration is done the same way.
 8. Will the Internet connection be a 1 sec. latency?
We've been pushing packets all over the Internet and our latency has been on the order of millisec.
 9. When can we do work in Southern California for height?
It depends on the kind of specs—smaller counties have 4-5 stations, larger ones like Riverside and San Bernardino have 8-9 stations.
 10. Every year you wait, the worse it gets.

OPEN DISCUSSION DURING REPORTS, P.M. SESSION

1. Data sampling rate, people in the meeting want a range from 1-15 secs.
2. We need to enable mom & pops to link into the CORS System. Actually, CORS system allows Mom & Pops to compete with the larger shops. You can rent L-1 receivers, yet rental is expensive in California and you've got to know how to use it. Rental companies will teach you how to use it but still there is a level of familiarity experience with the software that you won't get from a rental company.
3. If monuments are going to disappear, how difficult will it be for me to conduct my survey. I need a firm point of reference. We need guideline and procedures from

both the County and NGS for how it will all work. In general, Monuments are going away but all of them won't go away. Some will be maintained by local governments. Some will be maintained till we all agree to use CORS or certain monuments. There are really two kinds of monuments. There are those that set geodetic position and others that are set for property for instance. The law says that the latter type will always be there.

4. There are different users out there. If it is a life safety issue, it is a different ball game. We would need to look at system redundancy.
5. How does Homeland Security affect our plans? Homeland Security is a multi-agency function. CORS is part of the back up strategy. It does not have the redundancy or robustness to support real time applications. We don't have the systems or people to make it robust enough for businesses to rely on. Homeland Security will get us attention.
6. There is resistance to listening to the community.

**Meeting Critique Summary
State of NGS, CSRC, 2002
A Town Hall Meeting on Height Modernization
April 4, 2002**

No. of Submissions: (38)

1. Overall, how do you feel about what we accomplished today?

1 Highly Dissatisfied	2 (1)	3 (4)	4 (26)	4.5 (2)	5 (5) Highly Satisfied
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Why? Comments:

1. Very constructive – brought out new ideas.
2. Participants were reasonably homogeneous – could use broader constituency.
3. Additional discussions time too rushed.
4. Helps to realize different need from different users.
5. The issues were brought up. The concerns and proposal was presented.
6. Not enough direct Q&A of presenters.
7. Very good meeting. We need more non-surveyors and more surveyors from private sector.
- 8.-38. No Comments.

2. Overall, how do you feel about your group’s process and the way you worked together?

1 (1) Highly Dissatisfied	2 (2)	3 (5)	4 (20)	4.5 (2)	5 (8) Highly Satisfied
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Why? Comments:

1. Waste of my time.
2. Too little time. Too many questions in each part.
3. I would have liked more discussion on issues.
4. This was fun – a good way to get everyone involved.
5. We worked very well together. I sensed good energy in the group.
6. The ground rules worked out great. It helped us stay on track and accomplish our goal in answering the questions.
7. Just fine.
8. A little too verbose, even with the gatekeeper.
9. Good job!
10. Surprisingly well.
- 11.-38. No Comments.

3. The highlight of this meeting for me was

1. The AM Session.
2. Learning more about CSRC “accountability”.

3. Involvement from various agency representatives – NOS, CSRC, SCIGN, etc.
4. Bock's outline of CSRC activities.
5. Greg Helmer's presentation.
6. "Big Picture" information from NGS.
7. Seeing where GPS is going and discussing how to get there.
8. Presentation were enlightening and group discussions were rich.
9. The small group workshop.
10. Discussing and listening to how private and public (Federal, State, Local) will work together.
11. Group sessions.
12. The workshop was a great idea j- although I think some of the people aren't that up to speed to be able to effectively answer the questions – they don't understand what the CSRC has to offer.
13. To meet with people with different knowledge about our problem; try to put GPS as a effective vertical survey rod.
14. Group discussions.
15. Group discussion time.
16. Critical opinions voiced.
17. Stimulating and informative presentations.
18. Learning about the proposal of the additional stations to be put into place and possible timeframe.
19. The efforts being made to implement real time with CORS. NTOP will be improved.
20. Seeing others perspectives.
21. Presentations.
22. The half day forum, not full day.
23. Listening to different perspectives. (Also, low light.)
24. Discussion groups exchange on person to person basis.
25. The reports from the speakers.
26. Greg Helmer's presentation and his optimistic outlook for GPS real time surveying.
27. Networking.
28. The development of accuracy of new CORS.
29. Group session.
30. Group discussions.
31. Interactions with users.
32. Working with group.
- 33.-38. No Comments.

4. The one thing I suggest we change is ...

1. Forget the discussion group.
2. More questions and answers from floor – not such a structured environment . Meeting discussion controlled by questions asked – not open forum.
3. Group questionnaire format – each of the 3 questions had multiple questions.
4. The workshop group.
5. Meeting was biased – "pro" CSRC with no allocation for other views or national height modernization implementation proposals.
6. Educate users.
7. More advanced notice of what the agenda will include, so one can prepare and get opinions of co-workers and other interested parties.
8. Too many presentations – not enough questions and answers.

9. We need more non-surveyors and more surveyors from private section. Plus 1 hour for lunch.
10. The meeting was okay for us and 6 hours of work is okay!
11. Add more time.
12. Related members (CSRC, etc.) should have not been involved in groups.
13. Fewer surveyors; more farmers and pilots.
14. We need more time to discuss the issues - longer forum.
15. None.
16. Talk more about different epoch (time stamps).
17. Provide additional time.
18. More varied participants.
19. More time for discussions.
20. No forums.
21. Almost too complex and formatted. Run through first question as example, not 10 minutes of instructions.
22. Do it again.
23. Room size.
24. Organize this meeting more often.
25. Nothing.
26. Larger room – more nontraditional users.
27. Encourage private surveyors to attend.
- 28.-38. No Comments.

5. Comments

1. Not enough secreting of CSRC as a n organization. Are there private agendas at work.
2. Continue these meetings – possible more regional – North CA, Central CA, South CA. Publish results/finds of meeting on CSRC website.
3. I would suggest that if we are to break into smaller groups, it be for an open forum where NGS listens in. This meeting should be to get information to its members, not to build a better mouse trap. We drove 90 minutes to get here. We will drive 90 minutes home. We gave up an entire day of productive work. Not to mention paying \$25. While it is very little to give, it was us who are giving it, and I think the benefits should be all mine. I do realize I need you to be successful, but that should come under another guise.
4. None.
5. Thanks.
6. Thank you for giving us the opportunity to meet with this group of professional people.
7. One day cannot solve the issues that we are facing with the master plan.
8. Please summarize findings and distribute responses to attendees.
9. All speakers ere very informative and enthusiastic.
10. The private sector needs more educational seminars.
11. Great meeting.
- 12.-38. No comments.