A.R.C.S
Management Information

Construction Control Services Corporation
December 15, 1991
# A.R.C.S.
## Management Information

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Page</th>
<th>I. DETAILED WORK PLAN 12/15/91- 3/15/92</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>II. PROCESSING FIELD GENERATED DATA</td>
</tr>
<tr>
<td>2</td>
<td>III. MODIFICATION OF COMPUTER MAP FILES</td>
</tr>
<tr>
<td>3</td>
<td>IV. MONITORING PLAN</td>
</tr>
<tr>
<td>4</td>
<td>V. DRAFT COOP AGREEMENT VITA</td>
</tr>
<tr>
<td>6</td>
<td>VI. DRAFT COOP AGREEMENT DAI</td>
</tr>
<tr>
<td>7</td>
<td>VII. NUMBERS ASSIGNED AND USED</td>
</tr>
<tr>
<td>8</td>
<td>VIII. SAMPLE ROAD INVENTORY PRINT-OUT</td>
</tr>
<tr>
<td>9</td>
<td>IX. REPORTS AVAILABLE FROM DATA BASE</td>
</tr>
<tr>
<td>10</td>
<td>X. TRAINING OUTLINE ARCS</td>
</tr>
<tr>
<td>11</td>
<td>XI. TRAINING OUTLINE GPS</td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Construction Control Services Corporation

Peter E. Hager,
ARCS Consultant
December 15, 1991
### I. DETAILED WORK PLAN 12/15/91 THROUGH 3/15/92

<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/15/91</td>
<td>Computer operator to begin entering data from the forms into database, and modifying the computer map files.</td>
</tr>
<tr>
<td>12/16/91</td>
<td>Crew to be dispatched to the field to do more survey (complete the initial survey areas if practical).</td>
</tr>
<tr>
<td>12/20/91</td>
<td>Send printout of the data input, in inventory form and the data base design to DAI in Islamabad - computer specialist CCSC, should talk with Miles Toder, or Asif Niazi telephone numbers (051) 821342 or (0351) 260282/260283.</td>
</tr>
<tr>
<td>12/20/91</td>
<td>Send printout of data input in inventory form and the data base design to AID/Rep Peshawar - Roger Helms.</td>
</tr>
<tr>
<td>12/29/91</td>
<td>Survey crews return to Peshawar to turn in forms and get new assignments.</td>
</tr>
<tr>
<td>12/31/91</td>
<td>Write VITA and CBR telling them of progress to date and set up meeting for January 1, 1992 to discuss priority areas for survey and to invite them for training on January 19, 1992.</td>
</tr>
<tr>
<td>12/31/91</td>
<td>Dispatch crews to the field for more survey work - and quality control checks on work completed.</td>
</tr>
<tr>
<td>1/1/92</td>
<td>Computer specialist to complete data base design. Computer operator complete form entry and continue working on modifying the road files. Target for completing road files should be 1/20/92. Contractor available through Roger Helms to help.</td>
</tr>
<tr>
<td>1/7/92</td>
<td>Complete agreement with VITA and CBR. Agreement should reflect accomplishments expected based on experience of the 2 ACLU crews. Agreement should also state areas and/or roads to be surveyed and estimated completion dates.</td>
</tr>
<tr>
<td>1/9/92</td>
<td>Request additional GPS units from DAI.</td>
</tr>
<tr>
<td>1/16/92</td>
<td>Crew to return to turn in forms and conduct training.</td>
</tr>
<tr>
<td>1/19-23/92</td>
<td>Najibullah and the two ACLU crews conduct training for VITA/CBR crews including GPS training.</td>
</tr>
<tr>
<td>1/23/92</td>
<td>Dispatch all crews to field to do survey. New crews should return after 2 weeks or be visited in the field - all crews return forms every month.</td>
</tr>
<tr>
<td>2/1-2/92</td>
<td>Train more people as needed - continue adding data to database. Send revised road files to DAI - Miles Toder, AID/Rep Roger Helms and VITA.</td>
</tr>
<tr>
<td>3/15/92</td>
<td>ARCS consultant to return for follow-up, develop cost data and users manual.</td>
</tr>
</tbody>
</table>
II. PROCESSING OF FIELD GENERATED DATA

Processing of field generated data:

1. Data should be returned to ACLU at least once per month for quality checks and entry into the computer.

2. Data must be original forms - film to be unprocessed - rolls of film that are not completely exposed will be returned with the forms along with ARCS form D.

