Revised Recommendations for the USGA Method of Putting Green Construction
Overview

- Background
- Objectives
- Significant changes
- Future considerations
Revised Recommendations for USGA Putting Green Construction

• The USGA method is used successfully throughout the world in widely varying environments
• The Recommendations are updated about every decade to reflect updated methods, technology and techniques
• The USGA method is not necessarily the best or least expensive method to construct a putting green
Evolution of USGA Recommendations for Putting Green Construction

1960
- USGA publishes first "Specifications for a Method of Putting Green Construction" based on USGA-funded research
- Key components are mostly the same today

1989
- Fabric sleeves around drain pipes discouraged
- Drain pipes should be placed on a gravel bed in all cases

2004
- Tolerance for rootzone depth increased to ± 1 inch to simplify installation
- Optional use of flat drainage pipe included
- “Tips for Success” document published

1973
- Infiltration rate increased to allow for faster drainage
- Collar should be built to same standards as putting surface

1993
- Drain pipe spacing expanded from 10 to 15 feet, reducing unnecessary costs
- Requirement for intermediate layer is relaxed
- Perimeter drain at outfall points recommended
- Laboratory testing standards are introduced

2018
- “Assemble Your Team” section emphasizes collaboration
- Materials testing methods updated
- New information about selecting gravel, sand and organic amendments
“Success is not a continuum, its momentary, and it’s human nature to get satisfied and get a little complacent when you have success.”

Nick Saban
REVIEW OBJECTIVES
Revised Recommendations for USGA Putting Green Construction

1. Review and evaluate new technology – Review new technology for use in the testing to determine material suitability and the construction of a putting green
2. **Education** — Improve the clarity and increase awareness of the principles and methodology within the recommendations through expanding written clarification, video explanation and links to research and other external information
   - Tips for Success document
3. Maintain broad range of application – Preserve the brevity, simplicity and the wide range of applicability of the current recommendations across varied climate
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4. Consider alternative methods – Recognize the potential benefits and pitfalls associated with alternative methods to constructing putting greens and provide information and guidance for facilities whom choose such methods
Who Was Involved?

- University scientists
- Accredited soil testing laboratories
- Golf course builders
- Golf course architects
- Golf course superintendents
- USGA Agronomists
- USGA Research Committee
- Dr. Norm Hummel contracted to write the revisions
SIGNIFICANT CHANGES
Revised Recommendations for USGA Putting Green Construction

Step 1. Assemble your team

• A trusted team is necessary to design, implement, build and maintain a new USGA putting green. Typically an architect, superintendent, builder and agronomist
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Step 2. The Putting Green Cavity and Subgrade
  • Better explanation of stabilizing unstable soils using lime or geotextile, reaching out to a local soil engineer
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Step 3. Drainage

• Install clean out ports (flush outs) upstream and downstream – no mention in previous edition

• Perimeter drain – include all areas where water could accumulate not just the front of the green - install at the cavity wall
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Step 4: Gravel and Intermediate Layer

- Wicking barrier is optional – clearly stated
- Micro-Deval test for material stability
  - No more sulfate soundness test or LA Abrasion
- Acknowledgement of iron oxide layers when using an acidic root zone over neutral or alkaline gravel
  - Research continues on solutions to this scenario
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Step 5: The Root Zone Mixture

- Expanded explanation of root zone materials
- Delivers better guidance on how to choose a root zone mixture for your site conditions
- Calcareous sands – avoid predominantly calcareous sands such as coral
Step 5: The Root Zone Mixture

Root zone stability and putting green firmness

- CU range (Coefficient of Uniformity) – 1.8 – 3.5 for peat mixes, 2 – 3.5 for mixes with sand only or with inorganics
- Sand shape influences stability
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Step 5: The Root Zone Mixture

• Organic matter selection
  • Added section on composts, with warning about variability and a Table outlining chemical and physical characteristics

• “Others”
  • Biochar, humates, seaweed vermiculture byproducts are “value-added” and not a replacement for peat or inorganics
  • Important to include with performance testing of root zone mixture
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Step 5: The Root Zone Mixture – Physical properties

• Expanded and enhanced discussion on water & nutrient retention

• De-emphasize Ksat and shift focus to porosity

• Emphasize moisture retention (capillary porosity) while retaining air porosity – “if the capillary porosity of a mix is within the recommended range, the mix should not be excessively droughty even if the Ksat is high”
Step 5: The Root Zone Mixture

Quality Control Testing
- Expanded discussion and explanation
- Included table on QC testing (confidence intervals)

Root Zone Mix Blending
- Expanded discussion on “do’s and don’ts”

Table 6. USGA Confidence Intervals for Quality Control Testing

<table>
<thead>
<tr>
<th>Test Parameter</th>
<th>USGA Confidence Interval (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine gravel</td>
<td>50</td>
</tr>
<tr>
<td>Very coarse sand</td>
<td>50</td>
</tr>
<tr>
<td>Coarse sand</td>
<td>15</td>
</tr>
<tr>
<td>Medium sand</td>
<td>15</td>
</tr>
<tr>
<td>Fine sand</td>
<td>15</td>
</tr>
<tr>
<td>Very fine sand</td>
<td>30</td>
</tr>
<tr>
<td>Total Porosity</td>
<td>10</td>
</tr>
<tr>
<td>Air filled porosity</td>
<td>15</td>
</tr>
<tr>
<td>Capillary porosity</td>
<td>15</td>
</tr>
<tr>
<td>Saturated hydraulic conductivity</td>
<td>25</td>
</tr>
<tr>
<td>Percent organic matter</td>
<td>± 0.2 percent on mixes with more than 1 percent OM + 0.15 percent on mixes with 1 percent OM or less</td>
</tr>
</tbody>
</table>

The confidence interval for organic matter is an absolute value, not a percentage of the target organic matter content. For example, a mix with a target organic matter content of 0.7 percent would have an acceptable range of 0.55 to 0.85 percent.
• Step 6: Top Mix Covering, Placement, Smoothing and Firming
  • Mention power tamping along perimeter and heavy watering to firm
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Step 7: Pre-Plant Preparation and Establishment Methods (rather than seed bed preparation)

- Mention of seed, sod and sprigs as options
- Mix pre-plant fertilizer into top 2 inches based on soil chemical test results
Step 8: Grow In
Future Considerations

• Variable depth construction
• Interface of green cavity and green surround/approach
• Solutions to remediate iron oxide layers
• Water movement with and without wicking barrier
• Geotextile fabrics – longevity and integrity
• Crumb rubber – an alternative for gravel?
• Carbonate dissolution in root zone and gravel

Should the sand root zone mixture “bleed” out into the approach?