



Figure. 1

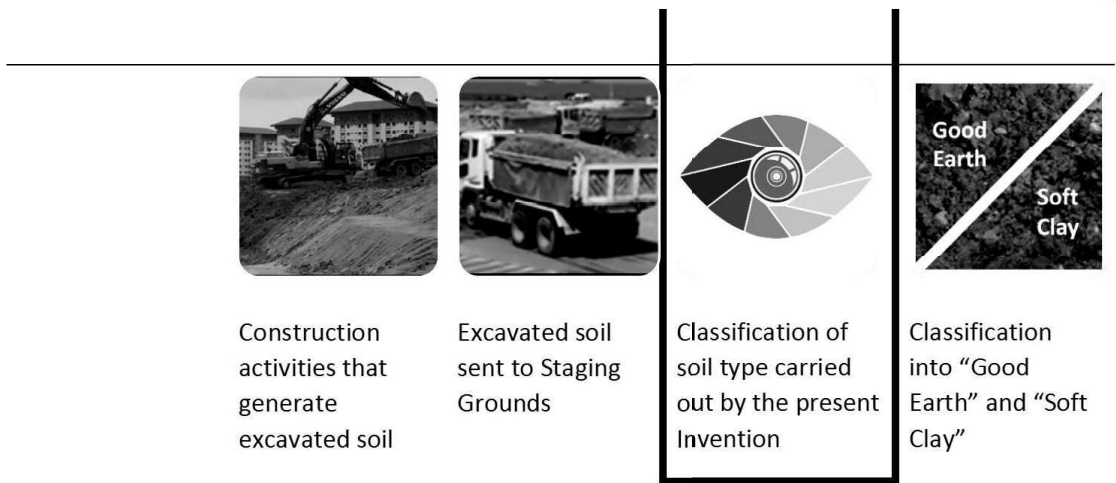


Figure. 2

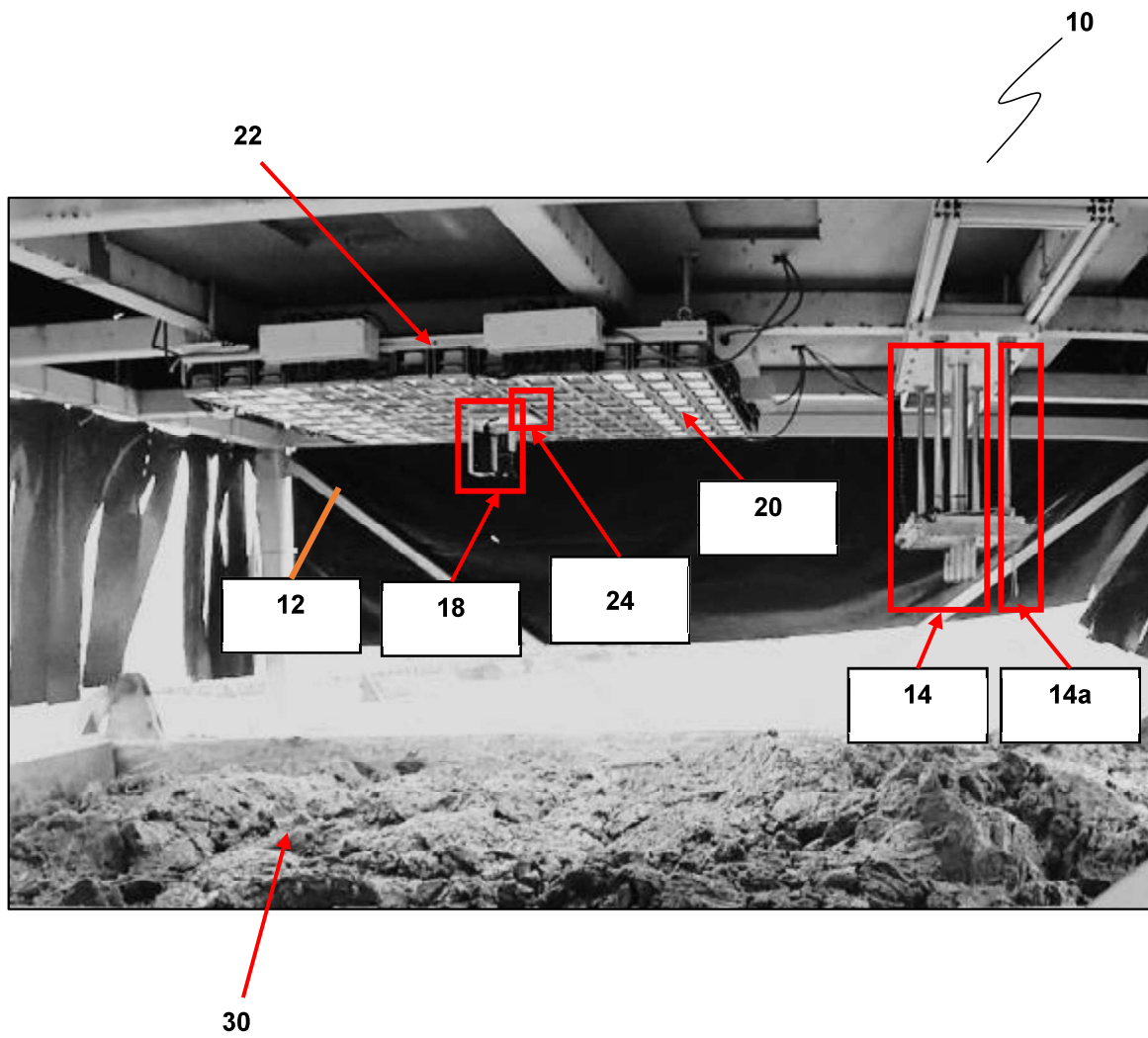