3. Keep record, by roll number, of the film given to, and returned by, each crew.

4. Office processing of survey information
   a) Get film processed assuring that the roll number is on the processing instructions. Get 2 copies of each.
   b) Visually scan the forms to assure that an entry has been made in every line item.
   c) Number the ARCS A Forms in the upper right hand corner as you scan them. Number the forms 1 through 20 and then start with 1 again.
   d) Using the following random numbering scheme take one of the 20 ARCS A Forms in each 20 form group for a field quality check: 7, 18, 5, 18, 14, 3, 19, 11, 10, 1, 9, 2, 15, 20, 13, 4, 12, 6, 8, 16. That is you would take the 7th from of the first 20, the 18th form of the second 20, the 5th from of the third 20, etc for quality control checking.
   e) Compare photos with the road category and standard to see if they approximately agree. Then check to see if ARCS B Forms are filled out if ARCS From A has an entry under damaged bridges. Staple an envelop containing the photo(s) to the back of ARCS Form A, B, or C.
   f) Prepare a map showing the roads that will require quality checks.
   g) Fill out the road name, road number, section and unit on ARCS Form A for each quality check unit and mark "Quality Control" across the top of the form. Give this information to the quality crew to complete in the field. Do not give them access to the original survey.
   h) Give all reviewed forms, except those chosen for Q.C., the computer operator for entry into the data base.
   i) Send a copy of the form along with a copy of the photo to DAI.
   j) Give a copy of data entry to Roger Helms AID/Rep and VITA.
k) Upon satisfactory review of the quality check enter the original ARCS forms into the computer.

l) If there are gross differences in the quality check and the original forms, the engineer making the original survey should be contacted - retraining may be required. If the information is obviously fabricated - all of the crew's input is suspect. The crew should be relieved and all of their work verified the field. Small differences can be expected since the starting point may vary some, but major items should basically agree. For instance each should note about the same number of culverts - the GPS coordinates should be the same, about the same number of slides, but the volume may be different. Unacceptable is where less than 75% of non-measured items agree.

The overall condition should be verified against the rest of the information on the form. For instance, if the form shows "L" for general condition and there isn't much listed under Drainage, Earthwork or Structures, there is a question as to what made the general condition "L".

m) All surveys should be quality checked using the same random sampling noted in "d" - the two ACLU crews will review each other's work.

n) 20% of all data entry will be verified with the forms.

III. MODIFICATION OF COMPUTER MAP-FILES

1. Using the province maps prepared by Eng. Najibullah, reclassify all the roads within the province. If the road crosses province boundaries break the road at the boundary.

2. At the same time the road classifications are being modified, make the necessary adjustments to the data. For instance if the road terminus is to a village and the digital file does not quite get there, extend it. If the digital file over-shoots the village clip it off at the village. Caution: some roads will extend beyond the terminus so only minor over-shoots should be clipped.

3. Label the roads using the base number shown on the map.

   a) Labeled encasement should have a distinctive shape or other distinctive method of identification for each design class. Example:

<table>
<thead>
<tr>
<th>Class</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
</tr>
<tr>
<td>3</td>
<td>301</td>
</tr>
<tr>
<td>4</td>
<td>1613</td>
</tr>
</tbody>
</table>

3
b) Labels should be parallel to the road on the map.

c) Establish terminal points in the data as shown on the map.

d) Labeling should be done with all the data showing on the screen so the label doesn't interfere with other information.

4. Print a copy of the revised map and make a visual (overlay) comparison to the original map. Also review the completed map against the 1:250,000 map to see if all the roads have been digitized.

