DISCLAIMER

SRC Technical Notes are informal memos intended for internal communication and documentation of work in progress. These notes are not necessarily definitive and have not undergone a pre-publication review. If you rely on this note for purposes other than its intended use, you assume all risk associated with such use.
1. GENERAL CONSIDERATIONS

1.a. Function. This mirror will be used in a Plane Grating Monochromator (PGM) for the new undulator beamline currently under construction at the Synchrotron Radiation Center.

1.b. Scope of Work. The vendor shall provide all of the materials, fixtures, and labor required to fabricate the mirror specified in this document.

2. OPTICAL SURFACE

2.a. The optical surface is 170 x 40 mm (L x W).

2.b. The ellipsoidal surface can be defined using two possible sets of parameter as illustrated in Figure 1.

2.b.1. The ellipsoidal surface is defined by the directrices $l_1$ and $l_2$ and the angle $\theta$ as follows:

2.b.1.a. $l_1 = 15554 \pm 60$ mm

2.b.1.b. $l_2 = 4000 \pm 60$ mm

2.b.1.c. $\theta = 5.00^\circ \pm 0.05^\circ$

2.b.2. This is equivalent to the ellipsoidal surface described by:

$$\frac{X^2}{A^2} + \frac{Y^2}{B^2} + \frac{Z^2}{C^2} = 1$$

2.b.2.a. where $A = 9777$ mm

2.b.2.b. where $B = 688$ mm

2.b.2.c. where the x-axis is the axis of revolution and the x coordinate of the mirror pole is $X_0 = 5791$ mm.
2.c. The optical surface shall be coated with a (hard) carbon film 30 nanometer thick.

2.d. RMS slope error on the optical surface shall be less than or equal to 1.0 arcsec in both the meridian and sagittal directions.

2.e. RMS surface micro-roughness on the optical surface shall be less than or equal to 0.5 nanometer.

2.g. The requirements on slope error and surface micro-roughness apply to the coated optical element over the entire optical surface.

2.h. The slope error and surface micro-roughness shall be measured prior to delivery. The bidder shall describe in his bid submittal the measuring technique that he intends to use to verify these parameters. The process of determining the slope error will require subtracting a best fit ellipsoidal surface from the raw slope error measurements. The results of the slope error and surface micro-roughness measurements as well as the parameters of the best fit ellipsoidal surface shall be sent to SRC.

3. MIRROR BLANK

3.a. The blank material shall be silicon carbide, monocrystalline silicon or fused silica.

3.b. The nominal blank size will be 180 x 66 x 40 mm (L x W x H).
3.c. The blank will have 8 mm wide ledges on both sides that run along its length for clamped support as shown on SRC drawing 4975C008.

3.d. The optical surface will be centered on the 180 x 50 mm (L x W) surface of the blank as shown on SRC drawing 4975C008.

3.e. The mirror blank shall be scribed with an "X" (to identify orientation) on the end farthest from the origin of the ellipsoid as shown in Figure 1 and SRC drawing 4975C008.

3.f. Unless otherwise shown all dimensions have a tolerance of ± 0.4 mm.

3.g. All non-optical surfaces must be ground to within 0.025 mm (TIR).

4. FABRICATION

4.a. This mirror will be used in an ultrahigh vacuum environment and must comply with the applicable sections of SRC Technical Note # 99.

5. SHIPPING

5.a. All handling of the mirror after final cleaning and coating must be compatible with standard clean room practices.

5.b. Talcum powder free clean room gloves must be used when handling the mirror.

5.c. Oil, finger prints, dust and other contaminants must be kept off of the mirror.

5.d. Hermetically sealed packaging shall be used during shipping to protect the mirror from dust and contamination.

5.e. The mirror shall be held securely in its shipping container to prevent chafing that could damage the mirror and/or generate contaminating particles.

6. SUBMITTALS

6.a. Bidders must submit with their quotation the following information:

6.a.1. Examples of previous work on mirrors which demonstrate the bidder's capability to fabricate the mirror specified in this document.

6.a.2. Name and phone number of two references that bidder has supplied mirrors to that may be contacted by SRC.
6.a.3. Any exceptions or variations to statements, dimensions, tolerances in this document or SRC drawing 4975C008.

7. SPECIAL CONDITIONS

7.a. SRC reserves the right to visit the bidders facility before awarding a contract.

7.b. SRC reserves the right to inspect the mirror during fabrication.