Figure. 3

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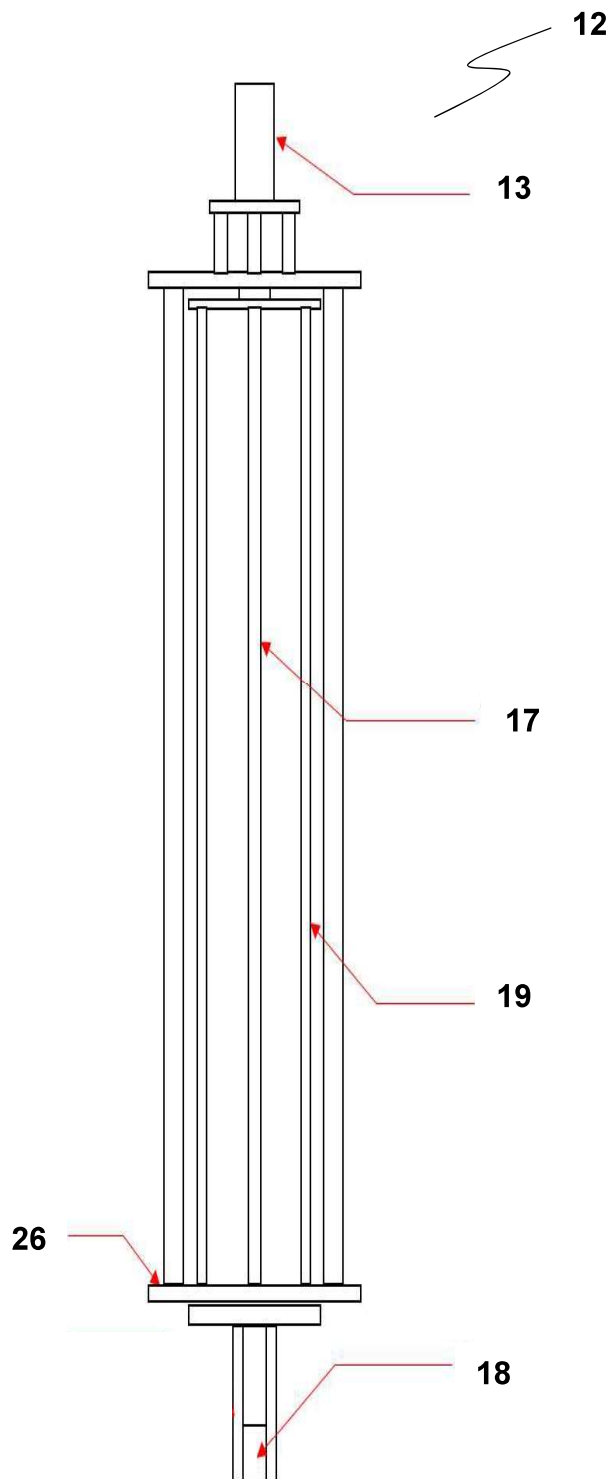