5. Save each province as a separate file.

6. As the roads are condition surveyed each road should be broken into 10Km units as listed on the ARCS Form A.

7. All roads that do not have a number in the files should be identified in the legend as local roads.

8. Secondary identification will be assigned to road numbers as follows: Class 1 = A, Class 2 = B, Class 3 = C, Class 4 = D. Local un-numbered roads will have a primary identifier of E.

9. Upon completion of the Condition Survey for an area or province a map file should be prepared showing the roads by road number and category rather that design class. This map will be valuable to those who want to determine best routes to transport materials or people.

IV. MONITORING PLAN

The objective of the monitoring plan is to assure accurate, consistent data is entered into the data base. All data generated by the Afghan Road Condition Survey will be monitored using the following procedures and standards:

1. Five (5) percent of all surveys will be resurveyed by a quality control crew. The quality control team will use the same equipment and procedures prescribed in the Procedure Manual.

2. The units selected for quality control will be based on a random sample.

3. Seventy five (75) percent of the major items in the two surveys must be in agreement, that is: GPS coordinates, overall condition, numbers of defective structures, numbers of earthwork defects, topography, geology and photographs.

4. One hundred (100) percent of the bridges were inventoried.

5. The road category will be verified on all roads through review of the initial photo.
6. Verification that all items on the survey forms were completed will be made on all forms.

7. Twenty (20) percent of the forms will be checked against the information in the data base. Significant errors will result in a 100% check of 10 from before the sample and 10 forms after.
V. COOPERATIVE AGREEMENT

The information generated from the Afghan Road Condition Survey ARCS, will be beneficial to CCSC/ACLU (and contractor). Therefore it is mutually agreed that each party will contribute the following toward the completion of the CCSC ARCS Project sponsored by USAID.

A. CCSC/ACLU WILL:
1. Provide the contractor with specialized equipment and supplies listed in Appendix "C" of the ARCS Procedure Manual except camping equipment and supplies.
2. Provide contractor with maps that have been annotated with assigned numbers and color coded for design class.
3. Provide training to the contractor's crew on how to conduct the survey.
4. Provide follow up quality control (a copy of monitoring procedures is attached) and training as needed.
5. Maintain an ARCS master computer file which will contain map files showing roads with number & classification and data on roads & bridges entered as a result of the survey. This data will be made available to the contractor on request.
6. Provide project assignments by area or province.
7. Provide per diem and travel costs at the rate of Rs.________ per day per person for per diem and Rs.________ per Km for travel.
8. Arrange for loan of GPS Unit from DAI.

B. CONTRACTOR WILL:
1. Provide a crew consisting of qualified engineer, a recorder (technician) and a driver for each crew on agreed upon provinces or areas.
2. Provide crew salary for training and conducting the survey.
3. Provide to CCSC/ACLU original forms completed to the quality standards set out in the monitoring plan and by the date agreed upon in advance.
4. Provide day to day administrative supervision of the crew.
5. Provide lodging and meal arrangements for their crews.
6. Return special equipment furnished by CCSC and DAI in good condition upon completion of the agreed upon segment of work.
VI. AGREEMENT - D.A.I

The information generated from the Afghan Road Condition Survey (ARCS) will be beneficial to CCSC/ACLU and DAI. Therefore it is mutually agreed that each party perform the following functions toward completion of the CCSC ARCS Project sponsored by USAID.

A. DAI WILL:
1. Provide GPS Units for field crews to assist in monitoring the quality of the project and to locate un inventoried roads. No more than 5 units.

2. Provide GPS training to ACLU and other contractor crews as needed.

3. Provide available special reports and maps as requested by CCSC/ACLU.

B. CCSC/ACLU WILL:
1. Provide survey information in the form of duplicate copies of each completed and accepted survey report.