Figure. 4a

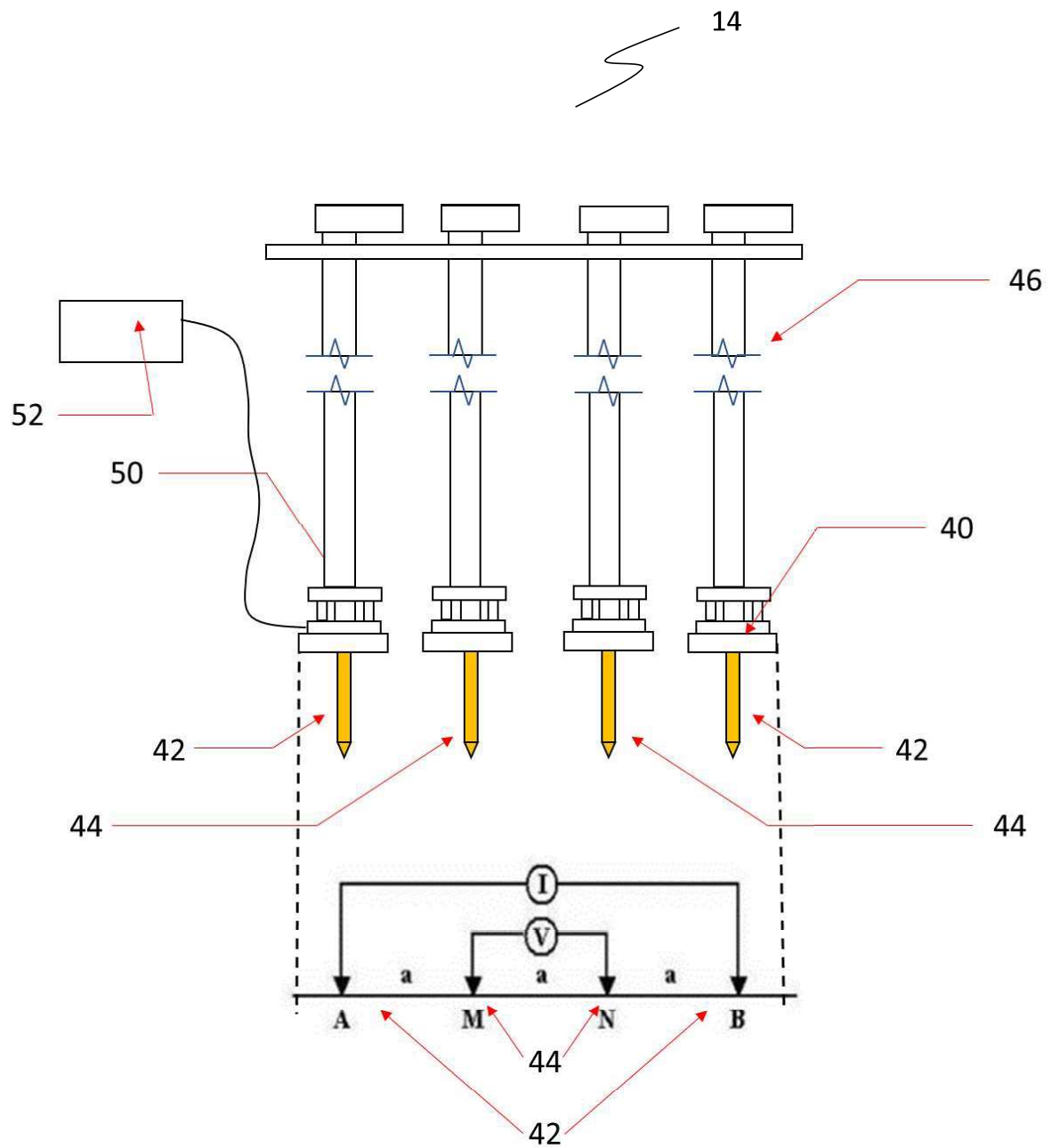
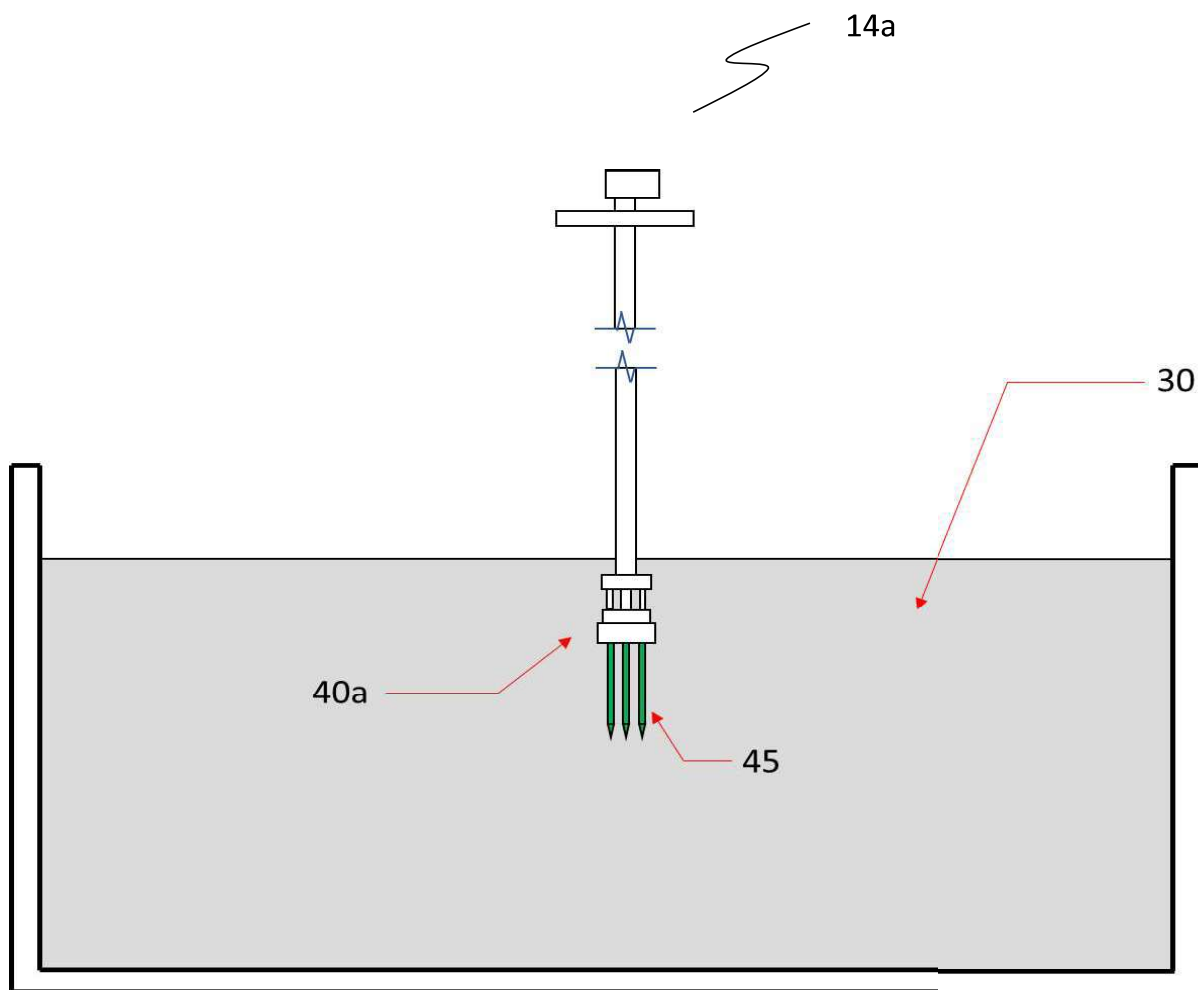