2. Return GPS units in good condition after completion of field work of the project.
### ARCS
### ROAD NUMBERS ASSIGNED AND USED

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>CLASS 3</th>
<th>CLASS 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASSIGNED</td>
<td>USED</td>
</tr>
<tr>
<td>KABUL</td>
<td>KL</td>
<td>101-117</td>
</tr>
<tr>
<td>KAPISA</td>
<td>KP</td>
<td>118-133</td>
</tr>
<tr>
<td>PARWAN</td>
<td>PN</td>
<td>134-149</td>
</tr>
<tr>
<td>WARDAC</td>
<td>WR</td>
<td>151-166</td>
</tr>
<tr>
<td>LOGAR</td>
<td>LR</td>
<td>167-182</td>
</tr>
<tr>
<td>GHAZNI</td>
<td>GI</td>
<td>183-199</td>
</tr>
<tr>
<td>PAKLIA</td>
<td>PA</td>
<td>201-217</td>
</tr>
<tr>
<td>NANGARHAR</td>
<td>NR</td>
<td>218-233</td>
</tr>
<tr>
<td>LAGHMAN</td>
<td>LN</td>
<td>239-249</td>
</tr>
<tr>
<td>KONARHA</td>
<td>KA</td>
<td>251-266</td>
</tr>
<tr>
<td>BADARSHAN</td>
<td>BD</td>
<td>267-282</td>
</tr>
<tr>
<td>TARHAR</td>
<td>TR</td>
<td>283-299</td>
</tr>
<tr>
<td>BAGHLAN</td>
<td>BN</td>
<td>301-317</td>
</tr>
<tr>
<td>KUNDAZ</td>
<td>KZ</td>
<td>318-333</td>
</tr>
<tr>
<td>SAMANGAN</td>
<td>SN</td>
<td>334-349</td>
</tr>
<tr>
<td>BACKL</td>
<td>BL</td>
<td>351-366</td>
</tr>
<tr>
<td>JOWZJAN</td>
<td>JN</td>
<td>367-382</td>
</tr>
<tr>
<td>FARIAB</td>
<td>FB</td>
<td>383-399</td>
</tr>
<tr>
<td>BADGHISAT</td>
<td>BT</td>
<td>401-417</td>
</tr>
<tr>
<td>HEARAT</td>
<td>HT</td>
<td>418-433</td>
</tr>
<tr>
<td>FARAH</td>
<td>FH</td>
<td>439-449</td>
</tr>
<tr>
<td>NIMRUZ</td>
<td>NZ</td>
<td>451-466</td>
</tr>
<tr>
<td>HELMAND</td>
<td>HD</td>
<td>467-482</td>
</tr>
<tr>
<td>KANDAHAR</td>
<td>KR</td>
<td>483-499</td>
</tr>
<tr>
<td>ZABUL</td>
<td>ZL</td>
<td>518-533</td>
</tr>
<tr>
<td>URVZGAN</td>
<td>UN</td>
<td>501-517</td>
</tr>
<tr>
<td>GHOWR</td>
<td>GR</td>
<td>534-549</td>
</tr>
<tr>
<td>BAMIYAN</td>
<td>BM</td>
<td>551-566</td>
</tr>
<tr>
<td>PAKTIKA</td>
<td>PK</td>
<td>567-582</td>
</tr>
</tbody>
</table>

**CLASS 1** Numbers assigned all ending in 0 and 5 through 1000
used 5-15-25-35-45-65-75 10,20,30,40,50

**CLASS 2** Numbers assigned 1 through 99 except those ending in 0 and 5
used 2-6-8-12-14-16-18-22-1,3,7,9,11,13,17,19

DL-TT, ARCS.wk1, PH/tt, 12/9/91
<table>
<thead>
<tr>
<th>Road</th>
<th>Sec</th>
<th>Unit</th>
<th>Ct</th>
<th>Dpn</th>
<th>Std</th>
<th>Traffic</th>
<th>Land Use</th>
<th>Months Closed</th>
<th>Cad Eng</th>
<th>Scr</th>
<th>Rig</th>
<th>Culverts</th>
<th>Side Ditch</th>
<th>Slides</th>
<th>Washers</th>
<th>Slumps</th>
<th>Rock Surf</th>
<th>Rklg</th>
<th>VT.WL.RP</th>
<th>UTNAMW</th>
<th>Cabin Req</th>
<th>Cab</th>
<th>New Eng.Freq</th>
<th>Terrain</th>
<th>Geology</th>
</tr>
</thead>
<tbody>
<tr>
<td>HITT</td>
<td>123</td>
<td>ET</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>123</td>
<td>UN</td>
<td>123</td>
<td>1</td>
<td>2</td>
<td>123</td>
<td>2312</td>
<td>Y</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kabul</td>
<td>123</td>
<td>UN</td>
<td>123</td>
<td>2</td>
<td>P</td>
<td>2342</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Afghan Road Condition Survey Data Base