Figure. 4b

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**Figure. 4c**

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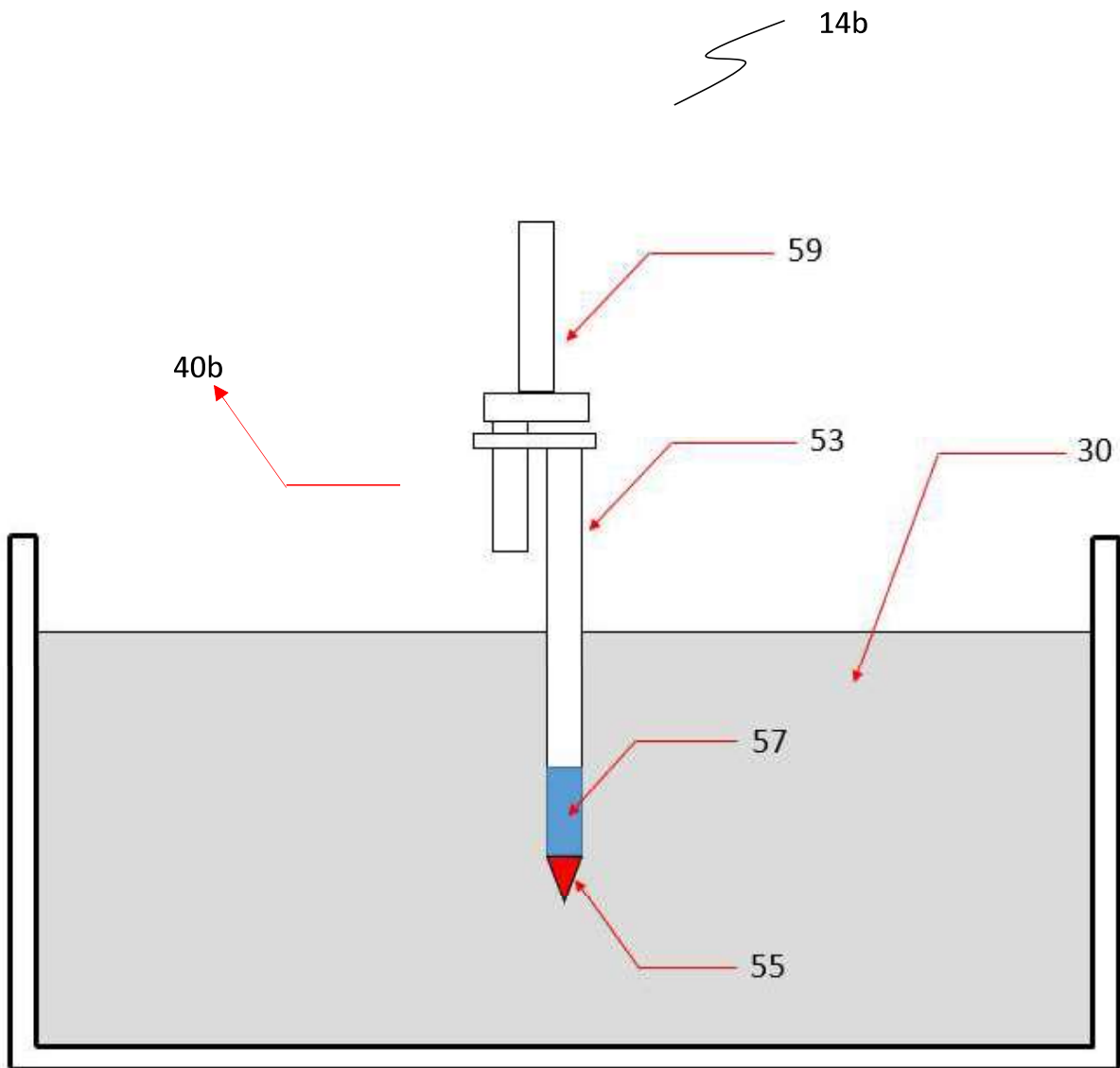