Inventory

<table>
<thead>
<tr>
<th>Road</th>
<th>Sec</th>
<th>Unit</th>
<th>Ct</th>
<th>Dpn</th>
<th>Std</th>
<th>Traffic</th>
<th>Land Use</th>
<th>Months Closed</th>
<th>Cad Eng</th>
<th>Scr</th>
<th>Rig</th>
<th>Culverts</th>
<th>Side Ditch</th>
<th>Slides</th>
<th>Washers</th>
<th>Slumps</th>
<th>Rock Surf</th>
<th>Rklg</th>
<th>VT.WL.RP</th>
<th>UTNAMW</th>
<th>Cabin Req</th>
<th>Cab</th>
<th>New Eng.Freq</th>
<th>Terrain</th>
<th>Geology</th>
</tr>
</thead>
<tbody>
<tr>
<td>HITT</td>
<td>123</td>
<td>ET</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>123</td>
<td>UN</td>
<td>123</td>
<td>1</td>
<td>2</td>
<td>123</td>
<td>2312</td>
<td>Y</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kabul</td>
<td>123</td>
<td>UN</td>
<td>123</td>
<td>2</td>
<td>P</td>
<td>2342</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
IX. REPORTS AVAILABLE FROM
DATA BASE

1. Inventory – listing of roads by Road Number and Design Class.

2. Listing of Roads or units by:
   a) Road Number
   b) Category
   c) Standard
   d) Months Closed
   e) Condition
   f) Those roads having sharp curves.
   g) Those roads having steep grades
   h) Those roads needing realignment.
   i) Those roads having damaged bridges.
   j) Those roads needing any one of the cost information items.
X. ARCS TRAINING OUTLINE

It is desireable that trainee's have the procedure manual and then be given enough time to read and understand it before the training begins. If this can not be assured, time should be given at the beginning of each day for that purpose.

Day 1 - AM

A. Discuss the scope of the project.
   1. Use the forward and introduction in the procedure manual.
   2. Emphasize the need for complete, consistent data.
   3. Emphasize the original status of construction. Examples of primitive etc.
   4. Magnitude of the project 20,000 km EST.
   5. Traffic estimate - Emphasis that it will be used to demonstrate relative importance rather than design.
   6. Talk about priorities for survey and that high risk roads should be avoided. High risk being mined roads or roads involved in active war.
   7. Discuss status of project - just starting, then what we expect to accomplish over the next year.

B. Talk about how we plan to accomplish the work.
   1. Crew of 3 members engineer, recorder, driver, explain role of each.
      (a) Drivers job is to drive at such speeds as directed by the engineer and stop when told and assist with measurements as needed.
      (b) Recorder makes notations on official forms, makes notes on defects as directed by the Engineer, keeps track of odometer reading for measuring 10 km units, as well as other required measurements.
      (c) Engineer - directs the survey making judgements about the condition of the road and relating those judgements to the recorder for documentation. He directs the driver as to what speed he should travel when to stop etc. He directs any measuring and quantity determinations.
   2. Discuss monitoring procedures
      (a) Use of photographs, a 5% random sample and GPS Unit.
      (b) Significant differences in the random sample and the survey will be cause for retraining.
      (c) If the 5% random sample position or beginning photo is significantly different an investigation will be made and appropriate action taken.
   3. Discuss expected production based on the two test projects.
      (a) Major deviation from the norm would require an explanation.
C. Procedures manual
1. Discuss the general instructions for roads.
   (a) 10 km unit is standard for each form.
   (b) Always start at the first point mentioned in the
       name and mark or document the starting point. (Use
       Example)
   (c) Emphasize survey is not to prescribe road betterment
       just restoration to original constructed standard.
   (d) Inform students that minor maintenance items need
       not be noted on the survey forms, surface
       maintenance, ditch maintenance, small washes,
       slides, slumps etc will be accounted for under
       general maintenance costs.