Figure. 4d

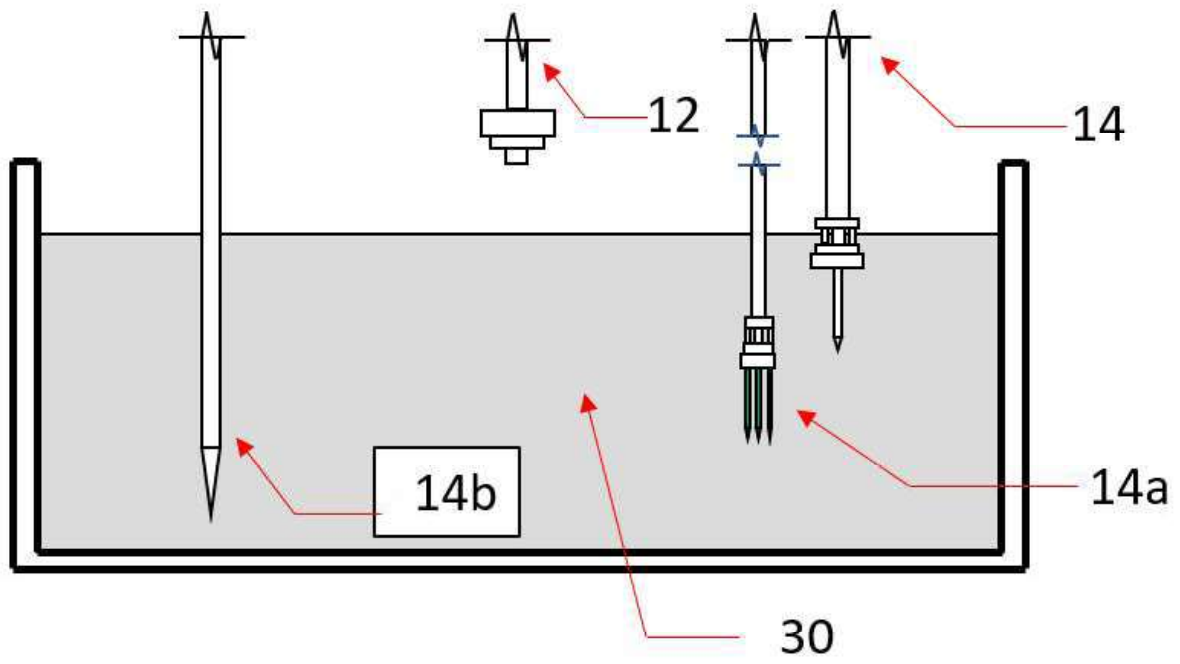


Figure. 4e

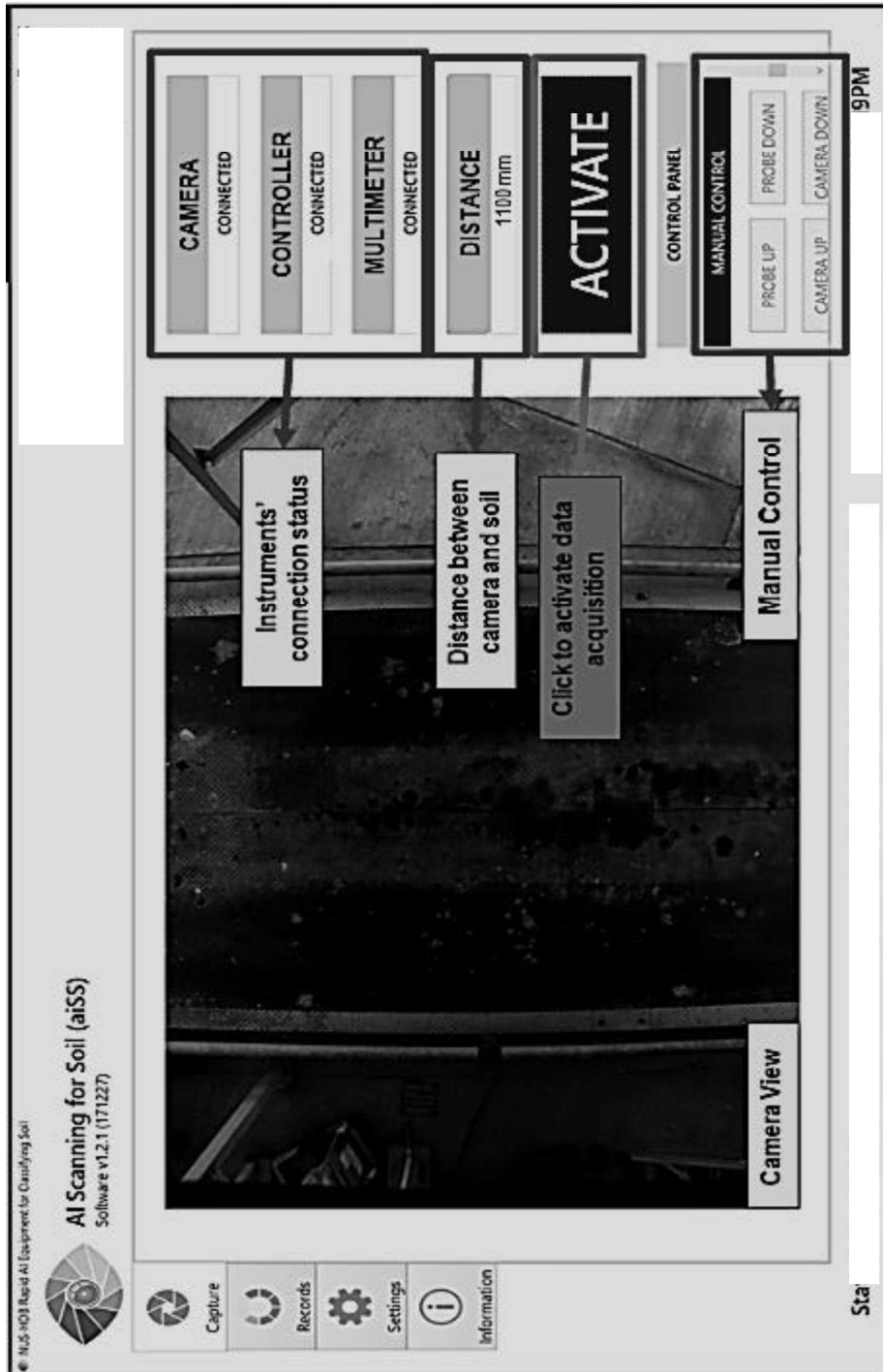


Figure. 5

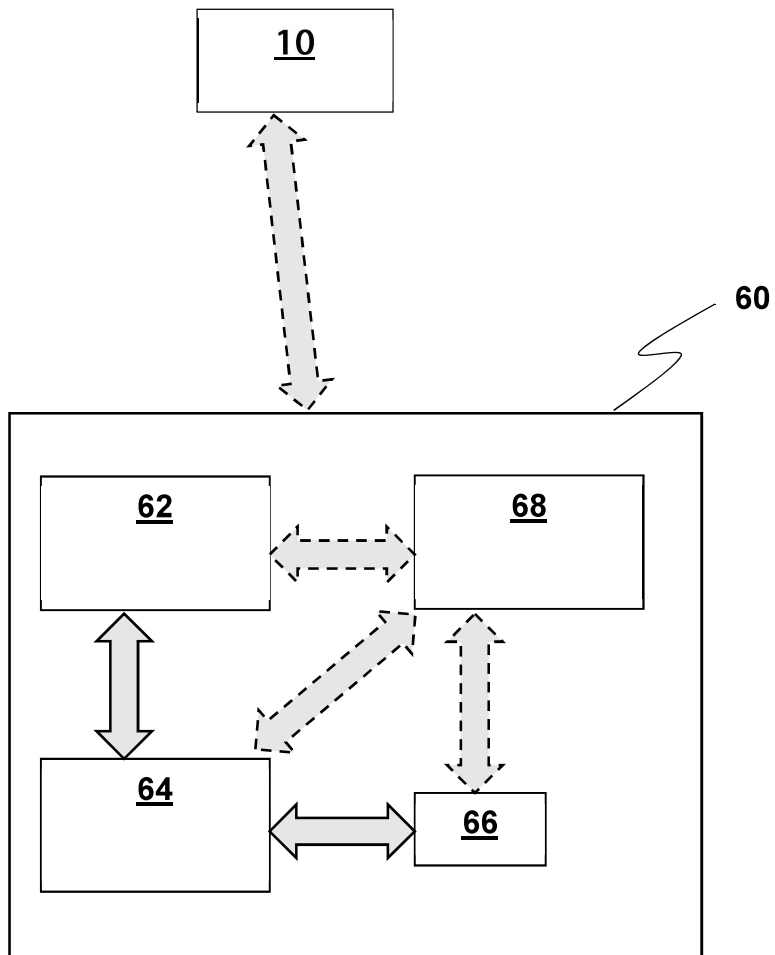
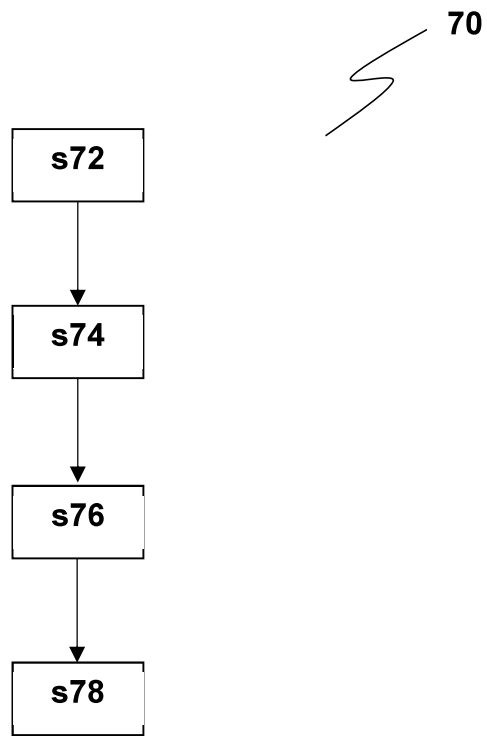
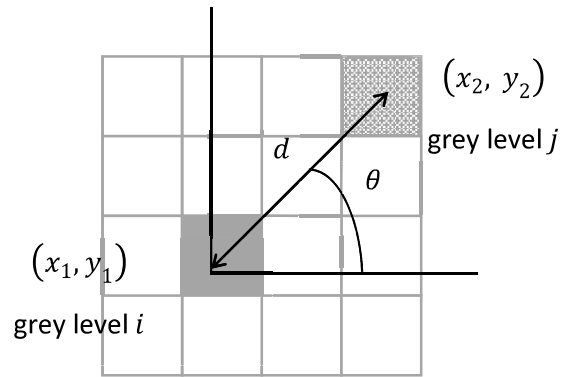