D. Instructions ARCS - Form A (use form)
1. General Information
   (a) Road name:
      (i) make sure the name is from road terminus to
         road terminus.
   (b) Road number use Appendix G to explain the road
       numbering system.
   (c) Discuss province code (Appendix B)
   (d) Discuss unit number including last unit on the road.
   (e) Discuss road category
      (i) Emphasize that this is original constructed
          road category. Not to be confused with the
          design class used in the numbering system.
      (ii) Note that if it is difficult to determine the
           original constructed road category that the
           existing road category should be documented.
           Document after surveying the entire 10 km unit.
      (iii) Explain difference between category 3 and 4
           roads.
   (f) Discuss Traffic
      (i) Note this is an average of 2 or 3 local
          estimates.
   (g) Months closed
      (i) Emphasize that this is a recurring closure year
          after year and not a one time event.
   (h) Standard
      (i) Emphasize this, with the road category defines
          the construction standard.
   (i) Condition
      (i) Note that this designation will be use to
determine the base restoration cost and should
be filled in after surveying the entire 10 km
unit.

2. Geometry
   (a) Excessive grades
      (i) Demonstrate how to determine steep grades with
          an Abney. Explain that short pitches less than 50 meters,
          on straight sections should be noted in the comments.
   (b) Sharp curves
      (i) Go through procedure in appendix "A". 
          Visualize a truck with trailer going around
          the curve. If it seem that the combination
would have trouble, it probably is a sharp curve.

(c) Realignment
   (i) Costs to accomplish this item will be total cost so emphasis that they should not make entries here and under washes slides etc.

3. Drainage
   (a) Culverts
      (i) Costs will be an average for roads of that constructed standard. All we need is a count of those needing repair and the number of new ones recommended. Culverts 2 meters, or more in diameter should be noted in the comments.

4. Earth Work
   (a) Emphasize cost of small washes slides etc. will be taken into account in the general maintenance cost under "overall condition". 2 cubic meters is about the size of 2 Desks.
   (b) Define Slides, Washes, Slumps.
   (c) Go over Appendix E.

5. Structures
   (a) Discuss retaining structures and method of measurement.
      (i) Generally these should extend 1 meter each any from the damaged area and high enough to be above high water or to retain the roadway.
   (b) Bridges
      (i) Emphasize need to inventory all bridges with 3 meters span or more. For Form A a count is sufficient.

6. Terrain
   (a) Used to determining cost factors explain that its more expensive to do work in the mountains than the plain.

7. Geology
   (a) Another cost factor. More costly to fix a road that is constructed from rock than from sandy soil.

8. Photographs:
   (a) Use ARCS Form D to explain photo record.

DAY 1 - PM

E. Instructions ARCS B form
1. General information
   (a) Complete road name and number
   (b) Complete other information - traffic is same as on ARCS Form A.

2. Bridge Location
   (a) Emphasize need to verify location with GPS.

3. Bridge Use
(a) Critical to note whether or not in use and the period that the detour, if any cannot be used.

4. Construction materials
(a) This section will be used in the inventory and can be used to estimate maintenance needs, life of structure etc.

5. Bridge/Dimensions
(a) This will be used in the cost estimate and as an interim item in the inventory. Future in depth survey of the bridges will show exact dimensions of each bridge.

6. Damage Estimate
(a) This section will be used to estimate the cost to restore the bridge to its original standard.

7. Photo
(a) It is very important that at least 2 photos are taken. These photos will assist bridge specialist review your recommendations and assessments.