Figure. 6

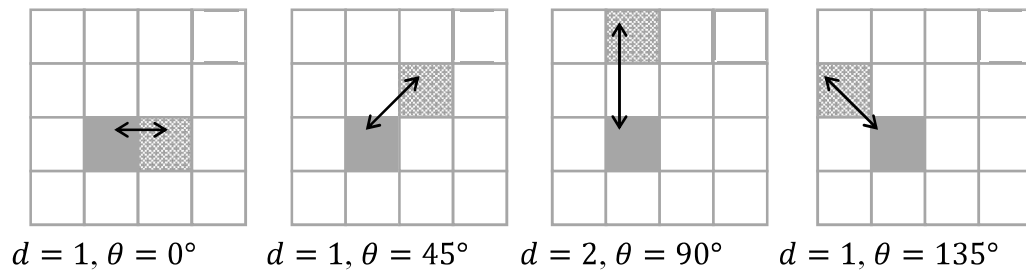


**Figure. 7**



$$d = \max(|x_1 - x_2|, |y_1 - y_2|)$$

$$\theta = \{0^\circ, 45^\circ, 90^\circ, 135^\circ\}$$



**Figure. 8**

| GLCM Textural Feature     | Abbreviation | Formula                                                                                                    | Measurement for                                                               | Range                                                                                                                                            |
|---------------------------|--------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Angular Second Moment     | ASM          | $\sum_{i,j=0}^{N-1} P_{i,j}^2$                                                                             | Uniformity of an image                                                        | [0, 1]<br>High ASM indicates a very orderly image. ASM = 1 for a constant image.                                                                 |
| Contrast                  | CON          | $\sum_{i,j=0}^{N-1} P_{i,j} (i - j)^2$                                                                     | Amount of local grey level variation in an image                              | $[0, (g - 1)^2]$<br>Low CON indicates smooth, soft textures. High CON indicates heavy, rough image textures. CON = 0 indicates a constant image. |
| Correlation               | COR          | $\sum_{i,j=0}^{N-1} P_{i,j} \left[ \frac{(i - \mu_i)(j - \mu_j)}{\sqrt{(\sigma_i^2)(\sigma_j^2)}} \right]$ | Linear dependency of grey levels on neighbouring pixels over the entire image | [-1, 1]                                                                                                                                          |
| Entropy                   | ENT          | $\sum_{i,j=0}^{N-1} P_{i,j} (-\ln P_{i,j})$                                                                | Statistical randomness, spatial disorder in an image                          | Ranges from 0 for a solid tone image and increases as disorder increases                                                                         |
| Inverse Difference Moment | IDM          | $\sum_{i,j=0}^{N-1} \frac{P_{i,j}}{1 + (i - j)^2}$                                                         | Homogeneity of an image                                                       | [0, 1]                                                                                                                                           |

Figure. 9

| Possible Outputs from Decision-Making Matrix |               | Image and ANN Results  |                            |                            |                   |
|----------------------------------------------|---------------|------------------------|----------------------------|----------------------------|-------------------|
|                                              |               | No Input               | "Good Earth"               | "Soft Clay"                | Indistinctive     |
| Soil Parameter 1/2/3                         | No Input      | No Input               | GE (ANN Only)              | SC (ANN Only)              | Indistinctive     |
|                                              | "Good Earth"  | GE (SP1/2/3 Only)      | GE                         | Requires User's Discretion | GE (SP1/2/3 Only) |
|                                              | "Soft Clay"   | SC (SP1/2/3 Only)      | Requires User's Discretion | SC                         | SC (SP1/2/3 Only) |
|                                              | Indistinctive | Mixture (SP1/2/3 Only) | GE (ANN Only)              | SC (ANN Only)              | Mixture           |

| Possible Outputs from Decision-Making Matrix |               | Soil Parameter 1     |                            |                            |                 |
|----------------------------------------------|---------------|----------------------|----------------------------|----------------------------|-----------------|
|                                              |               | No Input             | "Good Earth"               | "Soft Clay"                | Indistinctive   |
| Soil Parameter 2/3 at different depth        | No Input      | No Input             | GE (SP1 Only)              | SC (SP1 Only)              | Indistinctive   |
|                                              | "Good Earth"  | GE (SP2/3 Only)      | GE                         | Requires User's Discretion | GE (SP2/3 Only) |
|                                              | "Soft Clay"   | SC (SP2/3 Only)      | Requires User's Discretion | SC                         | SC (SP2/3 Only) |
|                                              | Indistinctive | Mixture (SP2/3 Only) | GE (SP1 Only)              | SC (SP1 Only)              | Mixture         |

|                        |                               |
|------------------------|-------------------------------|
| Soil Parameter 1 (SP1) | Electrical Resistivity Result |
| Soil Parameter 2 (SP2) | Water Content Result          |
| Soil Parameter 3 (SP3) | Cone Penetration Result       |

Figure. 10

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Figure. 11