F. Instructions ARCS Form C.
1. Pavement condition survey
(a) All the information on this form will be used to estimate restoration costs - in addition the type of pavement depth of pavement, width of pavement and width of shoulders will be used in the inventory.

G. Sample Forms.
1. Have each engineer read the example situation in the Procedures Manual and tell recorder to fill out the sample forms - in their copy of the manual. Evaluate the completed sample forms and discuss.

DAY 2 - AM

H. Defect Recognition.
1. Have each engineer look at the photos in sample cases.
(a) Have the recorder fill out the proper form for each case.
(b) Each case should be considered a 10 km unit.
(c) Put a check mark or the forms where quantities or the measurements belong. Importance here is to recognize defects.
(d) There is no right or wrong answer. ONLY document what you see or recommend a cure for a defect you can see.
(e) The students should take no more than 10 minutes on each case.
(f) Divide the cases up among the students and let them give their evaluation of the cases.
(g) Discuss with the class any deviations noted on each case.
I. Adding and Deleting Roads.
1. Use Appendix G and emphasize adding only important roads.

J. Field exercise use of the hand level and Direct Reading Rod.
1. Demonstrate how to use the hand level.
   (a) Give each student a hand level and demonstrate how
to hold it and how to stand when holding it.
   (b) Demonstrate reading grade in % and degrees.
2. Demonstrate the Direct reading rod.
   (a) Explain the adjustment needed for each student.
   (b) How the rod readings work.
   (c) Let each team, engineer and recorder cross section
for at least 4 points and figure the relative
elevation at each point.

DAY 2 - PM

K. Measuring Quantities.
1. Go through Example.
2. Then give the students an exercise to do.

L. Sharp curves.
1. Do a demonstration in equipment yard.
2. Then have each team measure a curve and determine its radius.

M. Review material covered so far and answer questions.

DAY 3 - ALL DAY: GPS Training (See separate training outline)

DAY 4 - ALL DAY: GPS Training

DAY 5 - ALL DAY:

N. Field exercise - Board to Naser Bagh Refugee Camp.
1. Every crew survey the 10 km section according to "How ot
survey".
   (a) Road number 1000 section TA Unit 01
2. Evaluate forms that have been filled out.
3. Compare instructors with other teams and discuss differences.

HOW TO SURVEY

A. Preparations.
1. Recorder to fill out heading of form.
2. Engineer takes the GPS reading.
3. Engineer or Recorder to take beginning picture and fills
in photo log, ARCS form D and bottom of ARCS A.
4. Recorder notes odometer reading on form A
5. Engineer notes GPS coordinates

B. Starting out.
1. Engineer should be seated in front of the vehicle, and the recorder in the back seat where he can see the odometer. The engineer gives instruction to the driver and the recorder.

C. Surveying
1. Engineer tell driver to start and drive no faster than 15 km/hr.
2. Engineer to observe, need for ditches, surface wash, geology, damaged or need for new culverts, structures, earthwork, terrain - geometry. Engineer tells recorder when there is damaged or needed culvert as they drive and stops and makes necessary measurements as they go.
3. At end of 1 km, recorder tells driver to stop.
4. Engineer summarizes what he saw and tells recorder.
5. Recorder notes the instruction in a separate notebook. Documentation should be for the entire km if more than 1/2 of the road segment needs a ditch it is recorded as 1 km.
6. Repeat steps 1 through 5 until the 10 km unit has been completed.

D. Measuring and Recording.
1. Engineer tells driver to stop when approaching a structure, wash, slide etc, sharp curves and steep grades.
2. The Engineer and recorder measure and record the necessary information on each.
3. The recorder is responsible for watching the odometer and stopping the vehicle when the 1 km unit is complete.
4. Recorder summarizes the data from all 10 km and posts the form.
5. Estimated time to complete exercise.
   (a) Preparation 10 min.
   (b) Surveying 120 min.
   (c) Discussion 1 hour.
   (d) Total time 3 hr 10 min.

After two or three road units have been completed the travel speed may be increased to no more than 25Km/hour.